Dunhuang tiles in Gansu: the creation and application of patterns in modern decoration

Yanda Du

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ศิลปะกระเบื้องดุนหวงในกานซู: การสร้างสรรค์และการประยุกต์ใช้ลวดลายในการตกแต่งสมัยใหม่กระเบื้องกานซูตุนหวง: การสร้างและประยุกต์ลวดลายในการตกแต่งสมัยใหม่

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ABSTRACT

As part of Dunhuang art, Dunhuang flower bricks not only have a long historical background and cultural value, but also show a wide range of application potential in modern decoration. The research in this paper has four main objectives: (1) To study the historical background, artistic characteristics, traditional and modern crafts of Dunhuang tile. (2)To Analyze the meaning and value of Dunhuang tiles and look for traditional cultural symbols. (3)To creation of Dunhuang tiles patterns conforms to modern artistic aesthetics and needs.(4) To application of Dunhuang tiles patterns in modern decoration innovations.This study adopts a qualitative research method, combining fieldwork and questionnaires, Purposeful sampling techniques were used,to analyze in depth the application of Dunhuang flower bricks in modern art. The interviewees included five experts and architects working in fields related to Dunhuang art, and 24 random Dunhuang indigenous interviewees. In addition, 9 Dunhuang brick artisans and 55 Dunhuang brick learners participated in the questionnaire.Through interviews and questionnaires, the study covered these groups' perceptions of Dunhuang tiles, feedback on their application and suggestions for innovation. The interviewees were not only from scholars in the field of Dunhuang art research, but also included professionals in related fields such as architectural design and interior decoration, which ensured the diversity and representativeness of the research data and provided strong support for the reliability of the study.

The results of the study correspond to four objectives. First, in terms of historical background and artistic characteristics, the cultural symbols of Dunhuang flower bricks have been inherited intact through patterns and techniques, and their unique artistic style still has important research and application value. Second, at the level of cultural symbols and meanings, the interviewees agreed that Dunhuang flower bricks are not only historical heritage, but also have the potential to be contemporary cultural symbols. Third, in terms of innovation, the study found that by incorporating modern design concepts, the patterns and techniques of Dunhuang bricks can be effectively adapted to contemporary aesthetics and market demands, especially in terms of modernizing and improving materials and techniques. Finally, in the application of architecture and interior decoration, Dunhuang flower bricks show a strong market potential, and the innovative application can provide a unique

cultural connotation for modern decoration, which is widely recognized by the market.Through this study, the cultural heritage and modern innovation of Dunhuang flower bricks have been strongly supported and verified, and new ideas of protection and application have been proposed, which not only promote the public's understanding of Dunhuang art, but also open up new paths for the modernization of traditional crafts.

Keyword : Dunhuang tiles, Traditional art, Modern Decoration

พหุน ปณ ฑิโต ชีเว

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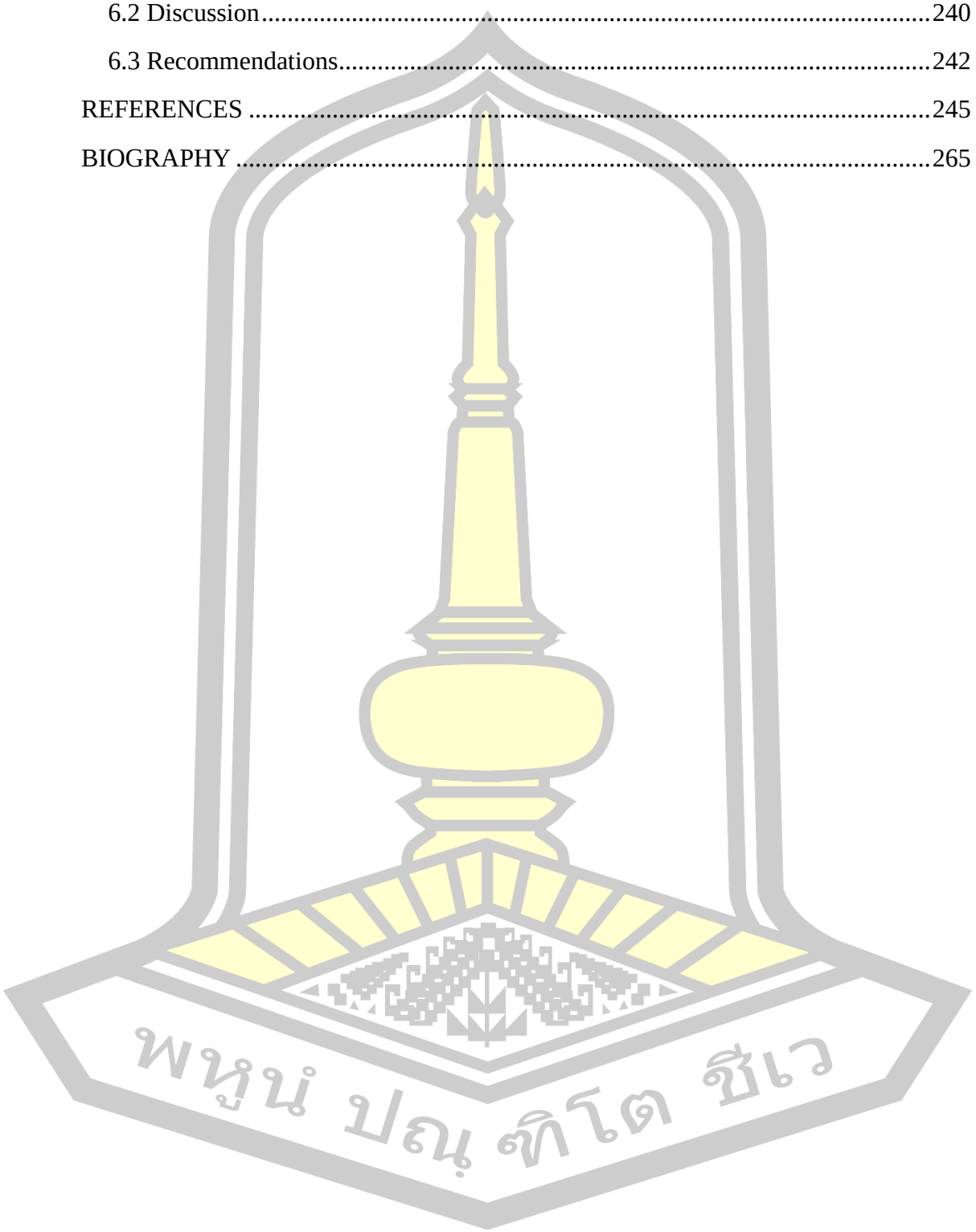

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Chapter Ⅰ

Introduction

1. 1 Background of Research

Dunhuang Grottoes are Buddhist grottoes carved in the rocks of ancient Dunhuang County and Jinchang County (Guazhou and Shazhou). It is located in Dunhuang City, Guazhou County, Subei Mongolian Autonomous County and Yumen City, Gansu Province. It is the general name of Dunhuang Mogao Grottoes, Dunhuang West thousand Buddha Cave, Guazhou Yulin Grottoes, Guazhou East thousand Buddha Cave, Guazhou Shuixiakou Cave, Subei five temple grottoes, Subei one temple grottoes, Yumen Changma Grottoes. Because its main grottoes Mogao Grottoes are located in ancient Dunhuang County, and the artistic style of each grottoes belongs to the same vein, and ancient Dunhuang is the political, economic and cultural center of the two counties, so the name Dunhuang Grottoes.For the definition of Dunhuang Grottoes, more authoritative source comes from the Dictionary of Dunhuang Studies(Ji X.L,1998,45), which provides a clear explanation of the definition of Dunhuang caves.

Among them, the Mogao Grottoes, which occupy the most important position in Dunhuang Grottoes, began to be excavated during the Sixteen Kingdoms period (about 300 years AD) and lasted for about 1,000 years until the Yuan Dynasty. This time span is unique in Chinese grottoes, making the Mogao Grottoes a microcosm of the development of Chinese grottoes art. At present, there are 735 caves in the Mogao Grottoes, among which more than 45,000 square meters of murals and more than 2,400 statues are preserved. These caves, murals and statues are not only of high artistic value, but also a microcosm of ancient Chinese culture, production and life, as well as an important heritage of religious belief.

The profound accumulation of Dunhuang history and culture and the precious heritage of Dunhuang grottoes have attracted many scholars all over the world to study them, thus forming a discipline called Dunhuang Studies. The object of the initial study of Dunhuang studies mainly concentrated on the unearthed documents and related issues in the Dunhuang Stone Chamber (cave of Tibetan Scriptures)(Ji X.L,1998,53-56).

Later, the scope of the study gradually expanded, and all the issues related to Dunhuang stone room documents, Dunhuang grottoes architecture, murals, sculptures and Dunhuang history and culture are the objects of Dunhuang study. Dunhuang Studies has developed from a hidden study to an international prominent study in the past hundred years, involving Dunhuang theory, Dunhuang history, Dunhuang historical events, Dunhuang art, Dunhuang bamboo slips, Dunhuang language and characters, Dunhuang and the communication between China and the West, and many other aspects. Dunhuang studies is a comprehensive discipline that studies, excavates, collates and protects the cultural relics and documents in Dunhuang area of China. The concept of Dunhuang studies was first proposed by the Japanese scholar Juntaro

Ishihama, who used the term "Dunhuang studies" in his lecture in Osaka in 1925.Chinese scholar Chen Yinke summarized Dunhuang studies in 1930: “Dunhuang scholars, the new trend of world scholarship. Since its inception, more than twenty years, from Japan in the East, West to France and Britain, the scholars of various countries, each on its scope of study, successively salty contribution.

Many Dunhuang tiles come from the Dunhuang Grottoes and are a branch of its art. Because of its art form and the environment of the unearthed sites, it is divided into three art forms:Paving tile, relief picture tile and painted picture tile.

Paving tile, the brick surface has a concave and convex pattern, to increase the friction when stepping.It belongs to a category of Dunhuang grottoes architectural art.In fact, the use value is as a non-slip treatment of the ground inside the grottoes, but after the religious and artistic development, the brick surface began to appear lotus pattern, pomegranate flower pattern and other Buddhist meanings of graphics.As for the patterns of Dunhuang tile paving, refer to Dunhuang Molded Brick Art(Yin G.M,1988,128-129).

Relief picture tile, It is more common in the early unearthed grotto sites and burial sites, including wall bricks and floor bricks, mostly wall bricks. Most of its production methods are patting or stamping, and there are a few direct lines. (Yin G.M,1988,124)Although it is essentially a sculptural art, its composition rules and artistic expression are closer to painting, so it is also called "picture tile".

Painted picture tile, It is a kind of decorative brick by applying lime, gypsum and other materials on the surface of the brick, and then painting on the above.(Wang Tianyi,1989,42-47)Since the 1960s, a large number of Wei-Jin tombs rich in plain painting bricks have been excavated in Gaotai, Jiuquan, Jiayuguan, Dunhuang and other areas of the Hexi Corridor in Gansu Province. The unearthed painting tomb bricks are not only huge in number, but also rich in content and vivid in picture, fully recording the life and interests of the tomb owners and the production and life of the society at that time.

In order to study these three forms of Dunhuang flower tiles in more depth, I visited relevant organizations and did corresponding fieldwork.Through visits to Mogaoli Craftsman Village, Dunhuang Art Research Institute, Zhao Junrong Studio, Gansu Mahayana Art Co., Ltd., and Lanzhou Hongyu Color Brick Factory. Two intangible cultural heritage research bases, two Dunhuang ceramic tile production companies and a studio conducted fieldwork.And analysis of age, education, skills, etc. found that the average age of Dunhuang tile art inheritors is 43 years old, with an age range of 22-84 years old. However, most people under the age of 35 are learners, and they mainly learn Dunhuang tile skills from master inheritors over 60 years old. There are very few inheritors between the ages of 35 and 50, and the gap is serious. In gender analysis, more than 90% of masters over 60 years old are men. Among learners under 30, the proportion of women has increased slightly. Analyzing from the educational level, 56% of inheritors under 35 years old have a bachelor's degree, and less than 15% of inheritors over 60 years old have a bachelor's degree (this is related to the changes and reforms in China's education history). Analysts believe that the inheritance of Dunhuang tile art has problems such as an imbalance in the ratio of men to women and a gap in the middle-aged talent pool.

Through exchanges with many masters, it was found that most of the inheritance methods of Dunhuang ceramic tiles are folk inheritance, that is, the method of masters leading apprentices, and a small number of them are family inheritance. However, from the 1930s and 1940s to the present, China's art education has mainly followed the French and Russian teaching models, paying little attention to traditional Chinese skills. Dunhuang tiles, in particular, are a relatively niche technique, and there are few institutions that actually study and teach its techniques. Nowadays, although some art schools also offer traditional art courses, most of them focus on the study of traditional art theory and ignore the reference and inheritance of traditional art production techniques. Traditional arts are not taken seriously, resulting in no successors to traditional skills, and few students are willing to specialize in them.

On the other hand, in the employment and talent recruitment methods of Chinese society, academic qualifications are generally regarded as the threshold for job seekers, which makes many art-loving students have to give up studying art as a teacher in order to obtain an art degree. Academic qualifications make the unique inheritance of traditional art not accepted by most young people.

According to surveys, most ceramic tile manufacturers or factories operate at low profits. A very small number of large enterprises mainly produce flat tiles with large market demand. Regardless of their scale and production lines, they have not invested a lot of research and development and funds in the production of ceramic tiles. Most of the remaining ceramic tile manufacturers are small in scale and lack financial support for market expansion or product research and development, and some even only conduct local procurement, workshop production and sales. However, few ceramic tile production companies organize professional skills training for relevant personnel, and the formation of teams specializing in R&D, marketing and publicity is too outdated, which greatly limits the overall development of the industry.

Among all the companies interviewed, most of the smaller companies have a common feature, which is that they have not introduced ceramic tiles or traditional art graduates, resulting in a lack of support for traditional art aesthetics in their ceramic tile production. Moreover, due to the financial problems of small businesses, it is difficult to offer higher salaries and attract outstanding talents.From a research perspective, the academic research on Dunhuang tile mostly focuses on the collection and arrangement of the tile patterns and patterns, and analyzes the religious factors behind them. As for the social factors behind it, the exploration of the process, the aesthetic logic and the horizontal comparison of similar decorative processes, there are a lot of gaps. From the application level, tile has been widely used in building structure and surface decoration, but throughout the market, there is still a lack of deep thinking about tile pattern, texture and even application. More of a copyist, or a transfiguration of unknown meaning. In turn, the researchers who understand the tiles will not do, and the people who will do do not understand the embarrassing situation of the tiles.

From a personal research level,what I am studying is one of the branches of Dunhuang art, Dunhuang tiles. Dunhuang tiles in Dunhuang grottoes, temples and tombs mostly exist for decorative purposes and are not the main body of the place.

Therefore, in the past research on Dunhuang studies or Dunhuang art, most research efforts focused on their patterns and religious background and significance. However, there is no in-depth exploration into the historical origin, social background, decorative form and other aspects of Dunhuang tiles. There are a lot of gaps and missing parts, which is a pity for an ancient art and skill. Therefore, I will conduct an in-depth, interrelated, and systematic exploration, sorting, and research on the Dunhuang tiles' expression form, artistic style, social environment, original appearance, original function, and cultural identity. Combining its patterns, decorative functions, and decorative forms with modern art creation or design, it is cleverly used in modern art decoration. This ancient art and technique can reappear new life and vitality in modern art.

1.2 Purpose of the Research

1.2.1 To study the historical background, artistic characteristics, traditional and modern crafts of Dunhuang tile.

1.2.2 To Analyze the meaning and value of Dunhuang tiles and look for traditional cultural symbols.

1.2.3 To creation of Dunhuang tiles patterns conforms to modern artistic aesthetics and needs.

1.2.4 To application of Dunhuang tiles patterns in modern decoration innovations.

1.3 Research Questions

1.3.1 What are the specific artistic characteristics of Dunhuang tiles? What are the differences and connections between its traditional craftsmanship and modern craftsmanship?

1.3.2 What is the significance of modernizing Dunhuang flower art? What special value does it have? What are its most important cultural symbols?

1.3.3 What are the difficulties in creating Dunhuang tiles? What is the entry point for modern art?

1.3.4 In what areas can Dunhuang tiles be used in modern art creation and design? What is its overall application idea or principle?

1.4 Definition of Terms

1.4.1 Dunhuang tiles mean Dunhuang painted sculpture, which belongs to Dunhuang art. According to its artistic expression, it is roughly divided into three kinds, namely, tile, relief picture tile and painted picture tile.

1.4.2 Cultural identity mean the positive recognition of the most significant things of the nation formed by people living together in a national community for a long time. The core of cultural identity is the recognition of the basic value of a nation. It is the spiritual link that unites this national community and the spiritual basis for the continuation of life of this national community.

1.4.3 Traditional art：Traditional arts refer to those art forms that have been formed and handed down through history, which reflect social life by shaping images and are characterized by typicality and social ideology. These art forms include sculpture, painting, music, dance, drama, etc., which not only reflect the social life of a particular historical period, but also contain rich cultural connotations and artistic values.

1.4.4 Artistic characteristics:It is the characteristics that distinguish art from things. It can usually be understood from three levels. The first is from the spiritual level, regarding art as a field of culture or a form of cultural value, juxtaposing it with religion, philosophy, ethics, etc. The second is from the activity process To understand art from the perspective of art, we believe that art is the artist's self-expression, creative activity, or imitation of reality. The third is from the perspective of activity results, we believe that art is a work of art, emphasizing the objective existence of art. The difference between art and other ideologies lies in its aesthetic value, which is its most important and basic feature. Creators express and convey their own aesthetic feelings and aesthetic ideals through artistic creation, and appreciators gain aesthetic feelings through art appreciation. , and satisfy their own aesthetic needs. In addition to aesthetic value, art also has other social functions, such as cognitive function, educational and edifying function, entertainment function, etc. Among them, the social function of art is that people understand nature, society, and society through artistic activities. Understanding history and life is different from the cognitive function of science. The educational function of art is that people are influenced and infected by truth, goodness and beauty through artistic activities, which can subtly cause profound changes in thoughts, feelings, life attitudes, values, etc. , it is different from moral education. The entertainment concept of art is that people satisfy aesthetic needs and obtain spiritual enjoyment and aesthetic pleasure through artistic activities.

1.4.5 Modern decoration:The definition of modern decoration is based on a minimalist decorative style, emphasizing the combination of simplicity, functionality and aesthetics.Modern decorative styles originate in architecture and design in Germany and the Scandinavian region, associated with the era of machining, often referring to the style of the 1920s to 1950s. The style emphasized simplicity, simplicity, and continued to be popular throughout the first half of the 20th century, with its later derivatives including medieval modern and postmodern styles. The characteristics of the modern decoration style include simple space design, the use of attribute design elements, the simplification of colors, lighting, and raw materials, and the high requirements for color and material texture. This style focuses on the communication between indoor and outdoor, and aims to introduce new ideas to the interior decoration art, using a large number of iron components, and comprehensively applying new techniques such as glass and ceramic tiles to interior decoration.In this thesis, Dunhuang tiles are used in modern decoration, which is just in line with its simplicity and simplicity, but has high requirements for texture and material texture.

1.5 Scope of Research

1.5. 1 Research area

Main research site: Dunhuang Grottoes Group. Dunhuang Grottoes are located in Dunhuang City, Guazhou County, Subei Mongolian Autonomous County and Yumen City, Gansu Province. It is the general name of Dunhuang Mogao Grottoes, West thousand Buddha Caves, Guazhou Yulin Grottoes, East thousand Buddha Caves, Shuxiakou cave, Subei five temple grottoes, one temple grottoes, Yumen Changma Grottoes. The main body of the grottoes, Mogao Grottoes, is located 25 kilometers southeast of Dunhuang City (92°13 '-95 °30' east longitude, 39°40 '-41 °40' north latitude), at the intersection of Gansu, Qinghai and Xinjiang provinces, with a total area of 31,200 square kilometers. Because the artistic style of the grottoes is the same, more consistent, so named Dunhuang Grottoes.In addition to some necessary on-site research and production in Dunhuang, I will use local studios. Most of the production will be completed in Lanzhou, Gansu Province, which belongs to the same province as Dunhuang, and transportation and travel are also very convenient.

1.5.2 Time

In terms of time, the study of traditional Dunhuang tiles is from the Sixteen Kingdoms period to the Yuan Dynasty. The study of modern Dunhuang tiles began after the founding of New China.

1.5.3 Another

In this study, the final works will be presented in two forms. First, as architectural decoration, specifically for floor decoration, that is, retaining the original use function of Dunhuang tiles (floor anti-slip and decoration), and combining modern aesthetics in patterns and patterns for integrated redesign. In addition, modern technology and materials are used in craftsmanship to make it more durable and valuable. Second, as interior decoration, specifically for desktop ornaments and wall hangings, the patterns and patterns are also combined with modern aesthetics for integrated redesign. And in combination with its use environment, appropriate adjustments are made to the decorative form.

This research uses qualitative methods. Collect research data by field working and document studies. The research methods used was purposive sampling to assess satisfaction with the Creativity and application in modern decoration. The research method is as follows: Historical document research: By consulting historical documents, we can understand the historical background, production process and cultural significance of Dunhuang tiles. For example, by studying Tang Dynasty documents, we can understand the Tang people's preference for tile patterns and the important position of tiles in official buildings.

Field investigation: Conduct field investigations on museums and sites in the Dunhuang area, observe the real objects of tiles, and understand their production process, pattern design and cultural connotations. For example, by observing the tiles exhibited in the Dunhuang Museum, we can understand the production technology and artistic style of Tang Dynasty tiles.

Decoration satisfaction analysis: Detailed analysis of the survey information collected and interviewed to explore their intentions, suggestions and satisfaction with Dunhuang tiles and tile decoration.

Technical analysis: By studying the production technology of tiles, we can understand the development process and technical characteristics of ancient brick making technology, and explore new technologies derived from modern materials in combination with ancient production technology.

1.6 Research methodology

1.6.1 Population and Sample

The fieldwork was informed by the following groups of people:

First, local people in Dunhuang, whose opinions are collected through interviews.The city of Dunhuang is relatively small, with a small population of 182,000 people(China Census, 2023). Many of the local families have intermarriages and are closely related to each other. And because of the influence of Dunhuang art, there are many local people who work in Dunhuang art, and even if they don't work in art, there are relatives in their families who do or have worked in the arts. As a result, they know more and more about Dunhuang art than the general public in other areas. They can also provide more valuable insights.

The second is an expert on the art of Dunhuang.

Du Yongwei, an expert in Dunhuang colored sculpture, is a national master of arts and crafts in China. Dunhuang flower bricks essentially still belong to the category of Dunhuang colored sculpture, so Mr. Du's help to the research is mainly in the art form, category and innovative forms of Dunhuang flower bricks.

Zhao Junrong, Dunhuang mural painting expert, researcher of Dunhuang Research Academy. His help to this study is mainly in the composition of Dunhuang flower bricks, planarized decorative representations and hand-painting.

Kou Kehong, Dunhuang cultural relics scholar, Director of Gaotai County Cultural Relics Bureau. His help to the study of Dunhuang flower bricks is mainly in the identification of the broken generations and period characteristics of the bricks.

Wang Yongsheng, an expert in modern techniques of Dunhuang art and professor at Lanzhou Jiaotong University. His help to this study is mainly in how Dunhuang flower bricks are represented and realized using modern technology, and the technology that can be applied in future research.

Du Yongsi, an expert in architectural design. His guidance for this study was mainly on how Dunhuang tiles should be applied to the decorative design of modern buildings and what principles should be followed when applying them.Third, learners of Dunhuang tiles. Like the second group of people, they are also divided into two types: one is people who learn for the purpose of making a living, and they learn Dunhuang tiles in the hope of surviving with this skill after learning; the other is people who learn because they love Dunhuang tile art. I will use a questionnaire to collect their opinions and suggestions.

I used a questionnaire to survey a total of 64 people from Mogaoli Craftsman Village, Dunhuang Art Research Institute, Zhao Junrong Studio, Gansu Mahayana Art Co., Ltd. and Lanzhou Hongyu Color Brick Factory.

Among them, Mogaoli Craftsman Village is located in Xindun Village at the foot of Sanwei Mountain in Dunhuang, 12 kilometers away from Mogao Grottoes. It is an intangible cultural heritage inheritance base with the purpose of researching, protecting, inheriting and displaying Dunhuang art. Its organizer, Mr. Du Yongwei, is one of the inheritors of the intangible cultural heritage of Dunhuang art and a national master of arts and crafts in China. After many years, he gathered many Dunhuang art masters like himself in the base, and based on this, he absorbed a large number of inheritors and learners of Dunhuang art.

The Dunhuang Art Research Institute is located in the suburbs of Dunhuang City. It was founded by Mr. Lu Qinxue, an inheritor of intangible cultural heritage, and is dedicated to the research of Dunhuang art and guiding learners. He began to engage in Dunhuang art in the 1980s and is a rare master in the field of Dunhuang art.

Zhao Junrong's studio is located in Dunhuang City. Zhao Junrong was originally a researcher at the Dunhuang Academy. After retirement, he established his own studio to create and guide learners. Although his major was Dunhuang murals when he was working, he was also very knowledgeable about Dunhuang caissons and tile patterns. He was a master who could not be avoided when studying Dunhuang patterns.

Gansu Mahayana Art Co., Ltd. is located in the Incubation Park of Anning District, Lanzhou City and was established in 2013. It has been committed to the research and production of Dunhuang art products for many years. It has flexibly used Dunhuang art products and designs in dozens of projects in Gansu Province, and has received unanimous praise.

It has been invited many times to participate in the development of art products of the Dunhuang Academy, and it is a very famous local company involved in Dunhuang art.

Lanzhou Hongyu Colored Brick Factory is located in Xigu District, Lanzhou City. It has two factory production sites. The owner, Lu Min, mainly designs and produces flower tiles, colored bricks and imitation stone bricks. Although the scale is not very large, it has accumulated rich experience since 2009.

1.6.2 Instrumentation /Tools

This study mainly plans to collect relevant data through three ways: field survey, interviews and questionnaires to ensure the diversity and depth of data. The fieldwork will focus on Dunhuang and its surrounding areas, and it is planned to understand the historical background of Dunhuang flower bricks, their production process, and their application in modern decoration through field observation and documentation. Through direct examination of traditional craft sites and modern use environments, the researcher will obtain first-hand information on the styles of flower bricks and how they are applied, and this data will provide the basis for subsequent analysis.

Interviews are planned to be conducted with a variety of groups, including experts in the field of Dunhuang flower bricks, craftsmen, artists, designers, and some local Dunhuang natives. The content of the interviews will be designed around the research objectives to ensure that the interviews are flexible but not disoriented. By gaining insights into different professionals' knowledge of Dunhuang bricks, their use and perceptions of their use in modern decoration, the researcher will be able to gather specific insights into the innovative use of bricks. The researchers will also be able to understand the needs of the target audience and market information of the research results through the information of the local indigenous people in Dunhuang.

The questionnaire will target a wider audience, and is planned to include practitioners, consumers and those interested in Dunhuang art. The questionnaire will be designed with both closed and open-ended questions, focusing on respondents' perceptions of Dunhuang's cultural symbols, their views on modern applications, and market demand. Through the extensive distribution of the questionnaire and data collection, the researcher will be able to quantitatively analyze the potential value of Dunhuang bricks in the modern market and the feedback from the audience, so as to provide data support for the relevant theoretical analysis and practical application.

This phase aims to obtain information from multiple perspectives through different research methods, so as to comprehensively explore the potential of Dunhuang tiles in modern art and decoration.

1.6.3 Data Collection

Dunhuang patterned tiles (decorated primarily with patterns) are one of the ancient architectural materials of China. The process of making these tiles does not involve direct carving or painting on the bricks. Instead, patterns are first drawn on the inner walls of wooden molds used for brick-making, and then the patterns are imprinted onto the brick using the mold, after which the brick is fired. The molds create intaglio (incised) patterns, while the surface of the brick shows raised designs. The decorative images on the bricks resemble low-relief stone carvings, which is why these bricks are also referred to as molded relief bricks.

This technique first appeared as early as the Shang and Zhou dynasties in Chinese architecture, gradually rising to prominence during the Qin and Han dynasties. By the Eastern Han and Six Dynasties periods, with the widespread custom of elaborate burials and the popularity of brick tombs, this craft developed considerably. The art form evolved from the single brick designs of the Qin and Han dynasties into large-scale brick-printed murals during the Six Dynasties, reaching its peak as a characteristic art form of the era. During the flourishing of Buddhism in the Northern and Southern Dynasties, as well as the Sui and Tang periods, not only did the patterns on patterned tiles adopt Buddhist motifs, but they were also widely used in Buddhist grottoes and temples.

In Dunhuang, brick-making technology was brought to the region with the establishment of Dunhuang County by craftsmen from the Central Plains who migrated there. Since the Han Dynasty, some of the prominent families residing in Dunhuang not only engaged in large-scale construction of halls and courtyards, but they also upheld the tradition of elaborate burial practices, building lavish tombs. In Qian Fu Lun (Chapter on Extravagance), Wang Fu notes: "Now in the capital and in noble families across the counties, while people may not lavishly indulge in life, they honor death with grand funerals... From Lelang in the east to Dunhuang in the west, for thousands of miles, people compete to emulate this custom." To this day, many ancient tombs in Dunhuang belong to these prominent families. For instance, the tombs unearthed at Foyemiao include a painted brick tomb of the prominent Zhai family and a patterned brick tomb of the large Yin family. It is evident that the burial customs of the aristocracy were imitated by smaller landowners.

With the eastward spread of Buddhism, the number of temples and grottoes in Dunhuang increased, making it a gathering place for Buddhist art. Consequently, the demand for patterned tiles also rose.

Due to Dunhuang′ s unique historical background, the tile-making process in the region developed differently from that of the Central Plains. Most Han tombs were constructed using strip bricks, especially those unearthed from Yangguan, which were highly durable due to their high firing temperature and were reputedly tough enough to be used as inkstones, earning them the nickname ″Yangguan iron bricks.″ This indicates that the brick-making techniques in Dunhuang had reached a high level during the Han Dynasty. Decorative engraved and painted bricks emerged during the Six Dynasties, while molded relief bricks appeared only in the Sui Dynasty. During the Tang Dynasty, with the economic and cultural prosperity, the brick-making industry in Dunhuang reached its peak, not only producing a wide variety of patterned tiles in large quantities with high craftsmanship but also spreading these tiles widely. The same patterned tiles were used across several tomb complexes and for flooring in grottoes, demonstrating that by this time, Dunhuang had specialized brick merchants and craftsmen with advanced manufacturing skills, as well as complete brick kiln facilities.

The form and patterns of Dunhuang patterned tiles also differ from those in the Central Plains. Central Plains patterned tiles, during the Han and Wei periods, were typically large and thick, often hollow bricks. Over time, the size of the bricks shrank, and their shapes became more varied, with rectangular and wedge-shaped bricks being common. The patterns were mostly on the sides and ends of the bricks, featuring traditional geometric designs, rope patterns, and coin motifs. Plant motifs began to appear in the Northern and Southern Dynasties. In contrast, Dunhuang patterned tiles had standardized forms, with square dimensions ranging from 26.5 cm × 26.5 cm to 38 cm × 39 cm and thicknesses between 5 cm and 6.5 cm. The patterns, mostly plant motifs with Buddhist symbolism, were all displayed on the front of the tiles.(Yin Guangming,1988,127-129)

In addition, there are also relief image bricks, a type of architectural brick featuring surface designs created through molding, engraving, or painting. These bricks were used in ancient times to adorn palaces, temples, ancestral halls, or tomb chambers. Painted image bricks were typically rectangular and commonly placed in tomb screens or on the middle portions of tomb walls. The images on these bricks often

depicted scenes reflecting the social status, lifestyle, personal preferences, and cultural customs of the tomb's owner during their lifetime. They also portrayed a wish for a worry-free afterlife, with attendants and messengers in constant service, a common desire among people, from the wealthy elite to ordinary citizens. The images on these bricks symbolized blessings, the pursuit of happiness, or the hope to ward off disasters and evil—a shared sentiment across social classes.

Molded image bricks were often used as paving bricks or wall decoration. Their decorative patterns were highly diverse, frequently combining multiple motifs, and held significant aesthetic value. These bricks were produced by using a clay mold carved with patterns, filling the mold with clay, then drying and firing the bricks. Afterward, only the finest bricks were selected for use. The mold for the brick could be reused, with each brick typically containing a complete pattern.

In modern decorative design, Dunhuang patterned tiles are valued for their unique artistic and aesthetic features. By integrating modern design concepts and technologies, they provide fresh inspiration and direction for contemporary decoration. As part of Dunhuang art, these tiles embody rich cultural and artistic values. They not only reflect the prosperity and cultural exchanges of the Tang Dynasty but also showcase both Eastern and Western painting techniques, such as the use of lines and colors. These characteristics give Dunhuang patterned tiles a special role and value in modern design.

For instance, the patterns and colors of Dunhuang patterned tiles have been inherited and innovated in modern decoration. Designers, through study and analysis of these tiles, extract core design elements and combine them with modern aesthetics and design principles to create new works that retain traditional qualities while meeting contemporary aesthetic demands. This approach preserves the iconic features of traditional patterns while offering new ideas and inspiration for modern design.

The symmetrical composition and rhythmic beauty of Dunhuang patterned tiles have also been reflected in modern decorative design. Symmetrical layouts not only provide a sense of stability and balance but also give a progressive depth and dynamic structure to the space. The application of these aesthetic principles brings a more harmonious and unified visual effect to modern designs while reflecting the essence of traditional Chinese decorative aesthetics.

As a part of Chinese culture, Dunhuang patterned tiles, with their unique cultural connotations and artistic style, offer a wealth of materials

for modern decorative design. By incorporating elements and colors from Dunhuang patterned tiles into contemporary designs, designers enhance the cultural depth of their work and infuse it with new vitality, making the designs richer in cultural character and artistic value.

In this study, the traditional Dunhuang tile data I collected mainly came from the grottoes within the scope of Dunhuang culture and art, and provincial and municipal museums. These data helped me to restore the patterns, sizes, materials and production processes of traditional Dunhuang tiles. Other data came from local experts, studios and related practitioners in Dunhuang (some of which came from Dunhuang tile makers in Lanzhou). These data provided support for the use of modern materials and processes in Dunhuang tiles and the use of Dunhuang tile patterns to create modern decorations.

In conclusion, Dunhuang patterned tiles are both a continuation of traditional Chinese tile craftsmanship and a product of their own unique development. Their emergence was closely tied to the flourishing of Buddhism. These tiles reflect the feudal economy and culture of Dunhuang at the time and the prevailing custom of elaborate burials. The brick-making craft in Dunhuang boasts a long history, representing a natural progression from ancient to modern artistic development.

1.6.4 Data Analysis

In data analysis, it is mainly divided into two general directions. The first is the theoretical direction, which mainly analyzes the patterns, history, religious factors, inheritance and cultural identity of Dunhuang tiles. The second is the application direction, which mainly analyzes the materials, ancient and modern craftsmanship, market conditions, production conditions and other production and sales factors of Dunhuang tiles.

1.6.5 Research presentation

1.6.5.1 Full Research
-Descriptive analysis.
1.6.5.2 Research Papers
-International research papers at Scopus level or ERIC .

1.7. Literature Review

Dunhuang tiles belong to a branch of Dunhuang art. Due to the limited energy and resources of previous scholars, they did not pay much attention to Dunhuang tiles. However, some of their works have covered them, which can provide certain support for this study.

Ji Xianlin,(1998,45-144)Dunhuang study big dictionary.The Dictionary of Dunhuang Studies is the first professional large-scale reference book on Dunhuang studies in China. It contains more than 6,900 entries covering all aspects of Dunhuang studies, including more than 60 categories such as Dunhuang art, Dunhuang relics and Dunhuang studies. In the chapter on the archaeology of the grottoes, the words "Dunhuang paving tile" and "paved tile" are listed, which specifies the direction and reference for the classification of Dunhuang tile in this article.

Editorial Committee of the Complete Collection of Chinese Picture Bricks,2006,96-287,109-141,233.The Complete Collection of Chinese picture Bricks.This book uses a combination of pictures and images to comprehensively display the representative picture bricks unearthed in China, and also analyzes the great changes of social appearance and ideology in the picture brick era. It basically reflects the historical development and overall appearance of Chinese ancient picture brick art. The analyses of the lotus- and carriages-patterned bricks of the Southern Dynasties in Chapters 7 and 22, as well as the analyses of the four-spirit- and sphinx-patterned bricks of the Eastern Jin Dynasty in Chapters 8-11 and 18, can be corroborated with the Dunhuang bricks of the pre-Sui-Dynasty period in the present study.

Yin Guangming,1990,11-28.Dunhuang picture bricks.The book systematically introduces the history and patterns of the picture bricks in Dunhuang area, and focuses on the analysis of some representative individual picture bricks.In addition, Mr. Yin Guangming also has another paper, entitled: Dunhuang molded tile exploration. His books and papers are of great help to my thesis, and some of the older data are obtained from his research.

Wang Tianyi,1989,35-107.Brick paintings of Wei and Jin tombs.This book is based on a collection of exquisite tomb brick paintings found in the early 1970s in the Jiayuguan area of Gansu Province, China, belonging to the Wei and Jin period at the end of the Han Dynasty. Among them, 13 (2) reproduction of life in ancient pastoral areas, 25 (3) sericulture industry on the Silk Road, 37 (4) depiction of aristocratic life, 61 (7) spectacular military pictures, 75 (8) ancient hunting scenes, and many other picture bricks display and analysis, more fully reflect the social production and life

and political and military of that period. As well as the artistic characteristics of 109 Wei and Jin tomb brick paintings, it also provides reference for the comparative study and multiple integration of Dunhuang tile grotto art and tomb art.

Chang Shana,2009,204-266.Decorative motifs of Dunhuang in China through the ages.It mainly describes the study of decorative patterns of Dunhuang in China through the ages and their application in modern design. It emphasizes that design should serve the clothing, food, housing and transportation of the general public and be accepted and loved by the masses, rather than blindly embodying the so-called individuality and eclectic fashions, thus neglecting the basic aesthetics, principles and spirit of design. Although most of Chang Shana's design prototypes come from Dunhuang murals, her design concepts and design ideas are also applicable to the modern design of Dunhuang flower tiles, which can provide more references and lessons for the modern design of Dunhuang flower tiles. At the same time, most of the Dunhuang tile topiary patterns in this book are also derived from this book.

Yin Guangming,1988,123-130.A preliminary study on the art of Dunhuang molded tiles. It is the earliest data that can be accessed that systematically summarizes the patterns, era analysis and dimensions of Dunhuang tiles. This paper classifies and summarizes 35 patterns of Dunhuang tiles, and selects the more representative Dunhuang tiles for era analysis and artistic analysis. It provides an important theoretical basis for the study of Dunhuang tiles.

Sakchai Sikka and Prathabjai Suwanthada. (2024: Abstract) Research on Creation of patterns from the art of wood carving, Cultural heritage for application in design work: Ubon Ratchathani Province, Thailand. It was concluded that in analyzing the identity of wood carving art, the cultural heritage of Ubon Ratchathani Province, the researcher used the selection of wood carving art to create patterns, divided into 2 steps: Step 1: Selection by the researcher using the selection criteria. After that, the selection results were divided into 2 main groups: Group 1: Round relief wood carving, and Group 2: High relief wood carving (High relief) and Low relief wood carving (Bass relive). Step 2: Evaluation of the styles by 6 experts to select the patterns that are unique to Ubon Ratchathani Province and suitable for application in the design. The results of the evaluation, the researcher used the wood carving art styles to find ways to create. By experimenting with creating main motifs using 6 main motif creation techniques: 1) Cutting out, 2) Reversing, 3) Adding shape details, 4) Recomposing, 5) Some shape changes, and 6) Substituting. The main motifs are then used to create new patterns with variety and to increase options for application in design, using the principles of artistic composition.

Dai Yong,2018,28-31.On the Cultural Dimension of Art and Design.The thesis discusses that the cultural background of human society regulates the behavior and style of art and design, and at the same time, art and design also faithfully records the history and culture of the period and the region. Today's art and design works are no longer the attachment of practical life, but the carrier to express the spiritual and cultural connotation of the times. Designer's works should not only emphasize the external form of art and design and ignore the cultural dimension reflected in the design works themselves, but also spread and highlight the national culture and cultural competitiveness.

He Jiayi,2023,94-96.Dunhuang motifs in modern design.The paper explores the characteristics of Dunhuang patterns and their integration with modern design.The paper explores the characteristics of Dunhuang patterns and their integration with modern design, exploring more possibilities for the development of traditional culture and looking for opportunities for its development in the context of contemporary society, so as to enable people to better inherit and carry forward this artistic heritage.

Cai Sihui,2016,1-53.A Study of Dunhuang Algae Well Patterns and Their Application to Modern Design.This thesis discusses in detail the study of the decorative art of Dunhuang algal well pattern, including the origin of the development of Dunhuang algal well, as well as the inheritance and evolution of Dunhuang algal well pattern through the dynasties, sorting out the style characteristics of the algal well pattern at various stages, the application of the elements, the proportion of the structure and the decorative color, etc., and to find out the representative algal well pattern of the various dynasties to carry out a specific analysis to excavate its decorative art features. It also analyzes the application of Dunhuang motifs in modern design, including the application value, application method, and application status, and collects the application of Dunhuang motifs in various fields of modern design. Provides a reference for the modern decorative design and application of Dunhuang flower bricks.

1.8 Concept, Theory and Conceptual framework

“traditional art” is a form of art and a way of creation that has been handed down in a specific cultural environment and passed on from generation to generation. It is the unique artistic expression of a country, region or nation, with rich historical and cultural connotations and unique aesthetic style. Traditional art is usually closely related to specific social customs, beliefs, historical traditions, etc., and has a high degree of ethnicity and regionality.

Traditional art is characterized by diversity and inheritance. It includes all aspects of painting, sculpture, music, dance, theater, folk crafts, etc., and conveys certain cultural memories and values through the creation and performance of artists. Traditional art is rich in symbolism and profound connotation, and it is an important expression of national identity and social cohesion.

As a kind of cultural heritage, traditional art is not only a manifestation of art forms, but also a carrier of cultural inheritance and innovation. It maintains cultural continuity and uniqueness through transmission from generation to generation. However, with the development of modern society and the impact of globalization, traditional art faces many challenges. Some traditional art forms are in danger of being lost, and traditional artists face livelihood and recognition problems. Therefore, the protection and transmission of traditional arts has become one of the important issues in today's society. In order to protect and pass on traditional arts, a series of measures need to be taken. One of the very important ways is to strengthen the interface with modern society, so that traditional arts can be more widely spread and recognized through innovation and integration. This is also the conceptual basis of this study to innovate and apply Dunhuang flower bricks, a traditional art, to modern decoration.

And modern decoration refers to the application of modern design concepts and decorative techniques in interior decoration. Compared with traditional decorative style, modern decoration is more simple, fashionable and spatial. It is not bound to traditional decorative elements and decorative styles, focusing on the use of flexible combinations of lines, colors and materials to create a more open, spacious and comfortable environment.

The development of science and technology has brought unprecedented changes to modern decoration, but looking at the modern decoration in the past two decades, with the continuous maturity of craftsmanship, materials and themes, followed by the solidification of decorative forms and decorative content, modern decoration has also begun to appear in the bottleneck of templating and routinization. At the same time, modern decoration has less accumulation in content and form due to the relatively short development time. At this time, there is an opportunity for the fusion of traditional art and modern decoration. Therefore, the development of modern decoration cannot be separated from the nourishment of traditional art, and some elements representing the essence of traditional art have been revitalized in the increasingly rich and diversified modern decorative art. Modernity and tradition are not contrary to each other, but are complementary and fully integrated to create more possibilities.（Figure 1）.

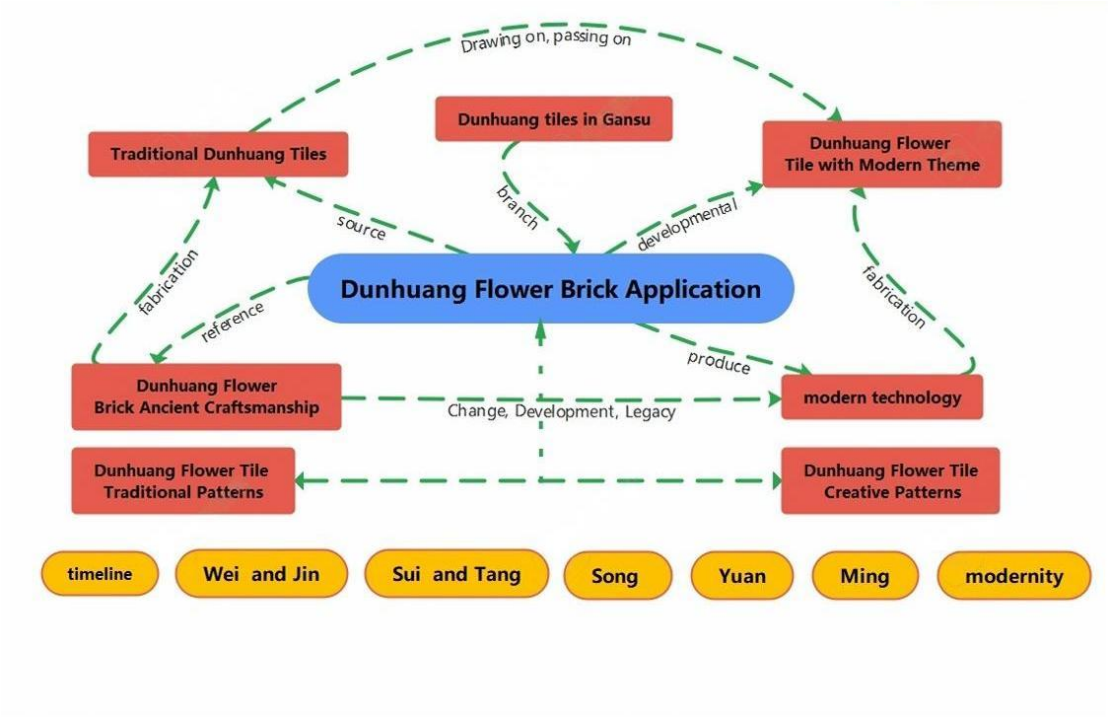

Figure 1 Conceptual Framework
Source：Du Yanda .

1.9 Research plan

This thesis is planned to take one year to complete, and the research steps are as follows:

The first stage: collecting relevant literature, documents and information. It focuses on collecting Dunhuang tiles and various similar art forms and other related materials.

Phase 2: Analysis of relevant literature, literature and information. It mainly analyzes the history of Dunhuang tiles, the culture behind them, social influence, cultural development, extraction of applied elements, and modernization of traditional art. Conduct site visits to confirm and supplement documentation.

Sumup :

The information and data required for this paper are given.

Stage3: according to the collected and analyzed data, formulate the thesis outline and complete the main content of the thesis.

Stage4: supplement and improve the content of key chapters, adjust the format of the paper, and finalize the draft.

1.10 Chapter structure

Chapter 1: Introduction

Chapter 2: Historical heritage and analysis of artistic characteristics, traditional and modern crafts of Dunhuang tile

Chapter 3: Analysis of the meaning and value of Dunhuang tiles and search for traditional cultural symbols

Chapter 4: Creation of Dunhuang tiles patterns conforms to modern artistic aesthetics and needs

Chapter 5: The application of Dunhuang tiles patterns in modern decoration innovations

Chapter 6: Conclusion, Discussion and Recommendations

1.11 Benefit of Research

1.11.1Deepen your understanding of the historical background and artistic characteristics of Dunhuang flower bricks:

Through an in-depth study of the historical background and artistic characteristics of Dunhuang flower bricks, as well as their manifestations in traditional and modern craftsmanship, this study provides academics with a complementary and expanded study of Dunhuang art. It helps to further sort out the cultural lineage of Dunhuang flower bricks, reveals their unique role in ancient architectural decoration, and provides systematic analysis and suggestions for improvement of craftsmanship and aesthetics in Dunhuang art.

1.11.2 Discover and pass on the cultural symbols and values in Dunhuang flower bricks:

By analyzing the cultural symbols and historical values of Dunhuang flower bricks, this study helps academics and designers understand their importance in cultural heritage. The results of the study provide a theoretical basis for how to continue and apply these traditional symbols in modern society, which not only helps to raise awareness of the cultural significance of Dunhuang flower bricks, but also provides practical guidance for integrating them into contemporary culture.

1.11.3 Promote the innovative creation of Dunhuang flower tile patterns in modern art:

In response to modern aesthetics and market demand, this research explores innovative methods of creating Dunhuang flower tile patterns. By studying the way of combining traditional and modern art aesthetics, the research results provide a reference framework for modern designers, enabling them to create designs that meet modern visual aesthetics on the

basis of respecting tradition. The research provides theoretical support for innovation in design practice and promotes the application of Dunhuang flower bricks in modern artistic creation.

1.11.4 Promote the innovative application of Dunhuang flower tile patterns in modern decoration:

The results of this study provide specific design ideas and application paths for the application of Dunhuang flower brick patterns in modern architecture and interior decoration. By combining modern materials and technology, the study expands the application scope of Dunhuang flower bricks, especially its innovative use in modern architectural decoration, and enhances its applicability and cultural influence in the field of contemporary design.

Chapter Ⅱ

Historical heritage and analysis of artistic characteristics, traditional and modern crafts of Dunhuang tile

The term "DunHuang patterns tiles" in this thesis primarily refers to three types of ancient bricks found in the Dunhuang region with different uses. (Ji Xianlin,1998,45-48)One type is paving bricks used for flooring, known in academic circles as Dunhuang paving flower bricks due to their embossed patterns. The other type is bricks used for wall construction, known as image bricks, which are further categorized as either relief image bricks or painted image bricks based on their surface design. The study focuses on these three forms of ancient Dunhuang brick art: paving flower bricks (Figure 2), relief image bricks (Figure 3), and painted image bricks (Figure 4). Despite the differences in their use and form, all these bricks are considered decorative bricks and are part of the cultural relics found in the Dunhuang region. Therefore, they are collectively referred to as "DunHuang patterns tiles" in this thesis. These bricks are mainly discovered in Buddhist grottoes, ancient tombs, and temple sites in the Dunhuang area, with the paving flower bricks found in the Mogao Grottoes being the most renowned. Their research value and artistic aesthetic significance are unparalleled among the ancient paving flower bricks discovered in China.

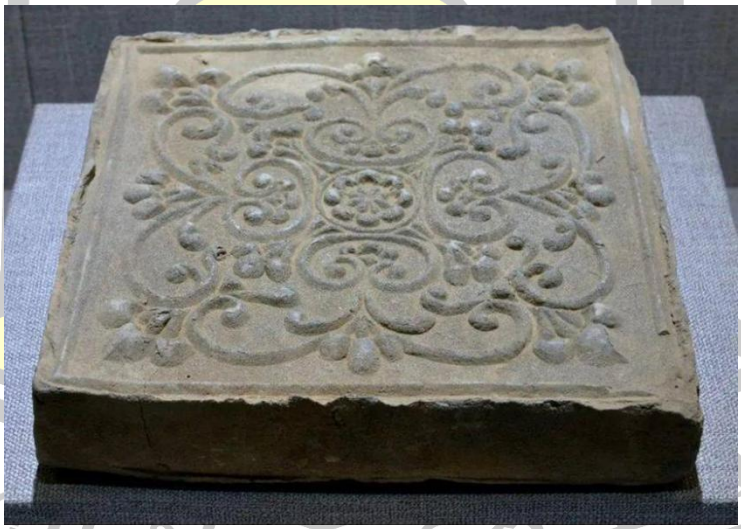

Figure 2 paving flower bricks.
Source：Gansu Provincial Museum.

Fig

Figure 3 relief image bricks.
Source：Gansu Provincial Museum.

Figure 4 painted image bricks.
Source：Gansu Provincial Museum.

From the perspective of function and use, the art category of Dunhuang patterned tiles belongs to the realm of architectural art. In terms of cultural and artistic regional scope and historical origin, the art of Dunhuang patterned tiles falls under the broader category of Dunhuang art, representing a smaller branch within it. Dunhuang art is a complex of multiple art forms that originated and accumulated in the Dunhuang region, encompassing not only Dunhuang murals and sculptures but also cave architecture, paintings from the Library Cave, Dunhuang calligraphy, Dunhuang music and dance, and Dunhuang textiles and embroidery. Broadly speaking, it should also include Dunhuang literature, transformation texts, and lyrical compositions directly related to Dunhuang murals and unearthed artifacts. (Ji Xianlin,1998,50)With the century-long accumulation of Dunhuang studies, the scope of research has gradually expanded, and the concept of Dunhuang art has correspondingly broadened. The initial focus of Dunhuang studies was primarily on the manuscripts unearthed from the Dunhuang Library Cave and related issues. Over time, the scope of research expanded to encompass all matters related to the manuscripts from the cave, as well as Dunhuang cave architecture, murals, sculptures, and Dunhuang's historical culture.

Thus, Dunhuang studies have evolved into a highly comprehensive discipline. In recent years, research on Dunhuang art within Dunhuang studies has increasingly extended beyond cave art to include artifacts unearthed from ancient tombs and architectural sites in the Dunhuang area. Scholars in Dunhuang studies have reached a consensus that Dunhuang art not only includes various aspects of Dunhuang cave art but should also encompass other ancient artworks unearthed within the broader Dunhuang region. In the context of this thesis on Dunhuang patterned tiles, most paving tiles are relics from caves and are originally part of cave art (Dunhuang art). Image bricks unearthed from tombs and ancient temples in the Dunhuang area should also be considered part of Dunhuang art.

Dunhuang art can be described as a kaleidoscope of ancient Chinese art. Although it is a regional art phenomenon that originated in the Dunhuang area, it ultimately developed into a comprehensive representation of ancient Chinese art due to its thousand-year-long continuity, unique geographical location, historical background, and cultural attributes. It possesses universal and representative characteristics of ancient Chinese culture and art, while also embodying openness, diversity, and inclusiveness. These attributes ultimately facilitated the exchange and fusion of Eastern and Western cultural arts, creating a magnificent artistic edifice that has even become a brilliant cultural phenomenon. The development of Dunhuang art into an important cultural heritage of human civilization is no coincidence. The deep-rooted reasons lie in the unique regional culture of Dunhuang and the special historical opportunities it encountered. Therefore, before delving into the study of Dunhuang patterned tiles, it is essential to analyze the social environment and historical background in which Dunhuang art emerged and developed.

Next, I will introduce and analyze the essential information that is crucial to this research, specifically the historical culture, artistic forms, and stylistic characteristics related to Dunhuang patterned tiles. This serves as the introduction to this thesis, providing a comprehensive overview of Dunhuang art and the art of Dunhuang patterned tiles. The three sections are titled: The Historical Background of Dunhuang Art, The Expression Forms and Stylistic Characteristics of Dunhuang Art, and The Current Research Situation of Dunhuang Patterned Tiles.

2.1 Historical Background of Dunhuang Art

2.1.1Geographic Location and Natural Environment of Dunhuang

On a broader scale, Dunhuang is geographically situated with the Mongolian Plateau to the north, the Qinghai-Tibet Plateau to the south, the Xinjiang oases to the west, and the Hexi Corridor to the east. It lies at the westernmost end of the Hexi Corridor, making it a critical frontier area in ancient northwest China. Starting in 121 BCE, Emperor Wu of Han began the development of the Hexi Corridor, sending General Huo Qubing to capture the region. The construction of the Great Wall was extended westward beyond Dunhuang, where the Yangguan and Yumenguan passes were established. Consequently, Dunhuang became a key military stronghold for controlling access to the Hexi Corridor and the Central Plains from the Western Regions. It served as a vital passage for both the southern and northern routes of the Silk Road, acting as a center for trade and a crossroads where Eastern and Western cultures converged. Historical records refer to Dunhuang as a "grand meeting place where the Chinese and the barbarians exchanged goods."(Ji Xianlin,1998,91-104)

Today, Dunhuang City is located at the junction of Gansu, Qinghai, and Xinjiang provinces (regions) and is administratively under Gansu Province (Figure 5). The total area of Dunhuang is 26,700 square kilometers, with an oasis covering 1,400 square kilometers. Surrounded by desert and Gobi, Dunhuang is often referred to as the "Gobi Oasis." Encircling the Dunhuang oasis, the remnants of the Qilian Mountains, known as the Sanwei Mountains, lie to the east, while the Mingsha Mountains, formed by the transitional zone between the Badain Jaran and Taklamakan deserts, stand to the south. To the north, the Beisai Mountains, part of the Mazong Mountain range, rise, creating a natural basin in the center. The terrain slopes from high in the south and north to low in the middle, with an average elevation of 1,139 meters. In the basin flows a clear, snowmelt-fed river originating from the Qilian Mountains, known as the Dang River, a primary tributary of the Shule River. The Dang River stretches 390 kilometers with a drainage area of 16,800 square kilometers, flowing from south to north as an inland river. It is the lifeblood of the Dunhuang people, with the population and agricultural activities historically concentrated along its banks.

Figure 5 Schematic diagram of Dunhuang's geographical location on the map of China.
Source: Yongwei Du,2019.

2.1.2 The Earliest Inhabitants of the Dunhuang Region

The traceable human history in the Dunhuang region dates back to the ancient Chinese periods of the Xia and Shang dynasties. The discovery of a large number of bronze artifacts at the Yumen Huoshaogou site indicates that this area had entered the Bronze Age around 4,000 years ago. This coincided with the Erlitou Bronze Culture in the Central Plains, making it the westernmost cultural frontier during the nascent stages of Chinese civilization. Artifacts with Central Asian characteristics, such as scepter heads, and the discovery of arsenical bronze similar to that of West Asia, found at the Huoshaogou site, demonstrate that around 2000 BCE, the Siwa culture in the central and western Hexi Corridor was significantly influenced by Indo-European and Near Eastern cultures. This suggests that as early as 1,800 years before the

opening of the Silk Road, the central and western Hexi Corridor had already become a frontier for receiving and disseminating Western cultures. The early inhabitants of this region had already begun interacting with Western civilizations. There is even the possibility that the ancestors of the Huoshaogou people migrated from the West. In ancient Chinese historical texts, these early inhabitants are referred to as the ancient Qiang people.(Ji Xianlin,1998,62-63)

Ancient Chinese historical records offer various descriptions of Dunhuang during the prehistoric period, using terms such as "Sanwei," "Liusha," "the territory of Yongzhou in the Yu Gong," and "the land of the ancient Rong." The most frequently cited is the phrase “(Shun) exiled the Sanmiao to Sanwei,” which suggests that Emperor Shun defeated the Sanmiao tribe in the Yangtze River basin and exiled them to Sanwei. Since there is a mountain in Dunhuang named Sanwei, some scholars believe that the phrase refers to the exile of the Sanmiao tribe to the Dunhuang region. However, this theory, which identifies the Sanwei location as Dunhuang and considers the Sanmiao as the earliest inhabitants of Dunhuang, has been highly disputed and is not widely accepted. The only reliable conclusion about the early inhabitants of Dunhuang comes from modern scientific archaeology, particularly the findings at the Huoshaogou site.

The historical records of Dunhuang during the Qin and Han dynasties and later are relatively accurate. According to ancient texts such as the Shiji (Records of the Grand Historian) and the Hanshu (Book of Han), during the Qin-Han period, the Hexi Corridor was inhabited by the Yuezhi, Wusun, Xiongnu, and Saka peoples, forming a multi-ethnic region (Figure 6). The Yuezhi later rose to prominence in the Hexi Corridor, driving the neighboring Wusun into the Ili River Valley in the Western Regions. Around the early Western Han period, the Xiongnu entered the Hexi Corridor in large numbers, defeating the Yuezhi and forcing them to migrate westward. After driving out the Yuezhi, the powerful Xiongnu dominated the Hexi Corridor and frequently raided the Han Empire's frontier regions. By the time of Emperor Wu of Han, the Han Empire reached the height of its power, defeating the Xiongnu and establishing commanderies and counties throughout the Hexi Corridor. A large number of Han Chinese military and civilian settlers were relocated to the Dunhuang area for frontier defense and agricultural development. From that point on, Dunhuang became a region predominantly inhabited by Han Chinese, along with minorities such as the Xiongnu, Xianbei, Di, Qiang, and Jie peoples.

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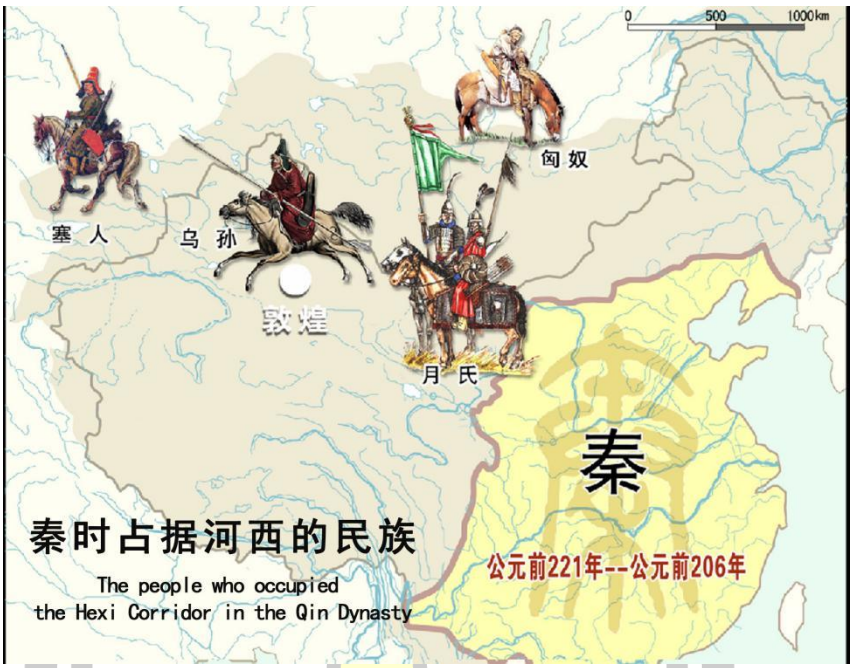

Figure 6 Distribution map of ethnic minorities occupying the Hexi Corridor during the Qin Dynasty. Source：Yongwei Du,2019.

2.1.3The Territorial Scope of Dunhuang After the Establishment of Dunhuang Commandery During the Han Dynasty

During the reign of Emperor Wu, the Han Empire embarked on extensive territorial expansion. Emperor Wu first dispatched Zhang Qian on diplomatic missions to the Western Regions, followed by a series of military campaigns aimed at defeating the Xiongnu, developing the Hexi Corridor, and securing control over the Western Regions. Starting in the second year of the Yuan Shuo period (127 BCE), General Wei Qing led a campaign in what is now Hebei Province and Inner Mongolia, forcing the Xiongnu to retreat from the Han border. In the second year of the Yuan Shuo period (121 BCE), Emperor Wu sent Huo Qubing with a cavalry force from Longxi, driving deep into the Hexi Corridor and decisively defeating the main Xiongnu forces in the region, thereby fully occupying the Hexi Corridor. Following these victories, the Han court established four commanderies—Wuwei, Jiuquan, Zhangye, and Dunhuang—in the Hexi Corridor, stationing troops to defend the region and relocating civilians to settle the frontier. They also constructed the Great Wall and established the Yangguan and Yumenguan passes to control the vital routes between Han territory and the Western Regions. This strategy became known as "establishing the four commanderies and guarding the two passes."

Dunhuang Commandery was established in the sixth year of the Yuan Ding period (111 BCE) during the Western Han dynasty, marking the beginning of clearly defined administrative boundaries for Dunhuang. Although the territorial scope of Dunhuang changed several times throughout different historical periods, the commandery's jurisdiction generally encompassed a much larger area than the present-day administrative boundaries of Dunhuang City. During the Western Han period, Dunhuang Commandery comprised six counties: Dunhuang, Longle, Xiaogu,

Guangzhi, Ming'an, and Yuanquan (Figure 7). The commandery's territory bordered Jiuquan Commandery to the east, the Yiwu region (modern-day Hami, Xinjiang) to the north, the Qilian and Altyn mountain ranges to the south, and the vast Taklamakan Desert to the west, extending to the ancient kingdom of Loulan (in modern-day Ruoqiang County, Xinjiang). The commandery's area covered the expansive regions of the Danghe and Shule river basins, totaling approximately 168,000 square kilometers.

Figure 7 Schematic diagram of Dunhuang's geographical location during the Western Han Dynasty. Source: Yongwei Du,2019.

During the Eastern Jin period (317–420 CE), the Former Liang regime designated the commanderies of Dunhuang, Jinchang, and Gaochang, along with the Western Regions Protectorate, the Wuxi Colonel, and the Yumen Garrison, as Shazhou, with its administrative center in Dunhuang. During this period, the jurisdiction of Dunhuang (Shazhou) extended as far as present-day Turpan in Xinjiang.

Dunhuang also served as the capital of two short-lived regimes in history. The first instance occurred in 400 CE when Li Gao was appointed as the Prefect of Dunhuang. The following year, he declared himself Duke of Liang, rebelled against Northern Liang, and established a Han Chinese regime with Dunhuang as its capital, extending its territory eastward to Jiuquan and westward to parts of the Western Regions. This regime is known in history as the Western Liang. The second instance took place three years after the fall of the Tang dynasty, in 910 CE, when Zhang Chengfeng, the grandson of Zhang Yichao, declared himself the "White-Clad Son of Heaven" and established the Xihan Jinshan Kingdom with Dunhuang as its capital. He ruled over Guazhou and Shazhou, opposing Zhu Wen, who had usurped the throne of the Later Liang dynasty.

2.1.4 Dunhuang: A Crucial Hub on the Silk Road

Zhang Qian is celebrated as the "Pioneer of the Silk Road." The Records of the Grand Historian (Shiji) described Zhang Qian's mission to the Western Regions as "carving out the skies," meaning opening up a great passage. He embarked on two missions to the Western Regions, first in 139 BCE and then in 119 BCE, which established official land routes connecting China with Central Asia, Western Asia, South Asia, and eventually Europe. From then on, China began exporting silk, tea, lacquerware, and other products to Central Asia and beyond, while importing spices, gemstones, glassware, and other goods from Europe, Western Asia, and Central Asia. The German geographer and geologist Ferdinand von Richthofen coined the term "Silk Road" for this trade route, a name that has since gained worldwide recognition (Figure 8). As the western gateway of the Hexi Corridor, Dunhuang became a key administrative and military center for the Western Han dynasty, which established commanderies, relocated populations, and stationed troops there. The government also set up the Yangguan and Yumenguan passes, two critical gateways connecting Han China to the Western Regions. For over a thousand years after the Western Han period, Dunhuang remained an essential and irreplaceable stop on the ancient overland Silk Road, playing a pivotal role in trade and cultural exchanges between East and West.

Figure 8 Map of the starting and ending points of the Silk Road, pictures from the Internet.

Source: http://silkroads.org.cn/portal.php?mod=view&aid=32459

The Hexi Corridor has long been a crucial thoroughfare connecting the Central Plains of China with the Western Regions. After the Silk Road was established, this natural corridor became a golden route for trade between the East and West. The corridor extended northwestward along the Qilian Mountains and the Badain Jaran Desert, with the Mongolian Plateau to the north and the Qinghai-Tibetan Plateau to the south, forming a narrow strip of arable land dotted with oases. This corridor stretched nearly a thousand kilometers westward from Wushaoling and, blocked by the vast Taklamakan Desert, ultimately ended at Dunhuang. As a result, Dunhuang became the final stop on the Hexi section of the Silk Road, serving as a vital gateway from the Central Plains to the Western Regions, as well as a frontier fortress of Han Chinese settlements—a place where Chinese and non-Chinese cultures met and interacted.

From a bird's-eye view, ancient Dunhuang would have appeared at the crossroads of the Central Plains, the Western Regions, the Qinghai-Tibetan Plateau, and the Mongolian Plateau. Even today, Dunhuang remains a key land transportation hub in northwest China, with routes extending north, south, east, and west. In ancient times, however, Dunhuang was even more critical as the gateway to the Western Regions and one of the few prosperous economic and cultural centers on the ancient Silk Road. Dunhuang was not only a hub for trade between Chinese and non-Chinese merchants but also a melting pot of diverse cultures. As Professor Ji Xianlin once noted, "There are only four ancient cultural systems in the world that have a long history, vast territories, self-contained systems, and far-reaching influence: Chinese, Indian, Greek, and Islamic. And there is only one place where these four cultural systems converge: Dunhuang and the Xinjiang region of China." This statement highlights Dunhuang's importance as the strategic throat of communication between the Central Plains and the Western Regions, a key node in East-West trade and cultural exchange on the ancient Silk Road. Dunhuang was not only strategically vital for the stability of the western frontier and control of the Western Regions by the Central Plains dynasties but also served as a bridge connecting ancient China with the world.

The Western Han dynasty also established the highest-ranking post station on the Silk Road at Dunhuang—the Xuanquanzhi, which is now listed as a World Cultural Heritage site by UNESCO. The Xuanquanzhi operated for nearly 400 years, serving as a large reception and transit station for envoys, officials, merchants, and postal services along the Silk Road during the Han and Tang dynasties. The site covers an area of 22,500 square meters. Artifacts unearthed from Xuanquanzhi reveal that prominent Han officials, such as Changluohou Chang Hui, Princess Jieyou, who married the king of Wusun, and diplomats from more than 20 countries, including Loulan, Wusun, Yutian, Shache, Shule, Qiuci, and Cheshi, all stayed at this station. The delegation of the King of Yutian alone numbered 1,074 people. This station, later dubbed the "Grand Guesthouse of the Han Dynasty," witnessed the friendly exchanges between different nations and ethnic groups along the Silk Road.

The term "Western Regions" mentioned throughout the text refers to an important geographical concept concerning ancient China's borders and its relationship with Western countries, and it requires further clarification. Since the Han dynasty, the concept of the Western Regions has had both narrow and broad

definitions. In its narrow sense, the Western Regions refer to the area west of the Yumenguan and Yangguan passes and east of the Congling (Pamir Plateau), primarily corresponding to present-day Xinjiang. During periods of strength, the Central Plains dynasties could extend their influence to this area, establishing administrative offices and forming vassal relationships with numerous small states. However, during periods of weakness or fragmentation in the Central Plains, control over the Western Regions was often lost. It was not until the 10th year of the Guangxu reign (1884) in the Qing dynasty that the Qing government formally established Xinjiang as a province, renaming the Western Regions as "Xinjiang." In its broader sense, the Western Regions refers to any region that could be reached via the narrow Western Regions (now Xinjiang), including Central Asia, Western Asia, and even further west. Over time, this term evolved to broadly refer to the regions west of Dunhuang (Yumenguan and Yangguan passes).

2.1.5 Dunhuang: Once a Cultural Center of Han China

When Cao Pi declared himself emperor in 220 CE, the Hexi region came under the control of the Cao Wei regime. During this period, Dunhuang was governed by three outstanding prefects: Yin Feng, Cang Ci, and Huangfu Long. They continued the Han dynasty's policies of military farming and defense, introduced advanced agricultural techniques, and protected the merchants traveling between the Han Chinese and non-Han regions. These efforts led to social stability, population growth, cultural prosperity, and economic recovery, making Dunhuang once again a thriving commercial city where Chinese and non-Chinese peoples interacted.

By the time of the Western Jin dynasty, the noble families who had settled in Dunhuang during the large-scale migration initiated by Emperor Wu of Han had been established there for over three centuries. These families had accumulated significant political, economic, and cultural power. During the chaos of the Yongjia Rebellion, many northern Han Chinese fled south of the Yangtze River to escape the invading northern tribes. Some of the noble families, however, crossed the Yellow River and sought refuge in the relatively stable Hexi region. Their arrival further stimulated the economic and cultural development of the area, making Hexi the only remaining Han Chinese-governed region in northern China at the time, alongside the Eastern Jin regime in the south, helping to preserve Han culture. Dunhuang, in particular, became a gathering place for talented scholars and military leaders. Military commanders defended the region, ensuring the safety of its inhabitants, while scholars promoted education, authored works, and led cultural trends. Meanwhile, Western cultural influences continued to spread eastward. During this tumultuous period known as the "Five Barbarians Disrupting China," Dunhuang, as a key passage for incoming Western cultures, unexpectedly experienced an unprecedented cultural flourishing.

The cultural prosperity of Dunhuang during the Eastern Jin and Northern and Southern Dynasties was built on a foundation of economic stability and thriving commerce. The economic success of Dunhuang was largely due to the activities of Sogdian merchants. These merchants used Dunhuang as a transshipment base for their long-distance trade between the Central Plains and the Western Regions during the Han and Jin periods, significantly contributing to the prosperity of the Silk Road. Evidence of their activities frequently appears in archaeological discoveries and historical research. For instance, ancient Sogdian letters from the late Western Jin dynasty were found at the beacon tower sites along the Han Great Wall in Dunhuang.

These letters recorded the activities of Sogdian merchants in Dunhuang, Jiuquan, Jincheng, and Luoyang, revealing that there were hundreds of Sogdian freemen living in Dunhuang at that time. This indicates that commerce in Dunhuang during the Western Jin period had flourished to the point where it was gradually restoring its status as a major commercial metropolis, similar to its position during the Western and Eastern Han dynasties. The commercial prosperity and cultural richness of Dunhuang during the Eastern Jin and Northern and Southern Dynasties also directly facilitated the spread and establishment of Buddhism in the region.

2.1.6 Dunhuang: One of the Earliest Adopters of Buddhist Culture in China

Dunhuang, situated at a key junction of the Silk Road, was a critical gateway for the introduction of Indian Buddhism into China. Indian and Central Asian monks traveling eastward would first arrive in Dunhuang, where they needed to learn Chinese, translate Buddhist scriptures, and preach before they could spread Buddhism further into China. As early as the Han Dynasty, the Western Regions were known as "Buddhist countries," and Dunhuang, as a major conduit to the Western Regions, was among the first to be exposed to Buddhism, establishing an early foundation for the dissemination of Buddhist culture.

According to the "Shazhou Dudu Fu Tujing" from the Paris National Library's collection of Dunhuang manuscripts, Buddhist niches were being constructed in Dunhuang's Shouchang County as early as the Han Dynasty, suggesting that the Western Thousand Buddha Caves in Dunhuang might be one such site. Additionally, a Han bamboo slip discovered at the Dunhuang Xuanquan Site in 1991 bears the inscription "Dunhuang Xiao Futuo Li" . The term "Li" refers to a basic administrative unit in ancient China, and the use of "Futuo" (a term for Buddhist stupas or temples) in the name indicates that this locality likely contained a Buddhist stupa or temple, suggesting the presence of Buddhist activities and structures in Dunhuang as early as the Han Ming Emperor's reign (58–100 CE).

By the Western Jin Dynasty, the influx of Western Region merchants into Dunhuang had become quite frequent, with many of them settling there permanently. With the increasing number of Buddhists, the specific practices and expressions of Buddhism began to flourish. The "Biographies of Eminent Monks" records that the renowned monk Zhu Gaozuo was active in Dunhuang in the mid-3rd century and accepted Zhu Fahou as a disciple. Zhu Fahou, a native of the Yuezhi kingdom and a prominent monk and translator in Western Jin, was known as the "Bodhisattva of Dunhuang." His main disciple, Fa Cheng, was also a key figure in the history of Buddhism in Dunhuang. Fa Cheng traveled with Zhu Fahou throughout the Western Regions and Central Plains before settling in Dunhuang, where he actively built temples, taught, and spread Buddhist teachings, eventually passing away there.

The emergence of prominent monks such as Zhu Fahou, Fa Cheng, and Tan You during the Western Jin period indicates that Buddhism had become increasingly prevalent in Dunhuang. This early establishment of Buddhist practices and institutions laid the groundwork for the later development of Buddhist caves and the creation of the Mogao Caves in Dunhuang.

2.1.7 The Transmission of Buddhism Eastward and the Formation of the Dunhuang Caves

The eastward transmission of Buddhism, also known as the spread of Buddhism, refers to the process of Buddhism moving from ancient India to Central Asia and then through the Western Regions into China(Figure 9). Dunhuang was a crucial node in this process. The generally accepted timeframe for Buddhism's introduction into China is during the reign of Emperor Ming of the Han Dynasty, specifically around the "Yongping Seeking Dharma" event. During this period (58–75 CE), Emperor Ming Liu Zhang sent envoys Cai Yin and Qin Jing to the West to seek Buddhist teachings, bringing back the Buddhist scriptures "The Forty-Two Sections" and a statue of the Buddha Shakyamuni, marking the official acceptance of Buddhism by the Chinese court. The imperial edict and the establishment of the White Horse Temple are key indicators of this event.

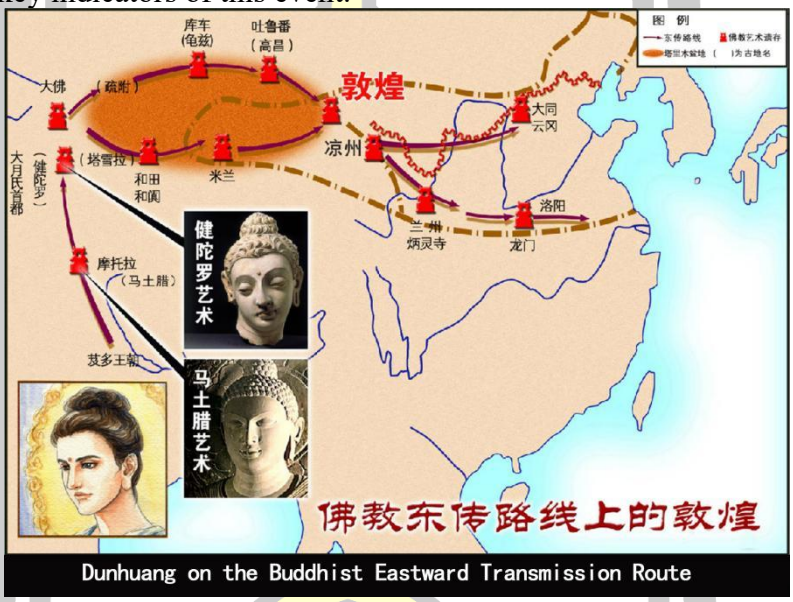

Figure 9 Map of the introduction of Buddhism into China.

Source：Yongwei Du,2019.

Some scholars argue that Buddhism may have entered China earlier, during the reign of Emperor Wu of the Han Dynasty when the Western Regions were opened up. However, Buddhism's extensive and comprehensive spread in China began during the Sixteen Kingdoms period following the Wang family rebellion and continued through the Southern and Northern Dynasties. This 300-year period was marked by unprecedented division, conflict, and upheaval in Chinese history but also represented a time of significant ethnic and cultural integration.

As previously mentioned, Dunhuang was one of the early adopters of Buddhist culture. Before the creation of the Mogao Caves, Buddhism had already become prevalent in Dunhuang. The construction of the Mogao Caves is generally believed to have begun during the Sixteen Kingdoms period of the Eastern Jin Dynasty. There are three main theories regarding the specific dates of the cave construction:

According to an inscription in the late Tang Dynasty found on the north wall of the front chamber of Cave 159, the caves began construction during the late Western Jin Dynasty.

According to the "Shazhou Dizh," a document unearthed from the Cave of Scriptures, construction began in the ninth year of Yonghe during the Eastern Jin Dynasty (353 CE).

According to the "Li Junxiu Mogao Caves Buddha Niche Stele" from the first year of the Shengli period in the Wu Zhou Dynasty (701 CE), the first cave was built in the second year of Jianyuan during the Former Qin Dynasty (366 CE), with the monk Lezun beginning the construction of the first cave.

Currently, the theory aligning with the Former Qin Dynasty's Jianyuan second year (366 CE) is the most widely accepted. According to this theory, one day in 366 CE, a monk named Lezun arrived at the Three Danger Mountains in Dunhuang and saw a golden light on the mountains that resembled a thousand Buddhas. He then carved the first Buddhist cave into the rock face of the Mingsha Mountain opposite the Three Danger Mountains, marking the beginning of the Dunhuang Buddhist caves. Subsequently, a monk named Foliang carved a second cave next to Lezun's. Over time, other notable figures, including the magistrate Jianping Gong and the King of Dongyang, also contributed to the construction of large Buddhist caves. By the early Tang Dynasty, during the reign of Wu Zetian, thousands of Buddhist caves and niches had been carved out by local people.

2.1.8 Dunhuang as a Cosmopolitan Trade Hub of Multicultural Coexistence

The large number of Confucian texts and educational materials discovered in the Dunhuang Mogao Caves' Cave of Scriptures from the early Tang period indicates that Confucianism played a dominant role in the scholarly environment of Dunhuang at that time. During the early Tang Dynasty, as the ruling Li family revered Laozi (Li Dan) as their ancestor, Daoism flourished in Dunhuang just as it did in the Central Plains. During the Kaiyuan and Tianbao periods, Dunhuang saw the construction of numerous Daoist temples, such as the Shenquan Temple, attracting many Daoist followers.

In addition to native Chinese culture and religions, Dunhuang, with its substantial settlement of Western Region merchants, also witnessed the influx of foreign religions, including Manichaeism, Nestorianism, Zoroastrianism, and Islam. In the early Tang Dynasty, a temple dedicated to Zoroastrian (Fire Worship) deities was established in Dunhuang's "Conghua Township," created specifically for the Sogdian people. Nestorianism also had a presence in Dunhuang, with a monastery named "Daqin Temple" built in the city. Manuscripts from the Cave of Scriptures include Nestorian texts, and manuscripts from the Kaiyuan era reveal the presence of Manichaean writings, showing the spread of various cultures from West Asia and Central Asia in Dunhuang. Among these foreign religions, Buddhism had the most significant impact. By the Tang Dynasty, Buddhism had deep roots in Dunhuang, even receiving imperial patronage. Empress Wu Zetian used Buddhism to solidify her throne, commissioning monks to compile and disseminate the "Daqiujing Shu" (Great Cloud Sutra Exegesis) and ordering the construction of the Daqiujing Temple across the country. Under imperial patronage, Buddhism in Dunhuang flourished like never before, with the construction of three colossal Buddhas measuring 35.5 meters, 26 meters, and 25 meters in height.

The inscriptions found in the Mogao Caves record a variety of temples such as Longxing Temple, Daqiujing Temple, Puguang Temple, Jinguangming Temple, Lingtu Temple, and Kaiyuan Temple. These temples housed imperial court manuscripts from Chang'an, where monks and laypeople studied Buddhism and conducted religious activities, reflecting the widespread influence of Buddhism.

During the Tang Dynasty, Dunhuang was known as Shazhou. From the 660s onwards, the Silk Road entered its peak period under the Tang Dynasty, and Dunhuang (Shazhou), controlling the two passes, was more prosperous than ever before. On the one hand, the Tang court established the Anxi Protectorate in Gaochang (modern Turpan in Xinjiang) to control the Western Regions, with Shazhou serving as a vital support base for assembling troops, providing supplies, and organizing labor. The court also directly administered areas along the southern route of the Silk Road, such as modern Ruoqiang and Qemex. On the other hand, Shazhou was a crucial trade transit station for official trade activities between the Tang Dynasty and many Central Asian states, including tribute and diplomatic missions. Additionally, free trade between the Central Plains and the Western Regions made Shazhou a major logistics and trading hub. Near present-day Dunhuang, there was a place called "Xinghu Lake," named for its role in receiving Western merchants. One of the thirteen townships of Shazhou to the east of present-day Dunhuang, Conghua Township, was established due to the settlement of Sogdian merchants.

During the Sui and Tang Dynasties, periods like the "Kaihuang Reign," "Zhenguan Reign," and "Kaiyuan Prosperity" maintained the smooth operation of the Silk Road, leading to over a century of vibrant trade and market prosperity in Dunhuang.

2.2 The Forms and Style Characteristics of Dunhuang Art

In a broad sense, the concept of Dunhuang art not only includes Dunhuang cave art but also other ancient art within the ancient Dunhuang region. However, the most rich, refined, and valuable is the cave art. Dunhuang cave art, also known as Dunhuang Buddhist cave art, refers to the ancient art preserved in the many Buddhist caves within the ancient Dunhuang region, with the Mogao Caves being the primary focus. Due to the significant proportion of cave art in Dunhuang art, the term "Dunhuang art" often specifically refers to Dunhuang cave art. This section, "The Forms and Style Characteristics of Dunhuang Art," focuses on the forms and stylistic features of Dunhuang cave art.

Dunhuang cave art mainly includes: Dunhuang murals, Dunhuang sculptures, Dunhuang cave architecture, Dunhuang Dunhuang Manuscript Cave paintings, Dunhuang calligraphy and seals, Dunhuang dyeing and embroidery, and Dunhuang music and dance. The "floor tiles" among the "Dunhuang patterned tiles" in this study belong to the category of cave architecture art in Dunhuang.

2.2.1 Types and patterns of Dunhuang tiles discovered

Dunhuang paving bricks: Dunhuang caves, used to pave the cave floor or paving caves before the building, the ground floor of the green brick, many are brick surface with patterned brick, that is, the so-called Dunhuang paving bricks, belonging to the Dunhuang caves architectural art of a classification. By Ji Xianlin, Tang Changru, Duan Wenjie and other editors of the Dunhuang Dictionary, in the chapter

of cave archaeology, there are “Dunhuang paving brick” and “brick plastering” term. The former is the introduction of the brick itself, that is, “Dunhuang caves paved caves and caves before the building floor of the brick”; the latter introduces the ground paved with this brick, that is, “with the brick paved with plastered grottoes ground”. After that, this paving brick has been called “Dunhuang molded brick, Dunhuang relief brick, Dunhuang portrait brick, Dunhuang brick” and so on. So many names in academic articles and various media, but the relatively accurate name of the brick has not yet reached a consensus. Among them, “Dunhuang molded flower bricks” although pointing out the production process of flower bricks, but the scope of its reference to at least two types of paving flower bricks and wall bricks (wall bricks are many also molded), and does not exclusively refer to paving with flower bricks, lexical extension than paving flower bricks; and “Dunhuang relief flower bricks “Although the art form of brick surface decorative images, but the scope of its reference still includes at least two types of paving and wall bricks; as for the” Dunhuang portrait bricks ”generally refers to the Dunhuang area of ancient tombs unearthed in the wall bricks, including painted bricks and relief bricks, compared with paving bricks, in addition to the use of different, artistic expression also have their own In addition to the difference between the use of paving bricks, the artistic performance also has its own focus: paving bricks to line pattern performance is important, that is, focus on the “pattern” performance, although there is no lack of line pattern in the wall-laying bricks, but mainly people, animals, scenes and other images, that is, focus on the “image” of performance; as for the most commonly used bricks, the most commonly used bricks are the painted bricks, including painted bricks and relief bricks. performance; as for the most commonly used “Dunhuang brick” term, in recent years appeared more frequently, refers to the scope is also very open, can be Dunhuang caves and other ancient sites of paving bricks, but also can be Dunhuang around the ancient tombs in relief bricks and painted bricks, Dunhuang brick term basically became the Dunhuang ancient brick art of the general term.

This paper inherits the “Dunhuang Dictionary” in the “Dunhuang paving brick” name, and suggests that the academic community continue to use this name to refer to the grottoes and ancient tombs, ancient sites such as the ground tiles. If it refers to the Mogao Grottoes and other grottoes and temples paving tiles, it can also be called “Dunhuang Grottoes paving tiles”.

Dunhuang relief bricks and Dunhuang painted bricks: Dunhuang around the ancient tombs and ancient architectural sites unearthed in the wall bricks, there are relief forms, there are painted forms, that is, the so-called Dunhuang relief bricks and Dunhuang painted bricks. This kind of Dunhuang cultural relics, also belongs to one of the Dunhuang art composition. The name “portrait brick”, initially refers to the Qin and Han dynasty palace sites and burial sites unearthed in the pattern of images of bricks, including floor and wall bricks, wall bricks, mostly wall bricks, and the “portrait stone” and known in the world. Picture bricks and images of the production of most of the way to beat (press) printing and molding two kinds, there are also a small number of brick blanks directly engraved on the shaded line pattern. Because most of the relief on this brick is very shallow, and many of them are colorful and colorful, although the nature of the sculpture art, but the composition of the law and the artistic expression is closer to painting, so it is called “portrait” has a certain reason. As for the ancient tombs unearthed in the pure plane painting brick, the

academic community also called it “portrait brick”, probably along the name of the early unearthed relief class portrait brick. However, since the sixties of last century, Gansu Hexi Corridor, Gaotai, Jiuquan, Jiayuguan, Dunhuang and other areas excavated a large number of pure plane painting brick rich Wei and Jin Dynasty tombs, unearthed paintings tomb bricks are not only a huge number of rich in content, vivid picture, and Shaanxi, Henan, Sichuan and other places unearthed in relief compared to the portrait bricks, although there is a similarity of similarity, but the characteristics of the significant, large-scale, can be said to be its own school of thought, should not be generalized. It is not appropriate to generalize. So many scholars try to distinguish the two from the name. Some scholars call this art form of a brick and a painting “mural brick”, also known as “brick mural” and “brick painting”, and called “painted brick”. “The. Although these claims are not unreasonable, but the name “portrait brick” has been used for a long time, has been deeply rooted in people's hearts, and the concept of “painting” is more in line with the characteristics of this plane painting brick, so most scholars have always been the Hexi Wei and Jin Tomb painting tomb brick Called portrait bricks.

The author believes that the paintings of tomb bricks called “portrait bricks” is reasonable and should be continued. But in order to distinguish with the relief class of portrait brick, the former can be called “painted portrait brick”, the latter called “relief portrait brick”, so as to distinguish between the two. Dunhuang area of these two types of bricks have been unearthed, so this article in the discussion of the two types of bricks in the art of Dunhuang, respectively, named “Dunhuang painted bricks” and “Dunhuang relief bricks”.

To summarize, Dunhuang art has a pattern, images of ancient bricks, can be collectively referred to as “Dunhuang flower bricks”; Dunhuang flower bricks, can be divided into “Dunhuang paving bricks” and “Dunhuang portrait bricks”; Dunhuang paving bricks, can be divided into “Dunhuang paving bricks” and “Dunhuang portrait bricks”; Dunhuang paving bricks, and “Dunhuang portrait bricks”. Dunhuang paving bricks; Dunhuang paving bricks, and then divided into “Dunhuang caves paving bricks” and “Dunhuang ancient tombs and ancient building paving bricks”; Dunhuang portrait bricks, and then divided into “Dunhuang relief portrait bricks” and “Dunhuang painted bricks”.

Table 1 Thirty-five types of Dunhuang paving tiles were excavated.

serial number	Pattern Name	place of excavation	age	Sizes(centimetre)
1	The big eight-petal lotus pattern	Mogao caves	Sui dynasty	39×38×5.5
2	eight-petal lotus pattern	tomb	Sui dynasty	35×35×6.5
3	nine-compartment perspex pattern	tomb	Tangdynasty	33×33×6.5
4	Baoshang four-petal	Mogao caves	Tangdynasty	34×34×6.5

	pattern	tomb		
5	Baoshang Ruyi pattern	Mogao caves	Five Dynasties and Song dynasty and Yuan dynasty	33×32×6
		tomb	Tangdynasty	
6	lotus pattern with compound petals	Mogao caves	Tangdynasty	34×34×6.5
		tomb		
7	quarter-lotus pattern	tomb	Tangdynasty	35.5×35.5×5.5
8	convoluted lotus pattern	tomb	Tangdynasty	34×34×6
9	Paulownia scroll pattern	tomb	Tangdynasty	35×35×6.5
10	pearl pearl scroll pattern	tomb	Tangdynasty	33×33×5.5
11	pomegranate pattern	Mogao caves	Tangdynasty	34×33×5.5
12	Lotus pattern with twelve scrolling petals in peach center	Mogao caves	Five Dynasties, Tang, Xia, Yuan	33×33×5.5 29×29×5.5
		monasteries	Western Xia	29×29×6
13	Twine pattern	tomb	Tangdynasty	35×35×6
14	Knitted pattern	tomb	Tangdynasty	34×31×6
15	Lianzhusha scrolling lotus flower pattern	Mogao caves	Five Dynasties	30×29×6
16	Sixteen-petaled lotus pattern with peach center	Mogao caves	Five Dynasties, Western Xia, Song, Yuan	30×30×6
				26.5×36.5×6

17	Lienzhu Summer Lotus Pattern	Mogao caves	Five Dynasties	30×30×6 28×34×5
18	Spiral pattern with creeping grass and curling clouds	Mogao caves	Five Dynasties, Western Xia, Song, Yuan	33×33×6
19	cloudburst pattern with lotus flowers and scrolling clouds	Mogao caves	Five Dynasties	30×30×6
20	summer-petal lotus pattern	Mogao caves	Five Dynasties	28×27×6
21	minus the ground cranberry pattern	Mogao caves	Five Dynasties,Song	31×28×6.5
22	Lonicera japonica with heavy petals and curly grass pattern	Mogao caves	Song, Western Xia, Yuan	27×27×5
23	Eight-petaled lotus flower with cloud head pattern	Mogao caves	Song, Western Xia	28×28×5
24	Eight-petaled lotus flower with cloud head pattern	Mogao caves Mingsha Mountain	Song, Western Xia, Yuan	28×28×6
25	Linnaeus pattern	Mogao caves	Song dynasty	32×32×6 30×30×5
26	Flame Beads Tattoos	Mogao caves monasteries	Song dynasty Western Xia	27.5×27.5×6
27	Lotus pattern with twelve scrolling petals in peach center	Mogao caves	Song, Western Xia, Yuan	28×28×5

28	Flame Beads Tattoos	Mogao caves	Western Xia	31×31×5
29	Flame Beads Tattoos	Mogao caves	Western Xia	31×31×5
30	Pointed angle and heavy lotus flower pattern	Mogao caves	Western Xia,Yuan	29.5×29×5.5
31	Lotus pattern with eleven scrolling petals and a peach heart	Mogao caves	Western Xia	28×27×5
		monasteries		28×26×5
32	Lotus pattern with sixteen scrolling petals in peach center	Mogao caves	Western Xia	33×32×6
				27.5×27.5×5.5
33	Twelve-petaled lotus pattern with peach center	Mogao caves	Western Xia,Yuan	28×28×6
34	Lotus pattern with eleven scrolling petals and a peach heart	Mogao caves	Yuan	28×28×6
35	knot pattern	Mogao caves	Yuan	30×30×6

2.2.2 Colors and materials used in production

Dunhuang patterned tiles are mainly divided into paving patterned tiles, relief image bricks, and painted image bricks. Each type of tile has distinct manufacturing processes and decorative characteristics, reflecting differences in technology and functional usage. Below is a detailed analysis of the craftsmanship for these three types of tiles.

Clay Selection and Preparation：The selection of clay is the first step in making paving patterned tiles. Craftsmen usually choose clay with fine texture and moderate sand content to ensure its plasticity and stability. The selected clay must be soaked, screened, and pounded to remove impurities and stones, ensuring the purity and uniformity of the clay body. Although the clay might seem ordinary, its composition and properties are quite complex. The mineral content and physical and chemical properties of clay can vary greatly depending on the location. According to

Cihai, a dictionary of Chinese terms, clay for traditional Chinese ceramics is described as "a type of sculpture craft in Chinese folk tradition, made by mixing clay with...," referring to clay used in sculpture. In a narrow sense, clay refers to a type of mineral raw material primarily composed of various silicates with small amounts of aluminum, magnesium, iron, sodium, potassium, calcium, and other compounds, as well as impurities like quartz, feldspar, mica, and sulfates, and carbonates. In a broader sense, clay refers to soil with fine particles, good plasticity, good cohesion, appropriate shrinkage, high fire resistance, and certain stickiness. The most common use of clay is in pottery firing, which dates back to ancient times. Clay found in different locations varies in its mineral content and thus in its properties and uses. Generally, it includes porcelain clay, ceramic clay, brick clay, and cement clay. Locals in Dunhuang and the Hexi Corridor refer to clay suitable for making pottery and bricks as "raw clay." This "raw clay" does not necessarily mean untouched soil in archaeological terms but rather refers to soil found deeper underground that does not see sunlight and is free of organic matter and excessive gravel, distinguishing it from seasoned soil, barren soil, floating soil, and sandy soil. This raises a question: Where did the clay used for Dunhuang patterned tiles come from? In researching ancient Dunhuang artistic techniques, I spent considerable effort on this issue. Ancient statues undoubtedly required raw clay, but determining the source of this clay was challenging. Based on logical deduction, the most plausible method that ancient Dunhuang craftsmen might have used is "local sourcing" — for large-scale projects requiring numerous patterned tiles for paving or decoration, such an extensive undertaking, given the limited transportation capacity, outdated tools, and scarce funds, would necessitate the simplest and most cost-effective approach. Thus, we focused on the area around the Mogao Caves. As an intuitive choice, we concentrated on the Daqing River in front of the Mogao Caves.

Those who have visited the Mogao Caves may have noticed a small river in front of them, originally named the Dangquan River, later misnamed the Daqing River. Like many inland rivers in desert regions, the Dangquan River has a long dry season and often runs dry; during the wet season, it can flood the valley like a mighty river; and in the event of a mountain flood, it roars and churns, resembling a host of galloping cavalry. The sedimentary soil in the riverbed of the Dangquan River, after many years of washing and scouring by floodwaters, has fine particles and very few impurities, with a certain amount of gelatinous content. Locals refer to it as "pure sediment soil." After experimenting with this pure sediment soil, we found it had unexpected advantages. First, this clay is particularly fine, showing a smooth texture when mixed with water and applied repeatedly; second, it has low shrinkage and is not prone to cracking.(Figure 10-11)

Figure 10 The river in front of the Mogao Grottoes, and the sedimentary soil that has been washed away by the river water, are the main source of "clay" in Dunhuang tiles.
Source：https://www.sohu.com/a/477506838_114731

Figure 11 The pictures are from sedimentary soil I dug from the river bed.
Source：Yanda Du,2019.

Table 2 Production of Dunhuang flower bricks, experimental statistics of cracking with different clays

Comparison table of Dunhuang tile soil experiment results

source	advantage	Probability of cracking
Dangquan River bed sediment soil	1.Delicate and smooth 2.Low cost of source 3.Less cracking	20%
construction soil	1.Available for direct purchase	100%
Plant Soil	1.Available for direct purchase 2.Low cost of source	90%

Appendix: Experimental method

Each sample contains 10 samples. After the square bricks are made, they are left to stand for 24 hours (the size of the square bricks is 20CM x 20CM square bricks, and the thickness is 5CM). The experiment was conducted in the Dunhuang Mogaoli craftsman studio. The local temperature on that day was 19 degrees Celsius to 32 degrees Celsius, and the air humidity was 28% to 35%.

For painting image bricks, pigments are primarily mineral-based, commonly referred to as "stone colors" or, in modern terms, "rock colors"(Figure 12-14). There is a common misconception that the pigments used by ancient Dunhuang artisans were all very expensive. In reality, while some pigments, such as lapis lazuli and malachite, were costly and are now considered rare, many pigments used in ancient times were relatively easy to collect and refine. Plant-based pigments were more challenging to extract and often had inferior color quality, purity, coverage, and stability compared to mineral pigments, which is why ancient artisans preferred mineral pigments for painting.

Figure 12 The raw stone of lapis lazuli is used to make blue pigment.
Source：https://www.163.com/dy/article/GUM2A07V0514BNHE.html

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Figure 13 Grind the lapis lazuli into fine powder. In theory, the finer the powder, the better.
Source：https://www.zhe2.com/note/618456462117

Figure 14 Add glue to the pigment powder, mix it with water, and you can use it. The glue is added to make the pigment adhere to the painting surface.
Source：Yanda Du, 2023.

The stone colors used for painted image bricks include ochre, cinnabar, lead red, lapis lazuli, indigo, malachite, celadon, kaolin, talc, calcite, mica, gypsum, realgar, umber, yellow ochre, and black iron, which are fewer in variety compared to modern stone colors.

Research has identified four main sources for these pigments: imports from other countries, local and regional mining, transportation from the interior, and synthetic production. For example, early painted images in the Dunhuang caves used cinnabar, lapis lazuli, and malachite, which were imported from Central Asia. According to experts, early Dunhuang sculptures and murals used local ochre extensively. Cinnabar, on the other hand, was imported from India and Afghanistan through Xinjiang into Dunhuang, which made it expensive and less used until it became more widely produced in Central China, leading to its increased use in later periods.

The blue pigments in early Dunhuang caves were primarily lapis lazuli, but later periods saw a shift to indigo. Early lapis lazuli closely resembled Afghan samples, suggesting it was imported from Afghanistan and India via Xinjiang. Indigo, likely sourced locally from nearby areas or from Central China, eventually replaced the costly lapis lazuli. In later periods (Western Xia, Song, Yuan), lapis lazuli was less used, with indigo becoming predominant. During the Qing Dynasty, synthetic ultramarine became widely used due to its lower cost.

For green pigments, early Dunhuang caves relied on imported malachite and verdigris. By the Tang Dynasty, malachite was produced in the Qilian Mountains, and verdigris from Central China may have been used. Local resources, such as copper ore rust, were also used to produce similar green pigments. Thus, both verdigris and malachite were widely applied in Dunhuang caves.

White pigments, used extensively for both surface coloring and as a base layer on sculptures and murals, were derived from local materials like mica, calcite, talc, and gypsum found in the Dunhuang region. These minerals were processed locally to produce white pigment, making them less reliant on imports or inland sources. Lead red, also used frequently, was made through ancient methods such as "roasting lead" and was known to change color over time due to oxidation. By the Tang Dynasty, lead red continued to be used, resulting in the appearance of blackened features in some murals due to oxidation.

Overall, the pigments used in Dunhuang caves were predominantly natural mineral pigments, with synthetic pigments like vermilion and ultramarine used sparingly. Although plant-based pigments like indigo, gamboge, and lac red were found, they constituted a minor part of the color palette in Dunhuang sculptures and murals.

2.2.3 Comparison of traditional and modern design

The traditional patterns of Dunhuang flower bricks and the modern patterns show obvious differences and inheritance relationships in terms of form, function, aesthetic needs and cultural significance. By comparing the two, we can find that although they are different in design concepts, their core cultural values and artistic expressions are in the same vein.

Formally, the patterns of traditional Dunhuang flower bricks are mainly derived from religion and nature, and the common ones are lotus pattern, curly grass pattern, flying sky, auspicious beasts and so on. These patterns are mostly symbolic, closely linked to Buddhist culture, representing good fortune, prosperity and the pursuit of transcendence. The lines of traditional patterns are smooth, the modeling is complex and delicate, with obvious decorative nature, focusing on the details and the conveyance of symbolism. Modern tattoos, on the other hand, tend to be simplified in form, with more emphasis on the simplicity of lines, geometric patterns and visual impact. This simplification is not only to meet the modern aesthetic simplicity, but also to better adapt to mass production and market demand.

Functionally, traditional Dunhuang flower bricks are mainly used in religious buildings, tombs and palaces, playing a role in decorating the space, enhancing architectural aesthetics as well as conveying religious and cultural information. Its main function is symbolic, serving religious rituals or royal life. The design of modern patterns, on the other hand, pays more attention to practicality and multifunctionality. Modern Dunhuang flower bricks not only retain their decorative function, but are also widely used in architectural decoration, tourist souvenirs, handicrafts and other fields, reflecting the penetration of traditional culture in contemporary daily life. Through innovative design and craftsmanship, modern Dunhuang bricks can simultaneously meet people's practical and aesthetic needs, becoming a product with both cultural and commercial value.

In terms of aesthetic demand, the design of traditional patterns emphasizes solemnity, elegance and delicacy, reflecting ancient artists' pursuit of natural beauty and religious concepts. They convey a sense of harmony and serenity through complex compositions and meticulous carvings. The design of modern patterns, on the other hand, is more in line with the contemporary society's aesthetic demand for simplicity, clarity and personalization. Through the reinterpretation of traditional elements, modern designers abstract and geometricize traditional patterns to make them more suitable for the decorative style of modern living spaces. This design shift not only allows traditional cultural elements to be preserved, but also allows them to resonate with modern lifestyles.

Culturally, the patterns of traditional Dunhuang flower bricks carry deep religious, historical and cultural connotations, reflecting the multicultural blend of Dunhuang as a major Silk Road town. Each brick is not just a decoration, but also a symbol of cultural identity and historical memory. The Buddhist beliefs, nature worship and good wishes they convey are an important reflection of the spiritual and cultural life of the society at that time. Modern tattoos, on the other hand, pay more attention to how to inherit and innovate traditional culture in the context of globalization. By incorporating modern design concepts, modern Dunhuang flower

bricks not only continue to convey the spiritual connotation of traditional culture, but also give it new cultural symbolism. This cultural re-creation is both a tribute to tradition and a response to modern cultural needs.

To summarize, the traditional patterns of Dunhuang flower bricks and modern patterns in the form of complexity to simplicity, in function from a single religious decoration to diversified modern applications, in the aesthetic from the pursuit of delicate and solemn to focus on simplicity and clarity, and in the cultural significance of the transition from the bearing of the ancient social spiritual beliefs to the promotion of modern cultural heritage and innovation. Although there are differences between the two, modern patterns retain the essence of Dunhuang art through the innovation and reinterpretation of traditional elements, so that they can continue to play an important role in contemporary life.

2.3 Traditional and modern crafts of Dunhuang tile

2.3.1 Basic Situation of Dunhuang Patterned Tile Art

For the study of Dunhuang flower bricks as an art form, although it can be found in the previous Dunhuang studies and related archaeology, art and other aspects of the treatise, but mostly scattered, brief and generalized. The depth, breadth and systematic nature of the research still need to be excavated, expanded and integrated, and the aspects that need to be filled in, increase the depth, expand the breadth and form an academic system mainly include: a comprehensive and comparative study of multiple similar or similar art forms; a study combined with the historical background and cultural phenomena; a study from the angle of fine arts specialization and aesthetic value; and a study of Dunhuang Huaqiao art and its ancient craftsmanship and its practical application. The study of the application of the ancient craft of Dunhuang flower brick art.

Up to now, there are two areas involved in the study of Dunhuang flower brick art. One is the study of the field of Dunhuang cave art, especially in the study of Dunhuang cave architecture, the study of the art of Dunhuang bricks involved, the main results of the Dunhuang Academy scholars Li Zhenfu book Dunhuang Brick Art (1981 Gansu Longmiao Magazine), Dunhuang Academy scholars Yin Guangming Dunhuang molded bricks (1988 Dunhuang Studies Series). The second is the study of northwest China Wei and Jin tombs in the field of portrait bricks, more research results in this field, important treatises such as archaeologists Zhang Pengchuan, Jiayuguan Wei and Jin tombs murals (1985 People's Fine Arts Publishing House), Gansu scholars Guo Yongli, Hexi Wei and Jin sixteen countries mural tombs (2012 Nationalities Publishing House). In recent years, the art of Dunhuang flower bricks has begun to receive a certain degree of attention from the cultural and expositional circles.2021 From September to November, the Dunhuang Research Institute and the Palace Museum jointly planned the “Dun Xing Gu Yuan: Dunhuang Special Exhibition in the Palace” in the Forbidden City in Beijing, where the first unit of the exhibition, “The Silk Road in Slow Motion”, featured key exhibits, including the “Silk Road in Slow Motion”. The first unit of the exhibition “Silk Road Slowly”, the key exhibits in the Dunhuang relief painting bricks “huoren holding camel”; the fifth unit “pattern chapter”, mainly showing the Dunhuang paving tiles; the sixth unit “all sorts of human condition “in the sixth unit,” the Wei Jin tomb in Jiayuguan, the exhibition of painted bricks.

2.3.2 Process used in producing Dunhuang tiles

Handmade Molds： Paving patterned tiles are different from relief image bricks in that they are usually molded first without original molds(Figure 15). Craftsmen need to use a wooden blank mold to first sketch the pattern with a brush and then carve the pattern out using a wood carving knife, a process similar to woodblock printing. After carving the wooden mold, it must be air-dried and baked to remove moisture. Then, the carved mold is filled with clay and pressed to imprint the design. The resulting "clay brick" is then fired. This process requires not only expertise in drawing and designing patterns but also skill in wood carving, demanding a high level of craftsmanship (or perhaps suggesting a collaborative production involving multiple craftspeople).

Figure 15 I was modifying and perfecting the carving of the Dunhuang tile mold.
Source：Ruiqiang Ma.

Mold Replication：Due to the need for large-scale replication, wooden molds, while relatively easy to make, have limited durability and may wear out over time, causing loss of detail in the tile patterns. Therefore, Dunhuang patterned tiles also involved replacing the "initial mold" with more durable molds after the initial use. For example, after imprinting and firing, the tile can be used to create a ceramic mold, thus ensuring high efficiency and consistent patterns suitable for mass production of paving patterned tiles(Figure 16).

Figure 16 Plaster molds.
Source:Yanda Du, 2023.

The mold-making process for relief image bricks differs from that of paving patterned tiles. While paving patterned tiles are directly molded, relief image bricks require creating an original model first to produce the mold. The specific process is summarized in seven steps:

Step 1: Create a relief sculpture on the clay brick using prepared clay. The degree of relief depends on the requirements of the work. Smooth the surface clay to eliminate roughness and air bubbles.

Step 2: Place the clay brick in a cool, ventilated area to air dry.

Step 3: Construct a rectangular frame using wooden boards or glass sheets on a flat surface. The frame should be large enough to accommodate the clay sculpture, with at least 3 cm of margin on each side. Seal the gaps between the boards or glass sheets and the surface with soft clay to prevent the plaster from leaking during casting.

Step 4: Position the dried clay brick in the center of the rectangular frame. Mix animal fat with water in a 1:8 ratio to create a release agent solution(Release agent). Use a wool brush to evenly apply the release agent to the surface of the clay brick. Carefully remove excess release agent bubbles with a clean wool brush.

Table 3 Dunhuang flower brick turning mold, mold releasing agent mixing ratio experimental records

Dunhuang tile release agent ratio experimental record table

Sort number	Ratio	Observation conclusion
1	1:04	The demoulding is smooth, but there are too many bubbles in the tile mold, details are lost, and the experiment fails.
2	1:05	The demoulding is smooth, but there are too many bubbles in the tile mold, details are lost, and the experiment fails.
3	1:06	The demoulding is smooth, but there are too many bubbles in the tile mold, details are lost, and the experiment fails.
4	1:07	Demoulding was smooth, but the tile mould still had air bubbles and a few details were lost.
5	1:08	The demoulding was smooth, there were a few bubbles in the tile mold, and the details were not lost. The experiment was successful.

Step 5: Mix plaster powder with water to create a plaster solution. Pour the plaster solution over the clay brick until it reaches approximately 2 cm in thickness. Stop pouring, and quickly mix dried hemp straw into the remaining plaster solution, stirring well, and continue pouring(Figure 17). It is crucial to work quickly during the second pouring to prevent the first layer of plaster from setting and causing layering with the second layer. Adding hemp straw improves the plaster's toughness and absorbs some moisture, making the mold sturdier and reducing drying time.

Figure 17 Pour plaster within the confines of the mold.
Source:Yanda Du, 2023.

Step 6: Place the plaster mold in a cool, ventilated area to dry.

Step 7: Remove the wooden boards or glass sheets, flip the plaster mold, and extract the clay brick. Clean any residual clay with water and a wool brush, checking for any air bubbles in the mold. If there are any, fill them with a damp brush and a small amount of plaster powder, then smooth it out. Allow the mold to dry again, completing the plaster mold(Figure 18).

Figure 18 After the finished plaster mold, although most of the bubbles have been expelled through the previous process, there are still a few bubbles on the surface. I need to use plaster to fill the surface and trim the shape.
Source:Ma Ruiqiang.

Although plaster molds are relatively easy to make, the plaster material is not very durable and can only handle a limited number of castings.(Wang Y.B,&Jia Y.B&Chen L.F,2000,55) After multiple uses, the mold will gradually deteriorate. For large-scale replication, a ceramic mold is necessary, which involves creating both silicone inner molds and plaster outer molds. The process is more complex and involves the following steps:

Step 1: Press soft clay into the plaster mold, smooth the surface with a spatula, and let it air dry(Figure 19). Once the clay is dry and slightly shrunk, remove the clay brick.

Figure 19 When pressing the mold, you need to use force to press the clay into the mold to avoid air in the middle.

Source:Ma Ruiqiang.

Step 2: Place the new clay brick on a flat surface and surround it with wooden boards or glass sheets to form a rectangle. Prepare silicone liquid, adding a curing agent in a ratio of about 1%-5% of the silicone liquid, depending on the ambient temperature. Higher temperatures require less curing agent, and lower temperatures require more. Typically, at room temperatures of 20-30°C, add 2%-3% curing agent. Pour the mixed silicone liquid over the clay sculpture to form the silicone inner mold and let it dry.

Table 4 The parameters and curing mix data of silicone are provided by the silicone manufacturer.

2806 Translucent Mold Silicone Performance Data					
project	unit	numerical value	reference range	Testing standards	Remark
Appearance	Translucent viscous liquid		-	GB/T7193-2008	
viscosity	pa.s	26000	-	GB/T7193-2008	qualified
tensile strength	MP.a	3.0	1.8-4.3	GB/T7193-2008	qualified
Stretch ratio	%	500	-	GB/T7193-2008	qualified
Tear strength	MP.a	4.2	-	GB/T7193-2008	qualified
Vulcanization time	Min	18-25	10+	GB/T7193-2008	qualified

Step 3: Once the silicone is fully dry, remove the surrounding barriers and slightly round the corners of the silicone inner mold with a craft knife or scissors. Surround the silicone inner mold with wooden boards or glass sheets again, leaving about 5 cm of margin on each side for casting the plaster outer mold.

Step 4: Pour plaster solution into the frame, ensuring that the height (thickness) is at least 4 cm to ensure the strength of the plaster outer mold. Allow it to dry.

Step 5: Remove the barriers, flip the inner and outer molds, and extract the clay brick. Separate the inner and outer molds, marking one side of each mold with a marker to avoid confusion during assembly.

Step 6: After reassembling the inner and outer molds, pour plaster solution into the inner mold until full and let it dry. Once dry, first remove the plaster outer mold, then peel off the silicone inner mold to obtain the plaster image brick.

Step 7: Press clay onto the plaster mold, forming a rectangular shape. Smooth the clay on all five sides with a spatula and let it dry slightly. Flip the mold to remove the clay brick, creating the clay model.

Step 8: Carefully repair and smooth the clay model. After drying, fire it in the kiln to produce the ceramic mold.

Subsequent cooling and maintenance of the ceramic molds follow similar procedures to those for paving patterned tiles and will not be elaborated further here.

Drying and Firing：Drying is a crucial step in the production of paving patterned tiles. After the clay has been carved or pressed, it needs to be dried to remove excess moisture. The drying process requires controlling temperature and humidity to prevent cracking or deformation of the clay body.

Firing is the final and most critical step in the production of paving patterned tiles. The control of firing temperature and time directly affects the quality and durability of the tiles. Firing temperatures typically range between 900°C and 1100°C, and the firing time varies depending on the thickness of the tiles and the type of kiln used. Traditional firing methods involve using kilns where temperature and ventilation are controlled to achieve the desired firing results(Figure 20).

Figure 20 My studio usually uses gas kilns and electric kilns. Most of the traditional old-fashioned kilns that burn charcoal have been eliminated because it is difficult to precisely control the temperature compared to gas kilns and electric kilns with electronic control systems, and the rate of defective products after kiln is high.
Source:Yanda Du.

Kiln Equipment and Techniques : Traditional kilns include dragon kilns and horseshoe kilns, which use wood or coal for heating. Craftsmen monitor the color of the flames and temperature changes inside the kiln to control the firing process（Figure 21）. Modern kilns, such as electric and gas kilns, provide more precise temperature control through electricity or natural gas. These kilns can automatically heat and cool according to set temperature curves, avoiding quality issues caused by improper manual control in traditional kilns. The use of modern kilns improves the firing quality and consistency of patterned tiles while also reducing production costs and energy consumption.

Figure 21 The traditional kiln that I used to use in the backyard of my studio is now abandoned.
Source:Yanda Du.

Cooling and Maintenance：After firing, paving patterned tiles need to cool gradually to avoid thermal stress cracking caused by rapid cooling. The cooling process can be achieved through natural cooling or by slowly cooling in the kiln. After cooling, the tiles require maintenance through soaking, drying, and other steps to further enhance their strength and durability.

2.3.3 Tools and technology used in each era

The history of Dunhuang flower bricks can be traced back to the period of the Wei, Jin and North-South Dynasties, during which the brick-making technology had not yet reached a very sophisticated level, but had already acquired certain characteristics of craftsmanship. Early production tools were mainly simple hand tools, such as wooden or stone molds, through which artisans pressed clay or pottery into specific shapes. At the same time, the craftsmen used hand-carving tools to accomplish the surface carving of motifs, the main patterns of which included simple geometric designs and Buddhist themes such as the lotus flower. These motifs were often rendered by direct carving or molding, a time-consuming and labor-intensive process.

Technically, the production process of flower bricks in the Wei and Jin dynasties was relatively simple, mainly based on hand kneading and carving. Firing technology is still in the preliminary stage of development, the kiln technology is relatively primitive, the firing temperature is low, resulting in a looser texture of the brick, the surface glaze layer is not smooth enough. (Editorial Committee of the Complete Collection of Chinese Picture Bricks,2006,98-101)In this period, the decorative function of flower bricks began to be emphasized, but their craftsmanship level has not yet reached the degree of sophistication of the later period.

By the Sui and Tang dynasties, there were significant advances in the tools and techniques used to make Dunhuang flower bricks. The tools of this period were more diverse, and the improvement of ceramic production techniques in particular contributed to the upgrading of the brickmaking process. Craftsmen began to make extensive use of potter's wheels for pulling and molding, which resulted in more standardized and symmetrical shapes. At the same time, mold-making techniques were also upgraded, with metal molds replacing wooden ones, resulting in more precise and clearer details in the patterns.

During the Tang Dynasty, a period of high cultural and economic development in China, the art of making flower bricks reached new heights. With the improvement of glaze material, the flower bricks began to appear glazed decoration, especially the popularity of three-color pottery makes the flower bricks more colorful. The Dunhuang bricks of the Tang Dynasty were not only more complex in shape and carving, but also improved the hardness and durability of the bricks through the firing process. Advances in firing technology were reflected in the optimization of kiln structures and improved fuels, which were able to reach higher temperatures, resulting in stronger bricks with smoother and brighter glazes.

The Song and Yuan periods were another peak in the development of Dunhuang's flower-brick art, and craftsmen of this period showed a high degree of refinement in their production tools and techniques. In addition to the traditional potter's wheel and molds, artisans began to use more sophisticated carving tools, such as metal carving knives, for more detailed pattern carving. The patterns on the bricks evolved from early geometric designs and simple plant motifs to more complex images of dragons and phoenixes, flying skies, and mythical beasts.

The firing process was further improved during this period, using more advanced kiln technology and more precise kiln temperature control, resulting in better texture and durability of the fired bricks. Song craftsmen mastered the use of

oxidizing and reducing flames to control the color changes on the surface of the bricks through different firing atmospheres. The flower bricks in the Song and Yuan Dynasties not only focus on decorative, but also through multi-layered carving and glaze color matching, forming a more visually impactful artistic effect.

By the Ming and Qing dynasties, with the development of the ceramic industry, the tools and techniques for making Dunhuang flower bricks further matured. Hand tools still dominated this period, but early mechanized aids, such as simple manual presses, appeared. Craftsmen were able to complete large batches of flower bricks more quickly and accurately with these mechanical tools, and the demand for construction of palace buildings and large temples, in particular, drove the mass production of flower bricks.

Technically, the production of bricks during the Ming and Qing dynasties became more refined, and craftsmen began to use decorative techniques such as painting and overglaze, making the brick surface more colorful and layered. Glaze formula in this period is also more mature, especially the use of low-temperature colored glaze, making the decorative patterns more colorful. Ming and Qing Dynasties firing technology has been highly developed, can accurately control the firing temperature and time, thus enhancing the quality and beauty of the brick.

In modern times, the production techniques of Dunhuang flower bricks have not only inherited the essence of traditional handicrafts, but also introduced modern mechanized production techniques and design concepts. Traditional techniques such as carving and mold forming are still retained, but more modern tools such as electric carving machines and automatic mold presses are widely used, greatly improving production efficiency and accuracy. Firing techniques have also been automated and standardized with the popularity of industrial kilns, resulting in more consistent product quality.

In addition, the introduction of modern technology has made the innovative design of flower bricks possible. The use of digital design tools has enabled artisans and designers to design and adjust patterns on the computer, and then quickly create molds through technologies such as 3D printing. These modern technologies not only greatly improve production efficiency, but also provide more possibilities for the innovation and recreation of Dunhuang bricks.

To sum up, the tools and techniques of Dunhuang flower bricks in different historical periods have gone through the process from simple handmade to highly mechanized, and each period reflects the level of craftsmanship and cultural needs of the society at that time. Through continuous improvement and innovation, traditional tools and techniques have enabled Dunhuang bricks to continue as an art form and adapt to the needs of modern society, preserving the deep cultural connotations and injecting new vitality into modern design.

2.3.4 Passing on production wisdom from generation to generation

The skills and production wisdom of Dunhuang flower bricks embody a profound cultural connotation that has been passed down from generation to generation. This inheritance not only involves the transmission of skills, but also covers the continuation of cultural, aesthetic and historical background. By studying the development of Dunhuang flower bricks, we can see that the transmission of production wisdom from generation to generation has played a crucial role in the

whole process, promoting the continuous development and innovation of this traditional craft.

First of all, the production wisdom of Dunhuang flower bricks originated in the ancient handicraft society, where the earliest craftsmen accumulated valuable experience in their long-term practice. By observing the forms of nature and combining signs and symbols from religion, culture and life, they incorporated these elements into the pattern design of flower bricks. Whether it is the geometric patterns of the early period or the lotus and scroll patterns of the Sui and Tang dynasties, all of these designs contain the craftsmen's deep understanding of life, nature and culture. This wisdom is reflected not only in the appearance of the design of the flower bricks, but also in the exquisite craftsmanship skills during the production process, such as the use of molds, the choice of clay, and the control of the firing process.

In the process of inheritance, the craftsmen pass on their skills and experience from generation to generation through oral transmission. This master-apprentice system not only ensured the transmission of skills, but also led to improvements and innovations. Especially in the Tang and Song dynasties, with the prosperity of cultural exchanges along the Silk Road, craftsmen not only maintained the core values of traditional craftsmanship, but also absorbed elements from other cultures, and gradually developed more diversified patterns and techniques. This technological innovation and cultural fusion reflects the openness and adaptability of production wisdom - it is not static, but evolves with the times.

In addition, the production wisdom of Dunhuang bricks is not limited to the technical level, but also includes a deep understanding and utilization of materials. From the earliest use of natural clay, to the glaze process introduced later in the Tang Dynasty, to the modern application of various new materials, the craftsmen showed great wisdom in the selection and processing of materials. They were able to make use of local resources according to local conditions, adopting different clay formulas and firing temperatures for different climates, temperatures and humidity conditions, so that each piece of flower brick could display the best texture and color. This understanding and use of materials not only improves production efficiency, but also determines, to a certain extent, the artistic style and expression of Dunhuang bricks.

Furthermore, the wisdom of production passed down from generation to generation is also manifested in the artisans' keen insight into the needs of society. From ancient times, when flower bricks were used as an important decorative element in religious buildings, to the widespread use of flower bricks in court and temple buildings during the Ming and Qing dynasties, to the diversified use of flower bricks as artwork, decorations, and even souvenirs in modern society, the wisdom of production reflects the craftsmen's deep understanding of the market demand and cultural values. In the process of passing on from generation to generation, they not only had to maintain the traditional standard of craftsmanship, but also had to continuously adjust the design and production process of their products according to the changes of the times in order to adapt to the new demands.

After entering the modern era, the wisdom of making Dunhuang flower bricks was further developed with the advancement of technology and the introduction of mechanized production. Although mechanization has led to a significant increase in production efficiency, the traditional techniques of hand carving, mold making, glaze proportioning and other skills are still an integral core part of the process. This

combination of modern technology and traditional wisdom has enabled Dunhuang flower bricks to adapt to the needs of modern society and enter a wider market while maintaining their historical and cultural value. This wisdom of production passed down from generation to generation is not only reflected in the continuation of skills, but also in the spirit of innovation and adaptability, so that this ancient technology can be revitalized in the modern society.

Finally, the inheritance of Dunhuang flower bricks relies not only on the wisdom of craftsmen, but also on the power of culture and education. Through education and cultural promotion, more and more young people are beginning to understand and learn the craft of Dunhuang bricks, which has injected new impetus into the inheritance of the skill. In the process, the spiritual core of the traditional craft is preserved, and the wisdom of production continues to develop in the new social context.

To summarize, the production wisdom of Dunhuang flower bricks has been passed down through generations, demonstrating the craftsmen's deep understanding of skills, materials, culture and the market. Craftsmen of each era have innovated and developed on the basis of their predecessors, allowing the technique to continue to adapt to the changes of the times and to take on a new vitality. Through this wisdom passed down from generation to generation, the Dunhuang Flower Brick has not only become one of the most important symbols of Chinese culture, but has also provided valuable inspiration and resources for modern art and design.

2.4 The overall historical heritage of the tiles

The culture of “brick” in China has a long history. According to ancient texts, bricks were invented by the minister Wu Cao of the late Xia Dynasty—recorded in the Taiping Yulan citing the Gushi Kao: "Wu Cao made bricks." Archaeological reports indicate that the earliest fired bricks discovered in China are a few fragments from the late Yangshao Culture found at the Xinjie site in Lantian, Shaanxi, dating back about 5,000 years(Figure 22). The earliest complete fired bricks were primarily hollow bricks and slab bricks from the early Western Zhou period found in Qishan and Fufeng, Shaanxi, dating back about 3,000 years(Figure 23).

Figure 22 Brick fragments from the late Yangshao culture were unearthed at the Xinjie site in Lantian.Pictures from the official Shaanxi Museum website collection display.
Source:https://www.sxhm.com/collection.html

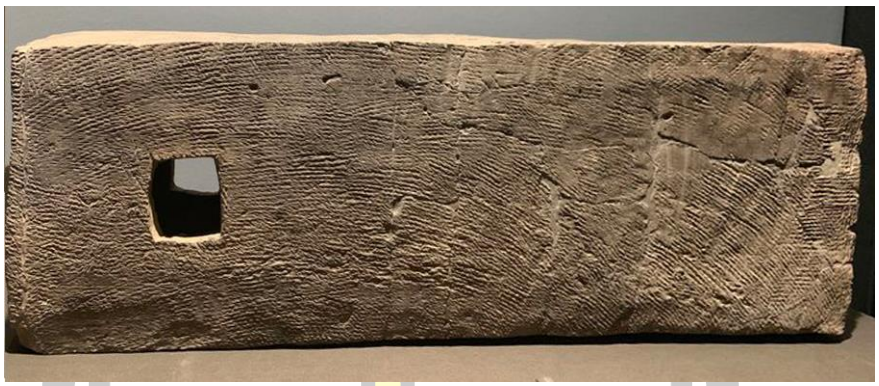

Figure 23 Hollow bricks from the Western Zhou Dynasty unearthed in Qishan. Pictures from the official Shaanxi Museum website collection display.
Source:https://www.sxhm.com/collection.html

The term "patterned tiles" refers to bricks with surface decorations or images, including two major categories: "paving patterned tiles" and "image tiles." Image tiles are further divided into "relief image tiles" and "painted image tiles" .(Editorial Committee of the Complete Collection of Chinese Picture Bricks,2006,96)

The earliest patterned tiles in China are hollow bricks with shallow relief decorations from the Warring States period (476 BC – 221 BC), although such artifacts are rare. During the Qin Dynasty (221 BC – 207 BC), large rectangular hollow bricks with decorations exceeding one meter in length began to appear(Figure 24), as well as solid square bricks with patterns(Figure 25). These bricks were mainly used for paving palace floors and steps. The decorative patterns on these bricks included dragon motifs, phoenix motifs, inscriptions, geometric patterns, and scenes of hunting and feasting, commonly referred to as "Qin bricks" in academic circles. These patterned bricks are classified as image tiles and represent a significant category of Chinese patterned tiles.(Chen J.Q,2023,162)

Figure 24 Tiger-patterned hollow bricks from the Qin Dynasty unearthed from the Xianyang Palace Ruins. Pictures from the official Shaanxi Museum website collection display.
Source:https://www.sxhm.com/collection.html

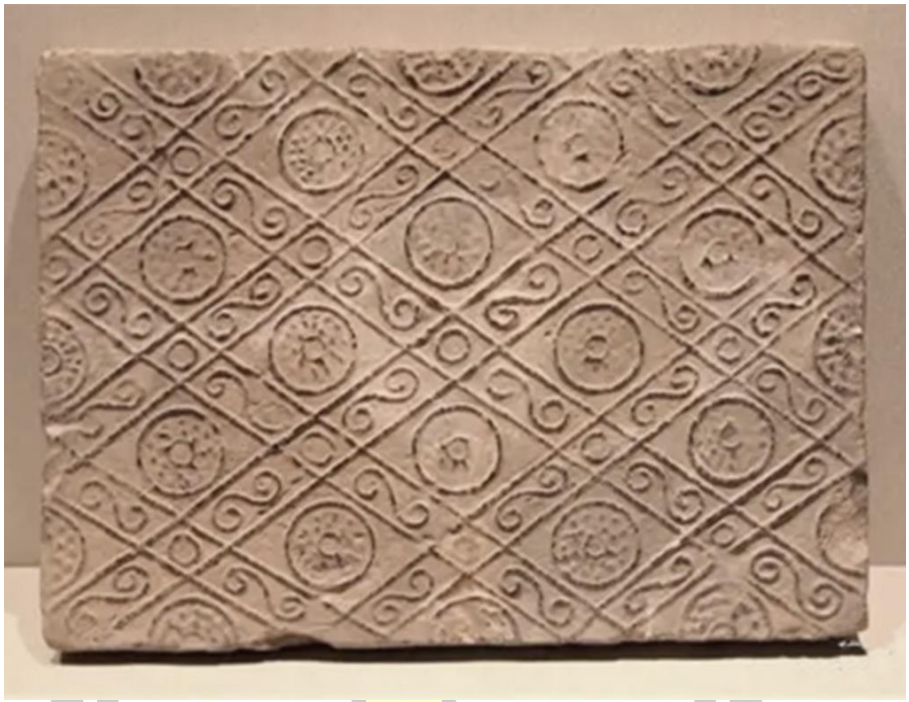

Figure 25 Qin Dynasty, square brick with sun pattern. Image from Xianyang Museum.
Source:http://www.xybwg.cn/

During the transition between the Han and Jin Dynasties (202 BC – 220 AD), image tiles became abundant and are often called Han picture bricks. They were mainly used for constructing and decorating tomb chambers, including paving tomb floors and building tomb walls and vaults. The production methods for these patterns primarily included stamping and molding. Stamping involved using wooden templates to imprint or press images onto semi-dry brick blanks, often using multiple templates to create various image combinations on the same brick surface. Molding involved pressing a pre-carved wooden mold into brick blanks, resulting in one pattern per brick. Molding appeared later, around the late Western Han to Eastern Han periods. During the Eastern Han period, relief image bricks reached their peak in terms of quantity and artistic expression, with significant finds in Sichuan, Henan, Shaanxi, Shandong, Anhui, Jiangsu, and Zhejiang, with Sichuan bricks being particularly artistically distinctive(Figure 26). Image bricks, along with the later image stones, were the mainstream forms of tomb art during the Han period and remain important visual materials for studying Han society and daily life. Additionally, the use of bricks for wall construction in ancient China began around the Han period, though it was initially limited to underground tomb walls. Brick construction for above-ground structures, such as residential buildings, did not become common until the Tang Dynasty or later.

Figure 26 Han Dynasty painted bricks unearthed in Sichuan and other places. The picture is from the Sichuan Museum.
Source:https://www.scmuseum.cn/sccms/

During the Wei, Jin, and Northern and Southern Dynasties (220–589 AD), although relief image tiles gradually declined, they remained a major form of tomb art. During the Wei and Jin periods, another type of image tile appeared: painted image tiles. Particularly in the Hexi Corridor of Gansu, and in areas like Gaotai, Jiuquan, Jiayuguan, Guazhou, and Dunhuang, thousands of Wei and Jin tombs have been discovered with a large number of wall paintings, mostly painted image tiles with one painting per brick, some composed of multiple bricks, and a few mud-base wall paintings.(Wang N.Y,2021,202-204) Compared to relief image tiles, painted image tiles covered a wider range of content, had more complex compositions, and displayed more vivid artistic expressions, representing a grand collection of medieval Chinese folk painting and summarizing contemporary secular life and beliefs about life and death(Figure 27).

พหูน ปณ ฑิโต ชีเว

Figure 27 A tomb portrait brick from the Wei and Jin dynasties unearthed in the Hexi Corridor in Gansu. Image courtesy of the National Museum of China and the Gansu Provincial Museum.
Source:https://www.chnmuseum.cn/
http://www.gansumuseum.com/

The production of patterns on Wei, Jin, and Northern and Southern Dynasties tomb image tiles continued to use methods such as stamping, with both single-image and multi-image designs. For instance, in the southern dynasties tombs around Nanjing, many stamped image bricks were found, including large-format detailed line-patterned images(Figure 28). In the Southern Dynasties, some image bricks were particularly noted for their colorful expressions, such as those found in a Southern Dynasties tomb in Dengzhou, Henan, which featured exquisite colored image bricks(Figure 29). Furthermore, during this period, hollow bricks became less common, brick sizes began to shrink, firing temperatures increased, and brick usage expanded to civilian architecture. In addition to underground tombs, bricks began to be used for constructing city walls and pagodas. The Songyue Pagoda in Dengfeng, Henan, built in the fourth year of the Zhengguang era (523 AD) during the Northern Wei Dynasty, is the oldest surviving brick pagoda in China.

Figure 28 A huge brick puzzle with fine lines unearthed in Nanjing. Image courtesy of Nanjing Museum.
Source:https://www.njmuseum.com/

Figure 29 A huge brick puzzle with fine lines unearthed in Nanjing. Image courtesy of Nanjing Museum.
Source:https://www.njmuseum.com/

During the Sui, Tang, and Five Dynasties (589–960 AD), the Sui Dynasty was a short-lived regime lasting only thirty-seven years, and the Five Dynasties was a period of over fifty years of fragmentation and turmoil. In contrast, the Tang Dynasty was a period of great prosperity and unity in ancient China. During this time, various forms of art in China, including sculpture, painting, decoration, music, dance, and drama, experienced unprecedented development. Image tiles had largely faded from prominence as a major form of tomb art, with central cities and affluent areas increasingly relying on sculptures and murals to decorate tombs. Particularly in royal tombs, extensive use of large stone sculptures and murals was common. Examples include the stone carvings in the Qianling Mausoleum of Emperor Gaozong and Empress Wu Zetian, and the murals in the tombs of Prince Zhanghuai and Princess Changle, which are grand and exquisitely detailed. Although tomb image tiles became rare, they were not completely abandoned, and some fine works emerged during this period, even showing a resurgence in certain cases. Examples include:

1)The “Hu People Leading Camel” and “Knight on a Journey” tiles from the Tang tomb at the Buddhist Temple of Fo Ye in Dunhuang(Figure 30;

2)The Tang Dynasty molded relief bricks with over 3,700 pieces in various shapes, including real figures, warriors, maidens, flying celestial beings, musicians, and mythological creatures from the Xueling Mountain Shuiding Temple Tower in Anyang, Henan(Figure 31);

3) The Five Dynasties “Music and Dance” patterned bricks from the Fenghui Tomb in Xianyang, Shaanxi. These works not only represent high artistic standards but also showcase diverse content, reflecting the exchange and integration of Eastern and Western cultures(Figure 32).

Figure 30 Tang Dynasty bricks of a foreigner leading a camel and a knight traveling unearthed from the Buddhist Temple in Dunhuang. The picture is from the Gansu Provincial Museum.
Source:http://www.gansumuseum.com/

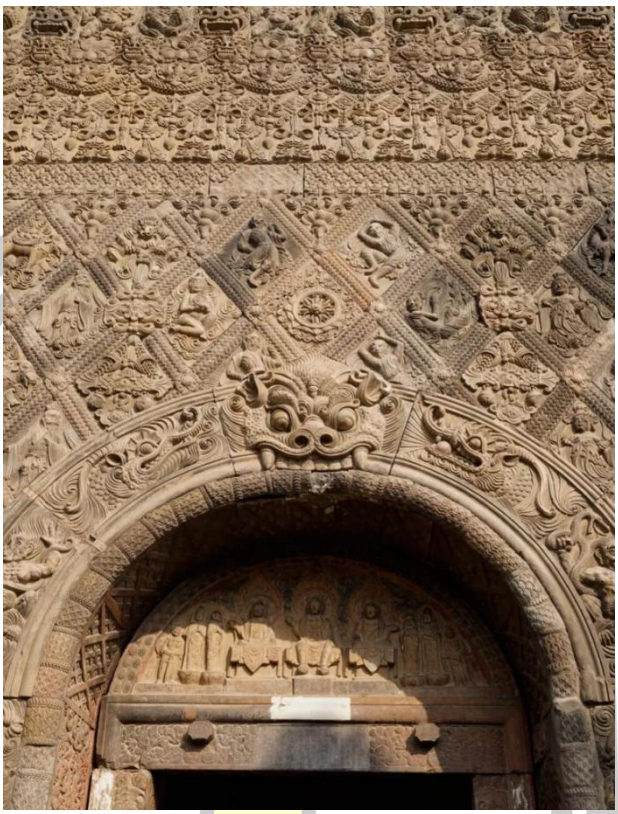

Figure 31 The pagoda of Xiuding Temple in Anyang, Henan.
Source:Ma Ruiqiang.

Figure 32 Molded bricks of the Five Dynasties "Music and Dance" in Feng Hui's Tomb in Xianyang. Image from Henan Museum.
Source:https://www.chnmus.net/

The works from the Tang and Five Dynasties periods mentioned here often appear to be of medium to high relief, rather than the shallow relief seen in Han picture bricks. Consequently, many classify these as “sculptured bricks” or “brick carvings” rather than image tiles. However, there is no strict distinction between molded sculptured bricks and molded image bricks in terms of craftsmanship. Any molded relief bricks that are not directly carved onto the brick blank should be considered image tiles. The accurate concept of “sculptured bricks” and “brick

carvings" pertains to designs carved into already fired bricks or at least carved into brick blanks, as opposed to those formed using molds.

Although wall image tiles from the Sui, Tang, and Five Dynasties periods generally declined, the number of molded paving patterned tiles surged dramatically, reaching a peak. During the Tang Dynasty, the use of patterned paving tiles became widespread, and these tiles were primarily used in three types of locations:

Palatial buildings: Paving tiles were mainly found in the Tang capital cities, Chang'an in the west and Luoyang in the east.

Temple architecture: The largest, most diverse, and best-preserved examples are found at the Mogao Caves in Dunhuang. Paving tiles with similar patterns have also appeared in other caves.

Tomb chambers: Paving tiles were used in various tombs from the Sui, Tang, and Five Dynasties periods. The number and variety of these tiles are also significant.

Although the designs on these three types of paving tiles differ, there are many similarities. Generally, they are intricate and diverse in composition. Most feature raised patterns, creating a relief effect, with a predominance of positive patterns. Common motifs include auspicious and beautiful plant designs such as lotus, honeysuckle, peony, grape, and pomegranate patterns. There are also a few auspicious beast motifs, such as sea monsters, dragon and phoenix designs, and rabbit patterns. These motifs and designs are influenced not only by native Han culture but also by foreign Buddhist culture and the art of the Western Regions, Central Asia, and Western Asia, reflecting a diverse and open artistic style of the period. As Buddhism's influence grew, lotus tiles became widely popular. Tang Buddhist temples were often adorned with various lotus-patterned tiles, a trend that even influenced palace designs(Figure 33-34).

Figure 33 From left to right they are: a Tang Dynasty double phoenix pattern square brick unearthed in Luoyang, a Tang Dynasty lotus pattern square brick unearthed in Luoyang, a Tang Dynasty lotus pattern square brick unearthed in Xi'an, and a Tang Dynasty nine-square rabbit square brick in the Dunhuang Museum.
Source:Ma Ruiqiang.

Figure 34 Cave 45 of the Mogao Grottoes in Dunhuang, Tang Dynasty floor tiles.
Source:https://zhuanlan.zhihu.com/p/512417458

During the Northern Song and Southern Song periods (960–1279 AD), the manufacturing and use of bricks became increasingly specialized, with tomb bricks becoming more common and brick structures above ground becoming more frequent. The Yingzao Fashi, compiled during the Northern Song Dynasty, details various brick specifications and uses. Although complete brick walls for palatial and temple buildings were still uncommon, brick usage began at the lower parts of walls, known as “isolating alkali.” The use of bricks for building foundations, previously made from rammed earth or stone, also emerged. The use of bricks for paving floors, roads, steps, and ramps, as well as brick and stone structures like pagodas and city walls, became more common in the Song Dynasty. Additionally, bricks were used for components such as Buddha statues, wells, and stoves.

In terms of decorative brick art, the Song period generally did not match the grandeur of the Tang Dynasty. Paving patterned tiles remained common in palaces, temples, caves, and tombs, but exquisite examples became rare. However, brick carving art developed rapidly during this period. Brick carvings can be subdivided into “sculptured bricks” and “brick carvings.” The main difference is that sculptured bricks typically feature one image per brick, while brick carvings involve multiple bricks forming a single or a group of images. Brick carvings also include three-dimensional shapes. For instance:

1)A set of five "drama character" sculptured bricks from a Northern Song tomb in Jiaozuo, Henan, using a combination of relief and incised lines to create varied and vivid figures(Figure 35).

2)"Warrior leading a horse" and "Hu people leading a camel" sculptured bricks from a Northern Song tomb in Zhenyuan County, Gansu, noted for their detailed realism and exceptional sculptural techniques(Figure 36).

3)A large-scale, skilled, and richly decorated brick carving from the Jincun Tomb in Jishan County, Shanxi, demonstrating strong decorative effects(Figure 37).

Figure 35 Bricks with opera characters unearthed from a Northern Song Dynasty tomb in Jiaozuo. Image courtesy of Henan Museum.
Source:https://www.chnmus.net/

Figure 36 Decorative tiles of "Warriors Leading Horses" and "Hu People Leading Camels" unearthed from a Northern Song Dynasty tomb in Zhenyuan County, Gansu Province. Image courtesy of Gansu Provincial Museum.
Source:http://www.gansumuseum.com/

Figure 37 Bricks unearthed from a Song Dynasty tomb in Macun, Jishan, Shanxi.

Source:Ma Ruiqiang.

By the Song Dynasty, image brick art had entered its decline, with colorful painted image tiles from the Wei and Jin periods mostly vanished. Molded relief image bricks from the Qin and Han periods also became rare. However, some fine examples of this ancient art form still survive in historical sites in Gansu and Henan. For instance:

In Qing Shui County, Gansu, several Song Dynasty tombs are almost entirely covered with colorful brick decorations, including molded relief image bricks, sculptured bricks, and brick carvings, with rich content, vibrant styles, and high cultural significance(Figure 38).

The "Iron Pagoda" in Kaifeng, Henan, from the Northern Song Dynasty, is constructed with imitation wooden structure glazed relief bricks. The bricks come in 28 shapes with over 50 patterns, including celestial beings, monks, bodhisattvas, qilin, dragons, and musical instruments, showing exquisite craftsmanship(Figure 39). These glazed relief bricks are considered a special type of image tile because they are molded and feature one image per brick.

Figure 38 A Song Dynasty tomb in Qingshui County, Gansu Province.
Source:Ma Ruiqiang.

Figure 39
Northern Song Dynasty Buddhist pagoda in Kaifeng, Henan. The picture is taken from the photography.
Source:Ma Ruiqiang.

During the Yuan, Ming, and Qing Dynasties (1271–1912 AD), brick carving art flourished, extending from tombs to surface architecture. Paving patterned tiles continued to be used in tombs, palaces, and caves, and were also found in luxurious residential buildings. Image tiles largely disappeared, with no new instances of using image tiles to decorate tomb chambers.

Brick carving decoration began in the Yuan Dynasty, likely related to the growing popularity of brick walls. Before the Yuan Dynasty, most wooden and earthen walls only had bricks at the lower parts to prevent moisture and alkali from affecting the walls. With the advent of full brick walls, incorporating brick carvings into walls became a logical development. This architectural decoration style continued through the Ming and Qing Dynasties and remains in use in modern historic buildings. An example is the "Hezhou brick carving" from Linxia, Gansu, which blends Islamic styles with Han Chinese culture(Figure 40).

Figure 40 Hezhou brick carvings in Linxia, Gansu.
Source:Ma Ruiqiang.

The Yuan Dynasty's paving patterned tiles are most notably found in the Mogao Caves at Dunhuang and the Yuan Dynasty layers in the Forbidden City in Beijing. These finds show that molded blue bricks remained the mainstream during the Yuan Dynasty(Figure 41). However, from the Yuan Dynasty onwards, the craftsmanship and materials of paving patterned tiles expanded beyond blue bricks to include ceramic tiles. The most typical example is the blue-and-white glazed ceramic floor tiles used in the Ming Dynasty’s Dapo’en Temple in Nanjing, which closely resemble modern glazed ceramic tiles(Figure 42). Another example is the "golden bricks" used in the Ming and Qing Dynasties' imperial palaces, produced in Suzhou with high-quality materials and complex craftsmanship, known for their metallic sound when struck. Although not patterned tiles, these bricks are considered luxurious due to their refined material and intricate process(Figure 43). Additionally, traditional buildings often had perforated patterned bricks installed at the lower parts of gables and rear eaves to allow moisture to escape from enclosed wooden columns, with intricate designs used in high-end buildings(Figure 44), giving rise to the saying, "There are no walls that do not ventilate."

Figure 41 Flower bricks from the Yuan Dynasty unearthed in the Forbidden City. Image courtesy of the Palace Museum.
Source:https://www.dpm.org.cn/Home.html

Figure 42 Blue and white glazed ceramic tiles from the Ming Dynasty Da Baoen Temple in Nanjing.
Source:https://www.njmuseum.com/zh

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Figure 43 Wanli gold brick from the Ming Dynasty.
Source:https://www.njmuseum.com/zh

Figure

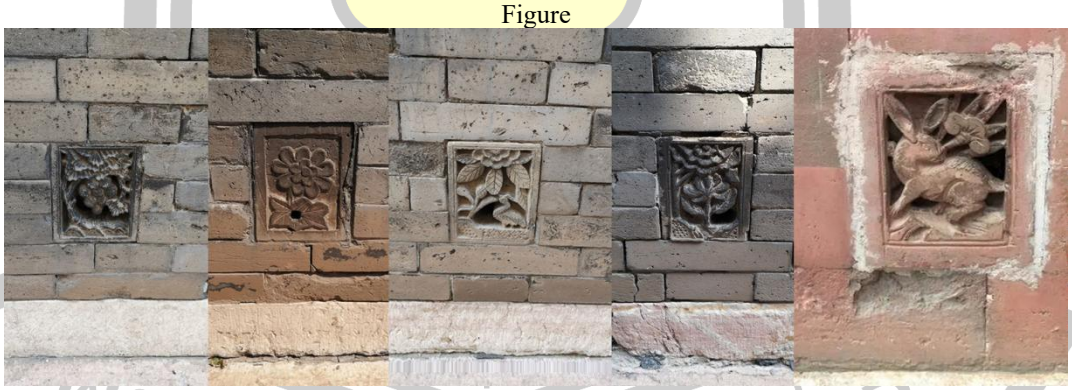

Figure 44 Ventilated bricks on the walls of the Forbidden City.
Source:Yanda Du.

After the Qing Dynasty, the trend of simple burial practices diminished the importance of tomb art, and traditional brick-and-wood structures became increasingly rare, leading to the gradual disappearance of traditional patterned tiles from historical use.

In recent decades, with the development of the cultural industry, the promotion of historical culture, the construction of tourism attractions, and the recovery of intangible cultural heritage in various regions of China, there has been a

sharp increase in the number of antique-style buildings and a corresponding market demand for antique-style patterned tiles. Meanwhile, with the growing interest in cultural relics and antiques, ancient patterned tiles are increasingly being exhibited in sites and museums, frequently coming into public view, and replicas of these relics are also emerging. Under this environment, Chinese patterned tiles (including relief image bricks, painted image bricks, sculpted bricks, and paving patterned tiles) have once again gained attention and popularity, becoming subjects of research, collection, and application. Among them, Dunhuang, with its extensive variety of ancient patterned tiles, has taken a leading role in the study and replication of these tiles, which is a topic for later discussion.

From the historical trajectory of Chinese patterned tiles, it is evident that the art of patterned tiles reached its peak during the Tang dynasty and began to decline after the Five Dynasties, and Dunhuang patterned tiles followed a similar trend. Therefore, the academic community generally divides the historical transmission of Dunhuang patterned tiles into three main stages: initial development, flourishing, and decline(Yin G.M,1988,124-125).

Initial Development Stage (Sui Dynasty): During this period, the patterned tiles were relatively large. Due to the underdeveloped craftsmanship and lower firing temperatures, the texture was loose and porous. The pattern types were relatively simple, mainly featuring eight-petal lotus designs. These patterned tiles employed traditional stone carving techniques, with high, broad, and heavy relief surfaces. Their characteristics were solemn and simple, showing the unique charm of early Dunhuang patterned tiles (illustration). Although the craftsmanship was not mature, this simple design style provided valuable experience for subsequent improvements and developments in the craft.

Flourishing Stage (Tang Dynasty): During this period, the craftsmanship of patterned tiles had fully matured, with standardized shapes, except for woven pattern tiles. The firing temperature was moderate, the texture was hard, and the tile surfaces had a certain degree of smoothness. The patterns were clear, with a rich variety of themes, including era-specific designs such as (precious flower), (pomegranate flower), (scrolling grass patterns), and patterns combining various scattered leaf motifs (illustration). The craftsmanship of patterned tiles during this period not only reached its peak in technique but also made new breakthroughs in artistic expression. Deformation techniques were widely used, with delicate shapes and intricate patterns full of vitality, showcasing a dynamic and progressive spirit. This artistic style was deeply rooted in the high prosperity of Dunhuang's economy and culture at that time. As an important node on the Silk Road, Dunhuang's economic development and frequent cultural exchanges provided fertile ground for the development of patterned tile craftsmanship.

Decline Stage (Five Dynasties to Yuan Dynasty): After the Tang Dynasty, with the decline of the Silk Road and the impact of wars, Dunhuang's economic status rapidly declined. The economic downturn directly affected the lives and creative environments of craftsmen, leading to a gradual decline in craftsmanship and a weakening of artistic innovation. Consequently, the development of patterned tile craftsmanship was naturally restricted, showing signs of decline. This was directly reflected in the continuous decline in craftsmanship levels, noticeable differences in

firing temperatures among various tiles, and even uneven firing temperatures among similar tiles, resulting in deformed surfaces and inaccurate patterns and motifs.

Although new techniques such as brick carving emerged during this period, introducing new pattern themes like(honeysuckle pattern), (flame pattern), and (knot pattern), and new developments in lotus patterns such as geometric pointed lotus and (rolled petal lotus), the patterns of this period focused more on deliberate imitation of previous designs, with repetitive and similar themes, and some inherited structural norms from previous eras. The patterns were rigid and complex, primarily aimed at decorative effects, leading to monotonous, stiff, and purely patterned designs that lacked artistic quality (illustration).

As an important component of ancient Chinese brick culture, the historical transmission of Dunhuang patterned tiles has undergone several stages, from the origin in the Sui Dynasty to prosperity in the Tang Dynasty, and then to decline after the Five Dynasties. Throughout this process, Dunhuang patterned tiles continuously absorbed cultural elements from both the Central Plains and the Western Regions, forming a unique artistic style and rich cultural connotation while maintaining continuity and development.

2.5 field survey

During my fieldwork, I used the two main forms of questionnaires and interviews. For experts related to Dunhuang art or research, I used interviews. I also used interviews with Dunhuang natives who have relatively little knowledge of Dunhuang art. For practitioners and learners of Dunhuang art, I designed two different sets of questionnaires to capture their thoughts and information.

2.5.1 interviews

During the course of the study, interviews were conducted using two directional populations. One is the Dunhuang art experts and related experts, i.e., the group of experts who provided support for this study.

Du Yongwei(Figure 45), Dunhuang colorful sculpture expert, China Arts and Crafts Master. He is also my master and leader in the field of Dunhuang art. Therefore the first expert considered in this study is him.In this study, he provides support and instructions on the artistic expression of Dunhuang flower bricks, traditional craftsmanship, and so on.

Figure 45 Du Yongwei was interviewed.
Source:Yanda Du.

Zhao Junrong(Figure 46), Senior Researcher, Dunhuang Academy. He provided support and guidance in this study mainly on hand-painted drawings of Dunhuang flower tiles.

Figure 46 Zhao Junrong was interviewed.
Source:Yanda Du.

Kou Kehong(Figure 47), director of the Gaotai County Cultural Relics Bureau and a cultural relics expert. He mainly provides support and guidance in this study in the areas of Dunhuang Flower Brick artifacts dating and period style characterization.

Figure 47 Kou Kehong was interviewed.
Source:Yanda Du.

Wang Yongsheng is a professor at the College of Arts(Figure 48), Lanzhou Jiaotong University. Provided technical and software application support and guidance for the Dunhuang flower bricks in this study at the level of decorative and modernization.

Figure 48 Wang Yongsheng was interviewed.
Source:Yanda Du.

Du Yongsi(Figure 49), a senior architect, has designed more than fifty museums and exhibition halls throughout China. He is also a good friend of Prof. Wang Yongsheng in work and life. He provided the ideas and concepts of architectural design and decoration for this study, and offered many valuable

suggestions and guidance on the application of Dunhuang flower bricks in the field of modern decoration.

Figure 49 Du Yongsi was interviewed.
Source:Yanda Du.

In the interviews with Dunhuang locals, more than 20 Dunhuang locals were selected. Some of them came from different professions, such as students, company employees, and staff of governmental organizations. In addition, my master, Mr. Du Yongwei, introduced several other Dunhuang experts for the purpose. Mr. Sun Rujian, Mr. Gao Shan, and Mr. Lu Qinxue(Figure 50-52). Although they did not have more time and energy to help and follow up my research all the time. However, they did offer many valuable comments and suggestions based on their professional knowledge and experience during the interviews.

Figure 50 Interviewed Dunhuang native.
Source:Yanda Du and Ruiqiang Ma.

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Figure 51 Interviewed Dunhuang native.
Source:Yanda Du and Ruiqiang Ma.

Figure 52 Interviewed Dunhuang native.
Source:Yanda Du and Ruiqiang Ma.

In addition, I visited a number of organizations and museums related to Dunhuang art or Dunhuang studies, both locally in Dunhuang and in Lanzhou, the capital of Gansu Province. Institutions such as the Mogoli Artisan Village, Dunhuang Art Transmission Institute, Dunhuang City Museum, Dunhuang City Cultural Center Intangible Cultural Heritage Pavilion, Gansu Provincial Museum, Dunhuang Research Institute, and Lanzhou Hongyu Color Brick Factory(Figure 53).

Figure 52 Visiting organizations or units related to Dunhuang art or Dunhuang studies.
Source:Yanda Du.

2.5.2 field survey

The fieldwork method, as a field research method, has helped me to obtain important information about the Dunhuang flower bricks craftsmanship, the production process and its modern application from the real environment. The fieldwork I conducted was not only limited to observations and interviews, but also included in-depth exchanges with local craftsmen and scholars in the following ways:

Fieldwork and observation: I traveled to Dunhuang and the surrounding areas and made fieldwork visits to the ruins, workshops and museums of Dunhuang flower bricks, observing in detail the styles of flower bricks and the characteristics of their craftsmanship in different historical periods(Figure 54-56). Through contact with the objects, I was able to visualize the materials and textures of the flower bricks as well as their decorative functions, thus providing first-hand information for the discussion of the craftsmanship and artistic features of the flower bricks in the dissertation.

Figure 53 Flower tiles for the Dunhuang Museum.
Source:Yanda Du.

Figure 54 Flower tiles for the Dunhuang Museum.
Source:Yanda Du.

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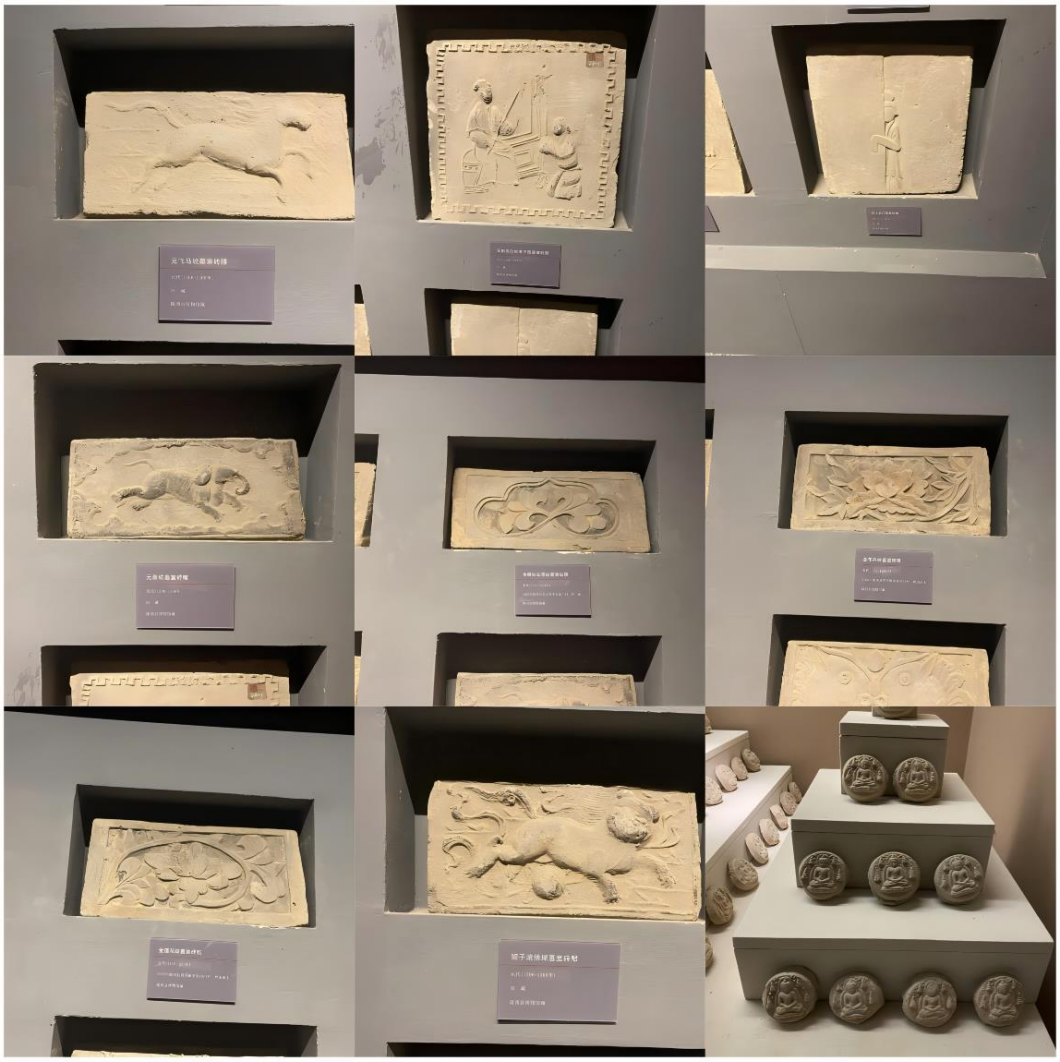


Figure 55 Longview County Museum Flower Brick.
Source:Yanda Du.

1) Communication with practitioners: During my fieldwork, I had face-to-face communication with artisans, scholars, and craftsmen engaged in Dunhuang flower bricks and related arts(Figure 57). These in-depth interviews not only enriched my understanding of the craft of making flower bricks, but also provided practical examples of how these traditional skills have been passed on and innovated in contemporary times. For example, artisans shared how they use the traditional flower brick craft in modern decorative designs and how they respond to the demands of the modern market.

Figure 56 Talking with artisans who make Dunhuang flower bricks.
Source:Yanda Du.

2) Combination of field data and literature: The field data obtained during the fieldwork further complemented the theoretical discussions in the literature study, enabling me to analyze in depth the transformation path of Dunhuang flower bricks from tradition to modernity through the comparison of history and modernity in my research. The combination of field data and historical documents allows me to present a clearer picture of the actual situation of Dunhuang flower bricks and the challenges they face in contemporary applications.

2.5.3 questionnaire approach

In designing the questionnaire, I fully considered the characteristics of different groups of respondents and the research objectives to ensure the breadth and validity of the data collected(Figure 58). The questionnaire method not only reveals learners' and practitioners' perceptions and attitudes towards dunhuang bricks through the analysis of quantitative data, but also complements the qualitative research. The following is an in-depth explanation of the details of the questionnaire design:

Figure 57 Respondents who received the invitation are filling out the questionnaire.
Source:Yanda Du.

Targeted Question Setting: In order to obtain comprehensive audience feedback, I designed two types of questionnaires: one for learners of dunhuang tiles and the other for practitioners. This design takes into account the background and cognitive differences of the different groups. For learners, the questions focused on their level of awareness, aesthetic attitudes, and interest in modern applications of flower tiles. For practitioners, on the other hand, the questions focused on their professional experience, in particular the technical and thematic issues they face in the practical application of flower bricks, as well as their perceptions of innovations in the craft.

Through these well-designed questionnaires, I was able to gain a comprehensive understanding of learners' and practitioners' perceptions of Dunhuang's flower bricks, ensuring the diversity and validity of the data, thus providing a solid foundation for the subsequent study.

Summary:

This chapter focuses on the historical transmission and artistic characteristics of Dunhuang patterned tiles. It first provides a detailed review of the historical development of Dunhuang patterned tiles, exploring their evolution and analyzing the cultural and social significance they carried in different periods. As a pivotal hub of the ancient Silk Road, Dunhuang served as a bridge for cultural exchanges between the East and the West, while also being a key center for the dissemination of Chinese culture. Against this backdrop, the development of Dunhuang patterned tiles reflects the blending of diverse cultural elements while retaining deep regional and national characteristics.

1. Historical Transmission of Dunhuang Patterned Tiles

Dunhuang patterned tiles, as a unique form of decorative art, bear the marks of a long historical memory. Their origins can be traced back to the Wei, Jin, and Northern and Southern Dynasties. Over different historical stages, as political changes and economic prosperity unfolded, the styles and functions of Dunhuang patterned tiles also evolved. Especially during the Sui and Tang dynasties, as Dunhuang became a crucial point for East-West cultural exchange, the craftsmanship and design of the tiles displayed a clear trend toward diversification, incorporating not only traditional Central Plains techniques but also exotic elements from regions like Central Asia and India.

The craftsmanship of Dunhuang patterned tiles has been continuously refined throughout history, progressing from simple to complex and from singular to diverse. The earliest tile patterns were relatively simple, featuring mainly geometric shapes and basic animal motifs. By the Tang dynasty, with the flourishing of handicrafts and the spread of religious culture, the tile designs became more vibrant and diverse. In addition to geometric shapes, images of plants, figures, and animals began to appear frequently on the tiles. Buddhist-themed tiles, in particular, became a significant part of Dunhuang art. During this period, the tile art was closely linked with other forms of Dunhuang art, such as Buddhist murals and sculptures, forming a distinctive artistic landscape unique to the region.

As Dunhuang declined, especially during the Ming and Qing dynasties, the prominence of Dunhuang patterned tiles waned, entering a period of stagnation. However, due to Dunhuang's unique geographical position and historical context, the traditional craftsmanship of Dunhuang patterned tiles was preserved and passed down through generations of local artisans. These tiles remain valuable physical evidence for understanding Dunhuang's cultural history, reflecting the cultural exchanges and technical advancements of different eras.

2. Artistic Characteristics and Cultural Significance

After discussing the historical transmission of Dunhuang patterned tiles, this chapter also focuses on their artistic characteristics, styles, and cultural background. Dunhuang patterned tiles are not only practical building materials but also artistic works imbued with profound cultural meaning. Their designs are highly symbolic, reflecting the religious beliefs, social ideals, and aesthetic preferences of the time.

The artistic style of Dunhuang patterned tiles can be summarized as exquisite, detailed, and diverse. The designs emphasize symmetry, order, and harmony. Common tile patterns include lotus flowers, treasure flowers, and geometric motifs. These patterns serve not only as decoration but also carry rich cultural symbolism. For example, the lotus is an important symbol in Buddhism, representing purity and transcendence, while the treasure flower symbolizes prosperity and good fortune. The design of Dunhuang patterned tiles has evolved over time, retaining classic elements from traditional Chinese culture while continuously absorbing influences from foreign cultures, reflecting the deep imprint of cultural exchange along the Silk Road.

In addition, the craftsmanship involved in creating Dunhuang patterned tiles is also highly artistic and creative. From material selection to the carving and painting of patterns, every production stage demonstrates the artisans' superb skills and aesthetic pursuits. The craftsmanship is not limited to surface decoration but reflects the overall level of architectural art at the time. This artistic approach was widely applied in Buddhist architecture and temple walls in Dunhuang, forming a regional architectural decoration style.

On a cultural level, Dunhuang patterned tiles carry deep religious beliefs and social consciousness. Especially during the flourishing period of Buddhism, many tile patterns were directly or indirectly related to Buddhist doctrines. Through these patterns, one can glimpse the reverence for and devotion to religion within the society of the time. The designs were not just for aesthetic purposes but also served as material expressions of religious and social ideals.

3. The Fusion of History and Art

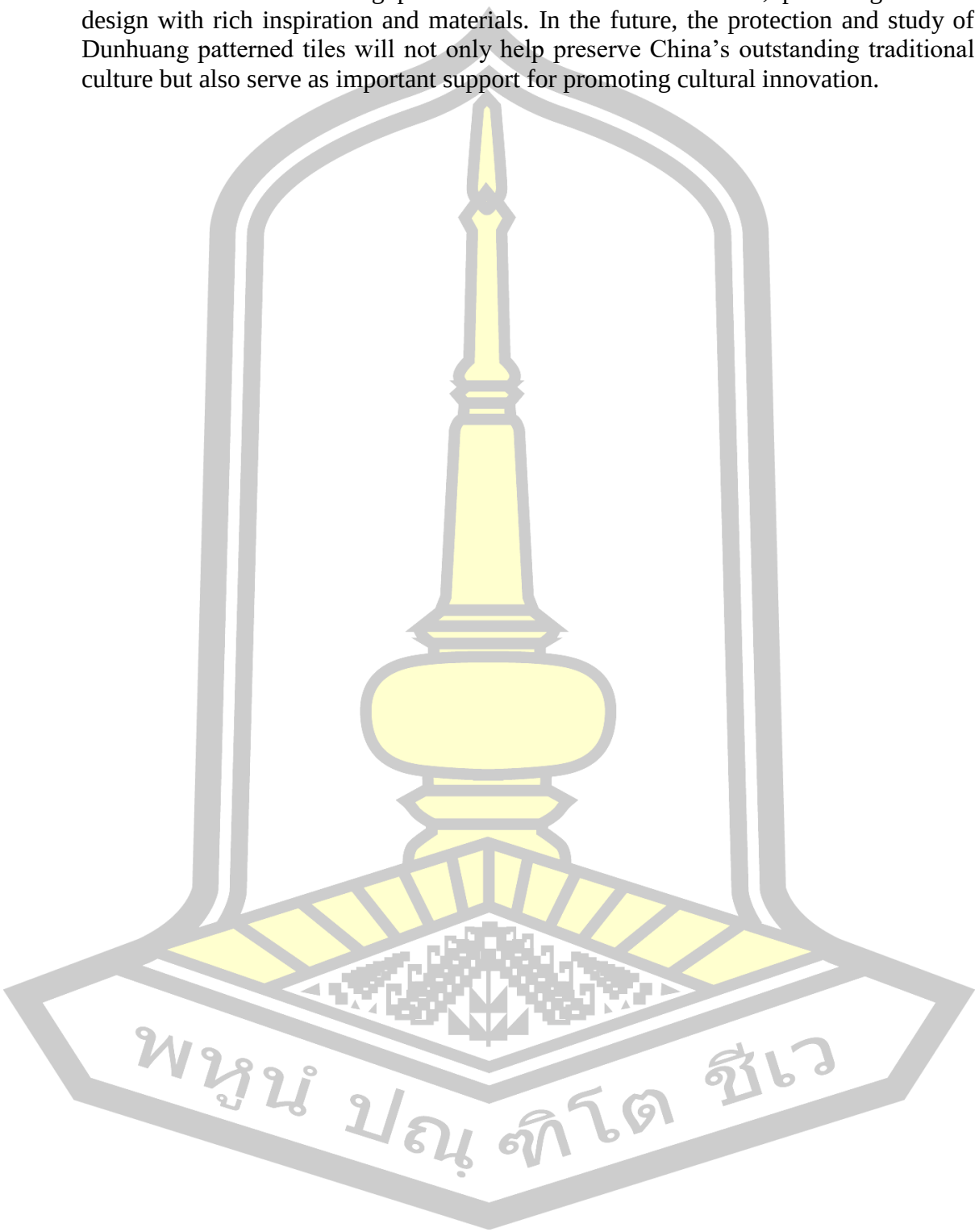
As products of the fusion of history and art, Dunhuang patterned tiles are valuable not only for their artistic qualities but also for the profound historical and cultural significance they embody. This chapter's discussion of the historical transmission and artistic features of Dunhuang patterned tiles reveals that they are not only cultural heritage specific to the Dunhuang region but also symbols of cultural exchange along the Silk Road. The designs, craftsmanship, and cultural meanings of these tiles are deeply embedded in their respective historical contexts, reflecting the cultural atmosphere and ideological trends of their time.

Dunhuang patterned tiles, as important cultural artifacts, carry rich historical memory and cultural information. Through their study, we can gain a deeper understanding of Dunhuang's historical and cultural landscape and better appreciate the process of cultural exchange and fusion along the Silk Road.

In contemporary times, the artistic value of Dunhuang patterned tiles continues to provide important inspiration. With the development of modern cultural industries, the design elements and artistic styles of Dunhuang patterned tiles have been reinterpreted and creatively applied. Modern designers have drawn inspiration from these ancient art forms, incorporating them into modern architecture, decoration, and craft designs, giving them new vitality and relevance.

In conclusion, Dunhuang patterned tiles, as a unique form of historical and artistic heritage, are valuable not only for their exquisite artistic form but also for the rich cultural and historical information they carry. Through an in-depth analysis of the historical transmission and artistic characteristics of Dunhuang patterned tiles, this chapter reveals their evolution and development across different historical periods, as

well as their key role in East-West cultural exchange. In contemporary times, the artistic charm of Dunhuang patterned tiles continues to shine, providing modern design with rich inspiration and materials. In the future, the protection and study of Dunhuang patterned tiles will not only help preserve China's outstanding traditional culture but also serve as important support for promoting cultural innovation.



Chapter Ⅲ

Analysis of the meaning and value of Dunhuang tiles and search for traditional cultural symbols

3.1 The Symbolic Meaning and Cultural Attributes of Patterned Tiles

In traditional Chinese decorative motifs, plant and animal patterns are widely used in architecture, sculpture and painting. They have an auspicious allegorical purpose and usually follow two approaches: one is based on the symbolism of the plants, usually derived from their personification or mythological associations; the other is where the name is pronounced in a way that creates a resonance or association with a positive meaning.

3.1.1 Lotus flower

The lotus, also known as the water lily or lotus flower, is one of the earliest plants in the angiosperms. According to paleobotanists, lotus plants were already present in many Northern Hemisphere water bodies during the Cretaceous period, approximately 137 million years ago. After an ice age, the lotus distribution area shrank, leaving two surviving species: the "Chinese lotus," which grows in China, Japan, India, and Southeast Asia with China as its distribution center; and the "American lotus," which is mainly found in Northern North America, with the United States as its distribution center. This indicates that the lotus species are found in suitable soils from India to China. Both India and China recognized the lotus early and endowed it with different cultural meanings.

The earliest literary records of lotus imagery are found in pre-Qin works such as the "Book of Songs" and "Chu Ci."The "Book of Songs" employs the metaphor of the lotus to describe beautiful individuals, such as in "Chen Feng·Ze Bi" ("In the marshes by the pond, there are reeds and lotuses") and "Zheng Feng·Shan You Fu Su" ("The mountain has Fu Su, the marsh has lotus flowers"). In "Chu Ci," the lotus is used as a metaphor for purity and high quality through rhetorical techniques, as seen in "Li Sao" ("Wearing clothes made of lotus leaves, gathering hibiscus for a skirt"). These references showcase the secularization and philosophical aspects of lotus imagery in traditional Chinese culture. The former reflects the public's association of the lotus with love and fertility, while the latter aligns with scholars' pursuit of the lotus as a symbol of purity.The former allegory is obviously more widely used in folklore. The

fruit of the lotus is the same as the continuous birth of children in the Chinese pronunciation. In ancient times, when medical care was not well developed, giving birth to a child faced more risks, and both mother and child could lose their lives due to lack of medical care. In addition, ancient China was an agricultural country and a larger population meant having more laborers and soldiers. Therefore, both officially and privately, it was hoped that the birth of children by women in the family could go smoothly and that more children could be born. This symbolism has been passed down to this day.

The lotus flower also symbolized the purity and cleanliness of officials during the feudal dynasties of China, especially during the Ming and Qing dynasties. Because the Chinese pronunciation of the word “lotus” is the same as the word “integrity”. There are a lot of ceramics from the Ming and Qing dynasties that have been unearthed or handed down in China with lotus flower motifs. According to historical records, the emperors of the Ming and Qing dynasties sometimes rewarded officials with such porcelains to recognize and encourage these officials to maintain their integrity.

Throughout history, the lotus has been viewed by some scholars, such as Qinzhao Wen, as an archetype reflecting three cultural connotations: firstly, as a symbol of reproductive worship and life; secondly, influenced by religious and philosophical thoughts, as a symbol of religion; and lastly, its development into mature art forms representing aesthetics. It is worth noting that the sacredness of the lotus in Chinese culture and its reverence in Buddhism are consistent, making it complex to discern which influenced the other. This complexity is reflected in the art of Dunhuang patterned tiles, where the lotus pattern is often depicted as an eight-petaled design(Figure 59), typical of early patterned tiles from the Mogao Caves. The central circle represents the lotus seed pod, with evenly spaced holes resembling the seed pod’s structure, and the outer layer features eight raised petals. This design is a prime example of biomorphic pattern design, reflecting the simple and heavy style of the Sui Dynasty’s patterned tiles. (Chang S. N,2016,20)

Figure 58 Dunhuang eight-petal lotus brick.
Source:Yin Guangming dissertation, “Dunhuang Molded Flower Brick Primer”.

3.1.2 Persimmon Calyx Patterns

Persimmon calyx patterns emerged during the Spring and Autumn and Warring States periods and were popular during the Han Dynasty. According to the "Youyang Zazu," "Among the roots of wood, persimmon is the most solid. It is commonly referred to as the persimmon disc." The persimmon calyx patterned tiles feature a traditional design with four persimmon calyx leaves, surrounded by small persimmon calyx flowers on all sides. The flower center is encircled by gentle floral leaves, and the corners of the tile are adorned with four symmetrical flower clusters. This central motif is well-suited to the pattern, symbolizing stability and auspiciousness(Figure 60).With this symbolism, it is often found in buildings that are expected to be stable for years to come.

The persimmon pedicle pattern tile is named because it looks like the leaves on the pedicle of a persimmon. There is also a modern theory that the four-leaf clover, which symbolizes luck, originated from the persimmon pedicle pattern.In Chinese folklore, persimmon also represents good fortune, because “persimmon” and “matter” have the same sound, which emphasizes people's desire and pursuit of a better life.

Figure 59 Persimmon tiles.
Source:Yongwei Du,2022.

Each persimmon calyx pattern resonates with the others, intertwining in a harmonious design. As a decorative tile, the persimmon calyx pattern also signifies the solidity and durability of the Dunhuang caves.

3.1.3 Honeysuckle Patterns

Also known as rolling grass patterns, honeysuckle patterns are frequently seen on Dunhuang patterned tiles. According to "Chinese Pattern History," "Rolling grass patterns are floral and grass designs that extend in a wavy shape either horizontally or vertically. They were popular during the Tang Dynasty and continued to be used as border decorations in subsequent eras... In terms of pattern evolution, the Han Dynasty referred to this as rolling cloud patterns, the Wei, Jin, and

Northern and Southern Dynasties called it honeysuckle patterns, the Tang Dynasty termed it rolling grass patterns (or Tang grass patterns), and modern times refer to it as fragrant grass patterns. Although the names differ, they generally feature a wavy vine structure with leaves and flowers, sometimes referred to as entwined branch flowers.(Figure 61)"Honeysuckle is hardy and withstands the cold and does not wither over the winter, and the Chinese have given it an anthropomorphic symbol of the tenacity and resilience of life. At the same time, it also fits in with the Buddhist culture, which symbolizes the immortality of the soul and the reincarnation of eternal life.

Figure 60 Rubbings of Tang Dynasty bricks with honeysuckle patterns from Dunhuang.
Source:Chang Shana, Decorative Patterns of Dunhuang in China through the Ages.

Honeysuckle patterns emerged as an imported design style with the rise of Buddhist art. Widely used in Buddhist decorations during the Northern and Southern Dynasties, the honeysuckle-patterned tiles often feature an eight-petal lotus flower at the center. Four swirling cloud motifs extend outward from the lotus center, with honeysuckle patterns added to the outer layer of the swirling clouds. The spacing between the flower leaves is well-coordinated, creating a smooth and natural visual effect. Honeysuckle patterns are characterized by their interconnected design, where flower branches form a tightly organized framework, with flowers integrated within or along the framework's lines, creating a dynamic and rhythmic flow.

The design of rolling grass patterns aligns with the traditional Chinese tendency toward fluid, intertwined, and harmonious decorative arts from the Spring and Autumn and Warring States periods to the Qin and Han Dynasties. These patterns reflect a mature grasp of lyrical curves and flowing rhythms, providing a tangible representation of the movement and grace in decorative arts.

3.1.4 Treasure Flower Patterns

Treasure flower patterns became popular with the rise of Buddhism during the Wei, Jin, Northern, and Southern Dynasties. "Treasure flower" is a term of reverence used by Buddhists for Buddha statues, symbolizing purity, dignity, and beauty. This pattern combines features of lotus, peony, and chrysanthemum flowers, representing a symbolic amalgamation of various floral elements. The design integrates leaves with a blend of abstract and realistic elements, alternating through the seasons and viewed from different angles(Figure 62).In reality, however, the Po Xiang Hua is not a plant that exists in nature; it is a pattern fabricated during the evolutionary process of Buddhist teachings by combining the fusion of several naturally occurring flowers. It was only later that it was gradually introduced from religion to folklore. From a religious point of view, the poinsettia represents holiness and solemnity. However, after entering the folklore, its symbolism has undergone some changes, because the Baoxiang Flower also incorporates the shape of the peony, which has the symbolism of “riches and wealth” in the folklore. Therefore, the Baoxiang flower also represents “treasure” in folklore, and besides appearing in handicrafts and architectural decorations, it is also used in a large number of precious jewelry.To show off the owner's wealth.

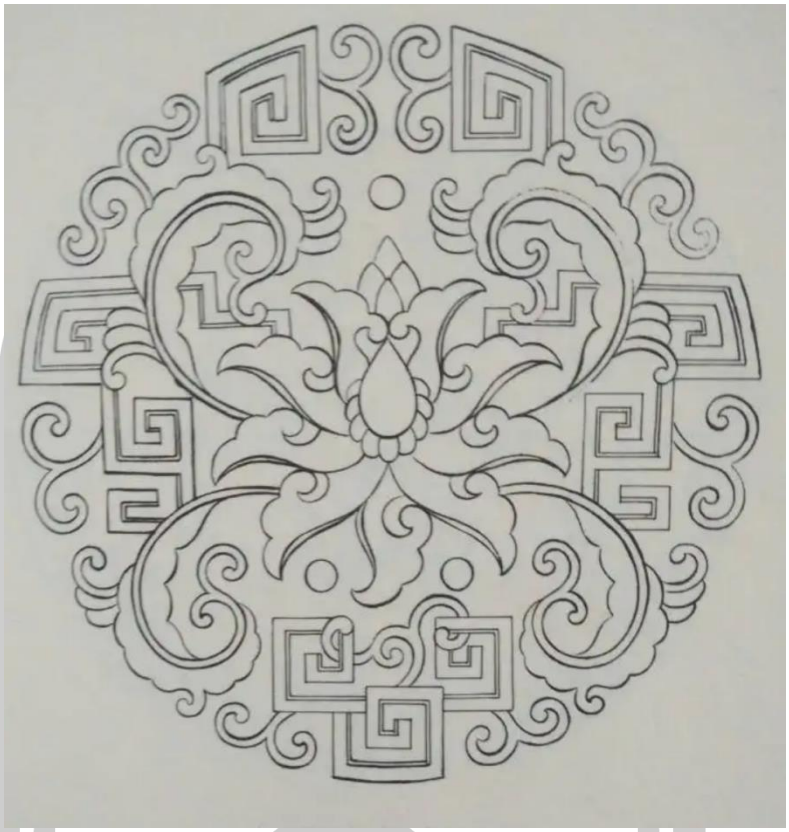


Figure 61 The pattern of the circular Baoxiang flower.
Source:Chang Shana, Decorative Patterns of Dunhuang in China through the Ages.

On patterned tiles, treasure flowers are typically framed by suitable decorative elements. The main flower is complemented by swirling cloud motifs and cloud patterns. The pattern's symmetrical design features a grand floral shape with flowing lines and well-handled auspicious motifs, creating a richly layered treasure flower tile pattern.

3.1.5 Pomegranate Flower Patterns

The main feature of pomegranate-patterned tiles is the robust pomegranate motif at the center. The design includes four small flowers with four swirling cloud motifs, and the corners are also decorated with pomegranate patterns. The central pomegranate is adorned with floral patterns to enrich the design. The fruit of the pomegranate exhibits multiple fruits and each has seeds in the flesh. In Chinese, the seeds are called “Zi”, which is the same as the Chinese word for child, and are therefore assigned to symbolize the desire for many offspring, reflecting the desire for a continuous and prosperous lineage (Figure 63). In this respect, there is a similarity to the symbol of the lotus in the previous section. It is also related to the cult of procreation and reproduction due to the lack of medical conditions and technology in ancient times.

Figure 62 The pomegranate pattern of the Dunhuang caisson.
Source:Chang Shana, Decorative Patterns of Dunhuang in China through the Ages.

3.1.6 Fusion and Derivative Patterns

Among the derived patterns of Dunhuang flower bricks, the most typical is the lotus flower jointed beads pattern.The lotus linked bead pattern was popular from the Wei, Jin, Southern and Northern Dynasties to the Sui and Tang periods. The overall design of the lotus linked bead pattern resembles the eight-petaled lotus. The main feature consists of two layers of eight-petaled lotus flowers, with the central flower heart decorated with bead patterns. The outer layer of petals is placed at the tips of the inner layer petals, creating a layered effect. The outer petals are larger and more intricately carved. The corners of the tile feature symmetrical leaf shapes and small flowers, with curved lines. This pattern forms a circular or interlocking ring shape with beads, reflecting the pattern's structure. The linked bead pattern evolved from the honeysuckle pattern, indicating a trend towards complexity in tile patterns(Figure 64).

Figure 63 Eight-petal lotus flower tiles unearthed from the Dunhuang Foye Temple. Source:Mr. Fan Jianshan,2004.

The term "linked beads" or "connected beads" first appeared in the Eastern Han Dynasty's "Han Shu," referring to celestial phenomena. In the "Xuan He Bo Gu Tu," the term is used to describe patterns on Zhou Dynasty bronze vessels. "Lian" (linked) and "lian" (connected) were interchangeable in ancient texts, with "lian" implying continuity and "lian" suggesting connection. Thus, "linked bead patterns" typically denote designs combining bead patterns with other motifs. In Dunhuang studies, the term specifically refers to patterns formed by white beads arranged in rings, sometimes depicting scenes such as knights hunting or mythical creatures, introduced from Western Asia around the fourth century and widely popular during the Sui and Tang periods. These patterns are also found on textiles from the Northern Dynasties to the Tang Dynasty.The word “lian” in the Chinese interpretation of “lianzhu” also stands for continuity and union. In folk understanding, it symbolizes the occurrence of multiple good deeds, or unity. And then derived from the symbol of good luck and happiness.

Fundamentally, linked bead patterns, beaded patterns, and ring patterns all involve continuous dots or circles arranged in various combinations. Linked bead patterns are a simple decorative design with a long history and wide application, evolving into complex forms in

Dunhuang art. This reflects not only the absorption and adaptation of foreign cultures but also the integration of Buddhism into Chinese culture and its secularization, serving as a testament to the cultural exchange along the Silk Road.

3.2 Analyze the patterns and colors that appear in Dunhuang tiles

3.2.1 Chinese Native Decorative Patterns

1）Bamboo

Bamboo is prevalent in India and often mentioned in Buddhist scriptures as places like bamboo groves and monasteries where Buddha preached. However, bamboo is seldom depicted in Indian Buddhist art. In contrast, China, one of the earliest countries to cultivate and utilize bamboo, has a rich cultural heritage related to bamboo. The depiction of bamboo in Dunhuang art conveys China's longstanding cultural connection with bamboo, using the Buddhist context as a medium.

The depiction of bamboo in Dunhuang art evolved over time. For instance, in Cave 254 of the Northern Wei and Cave 285 of the Western Wei at Mogao Caves, the bamboo paintings are quite primitive and differ significantly from contemporary expectations. By the Northern Zhou and Sui Dynasties, bamboo depictions remained simple with symmetrically arranged leaves. It wasn't until the Tang Dynasty that the image of bamboo became more defined, with lush foliage appearing more detailed. For example, in Cave 322 of the Early Tang at Mogao Caves, the Buddha figures are set amidst a dense bamboo forest(Figure 65).

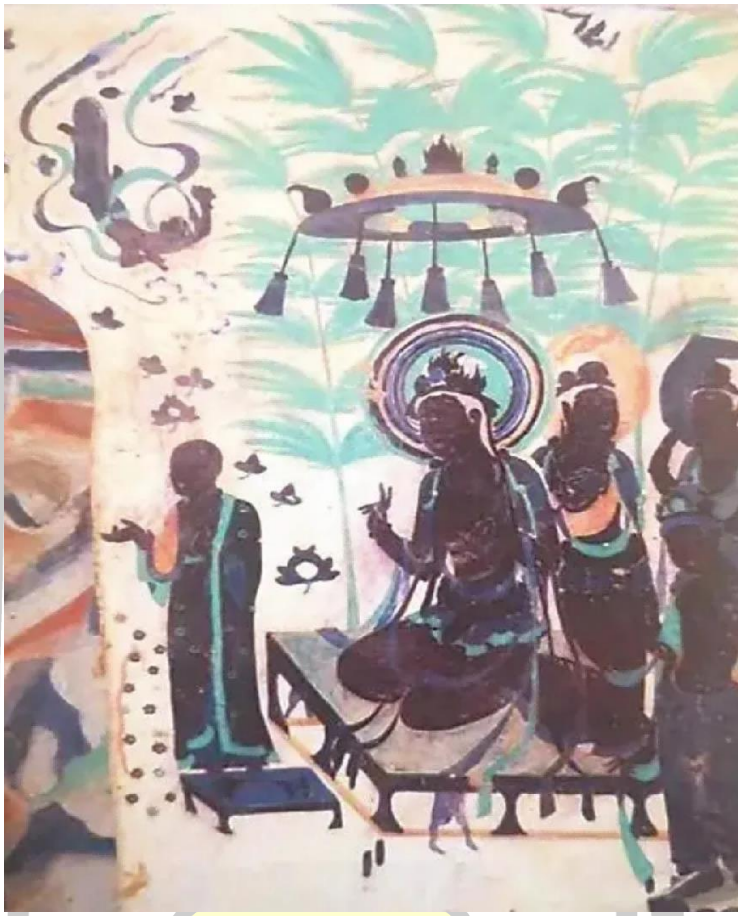


Figure 64 Bamboo in the Vimalakirti Sutra at Mogao Grottoes in Dunhuang.
Source:Dunhuang Research Institute.

During the early Tang Dynasty, the depiction of bamboo became more sophisticated, as seen in Cave 203 of the Early Tang, the tomb of Wei Hao from the Jinglong era, and Tang Dynasty bronze mirrors. These depictions show a popular style of bamboo with clustered leaves resembling brooms. Later, in the caves of Yulin and Mogao during the Tang Dynasty, bamboo appears more vibrant and graceful, reflecting the peak of early Tang bamboo painting.

The renowned Tang Dynasty poet Bai Juyi once wrote in "The Song of Painting Bamboo" that bamboo is the most challenging plant to paint. Although many have attempted to capture its essence, it wasn't until Xiao Yue that a true likeness was achieved. Xiao Yue's bamboo paintings were slender and upright, full of life, unlike previous depictions. His work significantly influenced bamboo painting standards.

From the Five Dynasties through the Song and into the Western Xia period, bamboo paintings reached new heights. For example, in Cave 2 of Yulin from the Western Xia period, the bamboo in the "Water Moon Guanyin" painting is realistic(Figure 66), and the techniques are mature. In Cave 3 of Yulin and Cave 3 of Mogao, the bamboo paintings exhibit high artistic quality and strong literati sentiment. The "Four Gentlemen" of ink painting—bamboo, plum, orchid, and chrysanthemum—are crucial themes in literati painting, which reached its peak during the Ming and Qing Dynasties. The theories and techniques for painting bamboo were well-developed during this period, addressing issues such as the variation in thickness

of bamboo stems, the arrangement of nodes, and avoiding parallel or intersecting patterns.

Figure 65Bamboo of the Water Moon Guanyin in Cave 2 of the Yulin Grottoes in Dunhuang.
Source:Dunhuang Research Institute.

From an art historical perspective, the bamboo paintings in Dunhuang murals offer three key values: first, they present the development of ancient Chinese art's understanding of bamboo; second, they reflect the influence of literati bamboo painting on Dunhuang art; and third, they provide "errors" and patterns that contributed to the evolution of bamboo painting from its rudimentary to mature forms. These patterns, as components of bamboo painting, have been continuously refined and revised over time, shaping the classic bamboo painting style and leaving a rich, diverse legacy for future generations of artists to explore and contemplate.

2） Hemerocallis (Daylily)

In Indian Buddhist art, Hemerocallis is not depicted, yet it holds significant importance in traditional Chinese culture. With a long history of cultivation in China, Hemerocallis is mentioned in the "Book of Songs" and has various cultural meanings. Historically, Hemerocallis is known as the "Forget-me-not" due to its reputed ability to alleviate sorrow. Additionally, it is called "Suitable for Boys" because it was believed that pregnant women who wore Hemerocallis would bear sons. By the Tang Dynasty, Hemerocallis also symbolized filial piety, earning it the name "Children's Flower." Thus, by the Tang period, Hemerocallis came to embody three attributes: "Forgetfulness," "Suitability for Boys," and "Filial Piety," making it a unique flower in ancient Chinese plant aesthetics(Figure 67).

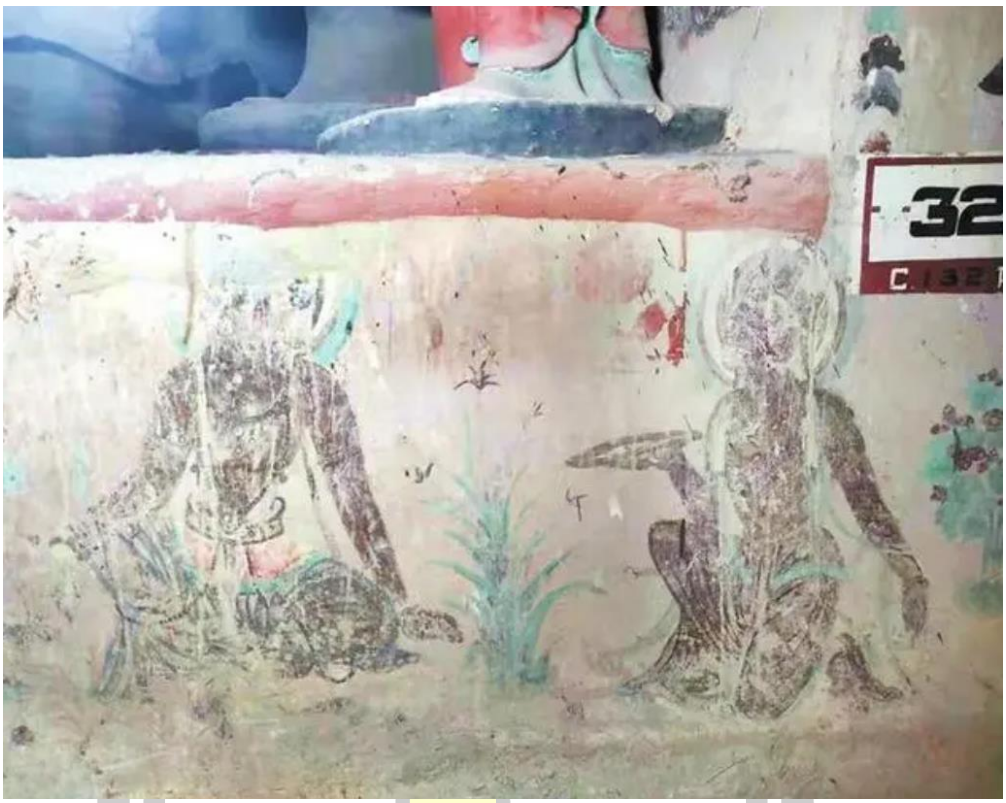


Figure 66 Daylilies in Mogao Cave 329.
Source:Dunhuang Research Institute.

This multifaceted symbolism likely contributed to the widespread cultivation of Hemerocallis from the Tang Dynasty onward, with literary works featuring the flower reaching their peak. During this period, flower-and-bird painting became an established genre in Chinese art, leading to an increase in visual representations of Hemerocallis.

In Dunhuang, Hemerocallis is depicted with naturalistic accuracy in several caves, such as Cave 329 from the Early Tang and Cave 217 from the High Tang. Additionally, the Late Tang Cave 11 at Bingling Temple and various artifacts, such as the floral screen from the Astana Tomb 217, the Yide Prince Tomb, and the Yongtai Princess Tomb, also feature Hemerocallis. Notably, a silk bouquet from Astana Tomb 187, with serrated orange-yellow petals, is considered a replica of Hemerocallis by some scholars. This widespread depiction suggests that by the Tang Dynasty, Hemerocallis imagery had become very popular and was disseminated from the royal tombs of Chang'an to other regions.

From the Song Dynasty onward, Hemerocallis became a favored subject for renowned painters. Many artworks include inscriptions indicating three primary purposes for depicting Hemerocallis: first, to alleviate personal sorrows through its "Forgetfulness" symbolism; second, to congratulate families with sons using the "Suitable for Boys" meaning; and third, to extend longevity wishes to the elderly, reflecting the "Filial Piety" connotation. Overall, the symbolism of Hemerocallis centers around the concept of "filial piety," emphasizing respect and care for one's parents.

3）Hollyhock (Alcea rosea)

Hollyhock, or Alcea rosea, is not present in Indian Buddhist art but holds significant importance in traditional Chinese culture. In Dunhuang murals, Hollyhock starts to appear in large numbers only during the Tang Dynasty. For instance, the Hollyhock depicted in the "Lady Governor Paying Homage" scene from Cave 130 of the Mogao Caves, copied by Mr. Duan Wenjie(Figure 68), showcases a high level of realism. Hollyhock can also be seen in Caves 172 and 320 of the Mogao Caves and in the carved line drawings from the Zhuang Huai Prince Tomb, indicating that the artistic models for Dunhuang Hollyhock images likely originated from Chang'an.

Figure 67 Mr. Duan Wenjie copied the hollyhock from Cave 130 of Mogao Grottoes.
Source:Dunhuang Research Institute.

From the Song Dynasty onward, Hollyhock is often depicted in large panels in Dunhuang murals, sometimes covering entire walls, resembling a screen of Hollyhock flowers. For example, in Caves 324 and 325 of the Mogao Caves from the Western Xia period, though small, the Hollyhock murals illustrate this extensive and striking depiction.

In terms of symbolism, Hollyhock is known by the name "Weizu Kui" in Chinese, which translates to "Protecting the Feet" due to its upright growth and symbolism of loyalty to the ruler. Poetry from the Tang and Song Dynasties often uses Hollyhock to express themes of "loyalty to the ruler and devotion to the country." This sentiment is also reflected in the inscriptions of Ming and Qing scroll paintings. For example, Chen Kuo's "Hollyhock Painting" from the Ming Dynasty and Dai Jin's "Hollyhock and Butterfly Painting" both convey similar themes of loyalty.

In ancient Chinese art, Hollyhock and Hemerocallis are frequently depicted together. In the Dunhuang murals, such as in Cave 329 of the Early Tang Dynasty and Cave 172 of the High Tang Dynasty, Hollyhock is shown alongside Hemerocallis. Additionally, Hollyhock and Hemerocallis are both present in the Tang Dynasty murals of Cave 65 at the Bezeklik Caves and in the Tang Dynasty stone carving of "Pounding Lin" from the Xingjiao Temple in Chang'an. Qing Dynasty artist Wang Wu also created two paintings combining Hollyhock and Hemerocallis, titled "Loyalty and Filial Piety." One of these paintings includes an inscription stating, "Hollyhock faces the sun, and Hemerocallis yearns for family," while the other inscription notes, "Ancient artists combined Hollyhock and Hemerocallis as symbols of loyalty and filial piety. This is a traditional representation, regardless of skill."

Overall, in traditional Chinese culture, Hemerocallis symbolizes "filial piety," and Hollyhock symbolizes "loyalty." Their combination in art represents the ideal of both loyalty and filial piety, reflecting a longstanding tradition in Chinese art.

3.2.2 Animal Auspicious Patterns

Dunhuang art shows many animal images. Most of these animals are depicted in Buddhist story paintings and warp paintings, and some appear in tiles, algae Wells, ornaments, frils and other patterns. From the expression of content, there are real animals, such as tiger, lion, deer, rabbit, monkey, cow, horse, sheep, dog, camel, peacock, ostrich, pigeons, parrots, cranes, fish, turtles, snakes and other aquarium and reptiles; the other is the myth, created by imagination, such as dragon, phoenix, wing horse, such mythical animals, this chapter as gods, described in the text, this paragraph only discusses the real life animals. From the point of view of the expression technique, the shape and color of these animals are using decorative techniques. With skilled lines and brush strokes as modeling, plane processing, exaggerated animal form and dynamics, image deformation and anthropomorphic, color generalization, emphasis and symbolism. On the basis of realism, the aesthetic form of decoration is particularly highlighted. Therefore, we can regard these animal images expressed in Dunhuang art as animal patterns, and sort out, study, learn and learn from them from the perspective of decorative art.

1） Birds

In Dunhuang art, bird patterns are never depicted independently but as parts of backgrounds and decorative elements. From the Northern Liang to the Western Xia periods, the diverse bird images left behind showcase distinct artistic styles and techniques of their times. The bird imagery in the Mogao Caves began with the Northern Liang period, with the Tang dynasty presenting the most splendid representations. After the Five Dynasties, the bird images began to fade, losing their former brilliance during the Song and Western Xia periods. These bird images are not only valuable for understanding ancient artistic methods but also serve as classic references for contemporary bird and flower painting. Due to the scarcity of preserved pre-Tang and Song works, particularly those with rich techniques and exquisite color, Dunhuang's bird imagery holds unique scholarly significance in China.

The earliest bird images appear in the Northern Liang period, such as in Cave 275 from the 1st century, where eagle and pigeon images are some of the earliest realistic bird paintings in Dunhuang. During the Northern Wei period, bird images were highly decorative, featuring romantic and exaggerated forms with bold lines and colors. This period's style, characterized by fluid and dynamic lines, reflects a shift from the meticulous iron-line drawing method of earlier periods. The integration of Buddhist and local beliefs expanded the subject matter of bird imagery during this time.

In the Sui and Tang dynasties, bird forms transitioned from early romanticism to realism, with detailed and refined expressions in the paintings. The depiction of birds in coffered ceilings and patterns became richer and more varied. While the Sui caves had relatively few bird images, those present showed significant changes in composition and color compared to earlier periods. Artists were moving towards creating distinct national forms, blending traditional influences with new artistic innovations. Tang dynasty bird images became fuller and more detailed, aligning with the aesthetic shift from "elegant bones and clear forms" to "beauty in fullness."

During the Tang dynasty's mid and late periods, bird imagery became a fusion of traditional Chinese and foreign styles, reflecting the popularity of Pure Land Buddhism. Phoenix and Garuda images, among others, remained prominent, displaying a grand variety of forms.

2） Beasts

Dunhuang art features various land animals, including tigers, lions, deer, rabbits, monkeys, cows, horses, sheep, dogs, and camels. A notable and widespread motif among these is the "Three Hares with Shared Ears" pattern. This motif first appeared in the Sui dynasty and disappeared by the late Tang dynasty. It is found in 16 caves in the Mogao Caves, including 8 from the Sui period, 1 from early Tang, 5 from mid-Tang, and 4 from late Tang, and appears in various forms such as coffered ceilings and borders.

The "Three Hares with Shared Ears" pattern(Figure 69), a unique and intricate design, is thought to be a product of local creativity, integrating traditional motifs with Buddhist ideas. The origin and symbolism of this pattern are debated. Some scholars suggest it represents the Three Realms of Buddha or is a fusion of Daoist and Buddhist elements. Others argue it might be influenced by Central Asian art but remains rooted in Chinese tradition.

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Figure 68 The Dunhuang style "Three Rabbits with One Ear", with the left one being a traditional Dunhuang painting and the right one being a Dunhuang clay sculpture. Source:Dunhuang Research Institute.

The motif's appearance in the Sui dynasty and its subsequent decline by the Tang period reflects its integration with contemporary Buddhist beliefs and local artistic trends. The pattern's uniqueness and its alignment with the period's religious and cultural context suggest that it is a product of local innovation rather than foreign import.

Overall, the "Three Hares with Shared Ears" pattern highlights the integration of traditional Chinese design principles with Buddhist symbolism, reflecting the period's artistic and cultural exchanges.

3.2.3 Buddhist Cultural Patterns

The decorative patterns in Dunhuang exhibit a strong Buddhist cultural influence, designed to beautify the Buddhist realm. These patterns encompass motifs, symbols, colors, and object forms. Unlike paintings, these patterns are abstract and standardized, often based on geometric shapes. They can be categorized into four main types based on their location and function within the caves: architectural, attire, ritual objects, and general decorations. This section will focus on analyzing a few common architectural and image patterns.

1）Tile Patterns

These patterns often feature a central lotus flower motif symbolizing purity. In traditional Chinese symbolism, the lotus represents “escaping fire and seeking peace.” The central flower is surrounded by concentric rings, with the inner and outer layers of petals arranged radially. The colors are typically gray-red, with the inner ring in light earth yellow and the outer in brown, separated by fine white lines. The small square wells surrounding the lotus feature abstract geometric curves, sometimes referred to as cloud patterns or local plant variations. This design breaks the rigidity of straight lines(Figure 70). The patterns may also include abstract flame motifs and honeysuckle curves, often forming rhythmic, wave-like arrangements.

Figure 69 The Northern Wei Dynasty flat pattern at the Mogao Grottoes in Dunhuang.
Source:Chang Shana, Decorative Patterns of Dunhuang in China through the Ages.

In Cave 257 of the Northern Wei period, the central tile pattern uniquely depicts four Bodhisattvas swimming nude in a lotus pond, rather than the usual lotus motif. The Bodhisattvas are shown in playful poses around the lotus, with lotus branches and leaves curving to enhance the water's undulating effect. Geometric and snake-like curves decorate the edges, with white dots for accent. The corner motifs include flames and flying apsaras, which contrast with the central figure's serene swimming Bodhisattvas. The color scheme of stone green lines on a red base echoes the central pond's hues.

2） Caisson Patterns

The caisson patterns are similar in theme to tile patterns but with some variations. The central motif is an inverted lotus flower, symbolizing "reverse planting of lotus blossoms." The lotus appears large and round, with narrow, densely packed petals radiating like a wheel(Figure 71). The caisson's design, with its wheel-like lotus and layered square wells, maintains a simple and unified style. Surrounding patterns include water swirls, flames, and honeysuckle motifs.

Figure 70 Dunhuang caisson pattern.
Source:Chang Shana, Decorative Patterns of Dunhuang in China through the Ages.

The corner decorations are richer than those on tile patterns, featuring more detailed lotus shapes, exaggerated flower centers, and intricate combinations with honeysuckle motifs. The edge patterns often include single or double leaf wave patterns, sometimes with a chain-like motif connecting the leaves. The outer ring of the caisson displays triangular patterns representing hanging fabrics, with simple designs such as layered triangles or semi-circles, often adorned with ribbons and bells.

3） Aura Patterns

The aura is the halo around the head and back of Buddhas, Bodhisattvas, and their disciples. In Buddhist art, auras symbolize the divine light of enlightenment. Head auras are typically round, while back auras are oval. The patterns used to represent auras vary depending on the figure and include simple color gradients, decorative patterns, or a combination of both.

Fire patterns are a prominent feature, influenced by the early Gandhara art style. Flames, representing the Buddha's power, continue to be a significant element in Dunhuang’s aura designs. These patterns vary from triple-petal flame motifs to more pronounced outward-flaring flames. Early aura designs also include simple motifs and organization, with layers often separated by narrow lines or white dots. Some designs emphasize fire patterns with intricate detailing, juxtaposing abstract and realistic elements.

In addition, Buddhist cultural motifs can be categorized into several decorative motifs from the point of view of the subject matter.China, as a civilization with thousands of years of brilliant culture, has a rich heritage of decorative patterns created by its ancestors over long periods of labor. These patterns, developed across various historical periods, regions, and ethnic groups, reflect a wide range of artistic characteristics, rich content, and unique features. They hold not only high aesthetic value but also special artistic significance in spiritual culture and ambiance. Decorative patterns are among the most intimately connected forms of art in daily life, embodying both practical and aesthetic qualities, and reflecting the human desire to love life and pursue beauty. Throughout the development of decorative patterns, numerous classic art forms have emerged, such as the lotus patterns and beaded patterns on Dunhuang patterned tiles, the solemn beast-face patterns on bronzeware, the elegant worm patterns on jade, the natural flower-and-bird patterns on porcelain, the solid and rigorous ruyi patterns in architecture, and the intricate and delicate eight-dash patterns on textiles. These patterns, whether abstract or figurative, realistic or freehand, form a distinctive traditional Chinese decorative pattern system.

Buddhas：The term "Buddha" is a transliteration of "Buddha," meaning "the Enlightened One." In Buddhism, this refers to the highest state of realization and perfect practice. According to Theravada Buddhism, only Shakyamuni Buddha has reached this state, and hence only Shakyamuni is called a Buddha. In Mahayana Buddhism, anyone who achieves self-realization, enlightenment of others, and perfection in practice can be considered a Buddha. Artistic representations often depict Buddhas draped in robes, with a topknot, elongated earlobes, a white tuft between the eyebrows, and webbed fingers. The hand gestures, or mudras, vary depending on the purpose, such as teaching, subduing demons, or meditation. Buddhas may be shown in various postures, including standing, seated in meditation or teaching, reclining, or leaning. Early cave art often features Maitreya Buddha seated cross-legged, while later depictions include Shakyamuni Buddha, Shakyamuni and Prabhutaratna (Dual Buddhas), and Vairocana Buddha. From the Sui and Tang dynasties onward, new representations included the Three Ages of Buddha, the Three Bodies of Buddha, Amitabha Buddha, Medicine Buddha, and reclining Maitreya Buddha.

Bodhisattvas ： "Bodhisattva" is a shortened form of the Sanskrit "Bodhisattva," meaning "one who seeks enlightenment for the sake of others." A bodhisattva is someone who has vowed to attain Buddhahood in order to help all sentient beings achieve liberation from suffering. Although originally male, bodhisattvas in Dunhuang often appear as female figures to embody compassion. They are typically depicted as serene, well-rounded, and elegantly dressed. From the Sixteen Kingdoms to the Mongol Yuan Dynasty, Dunhuang's bodhisattvas show an evolution in age—from youthful maidens during the Sixteen Kingdoms to mature, elegant women in the Tang Dynasty.

Heavenly Kings：The Four Heavenly Kings are guardian deities who protect the Buddhist realm. According to Buddhist scriptures, they guard the four cardinal directions and prevent demons from entering. They are:

Eastern Guardian (Dhritarashtra), usually depicted with a white complexion and holding a pipa.

Southern Guardian (Virudhaka), with a green complexion and a sword.
Western Guardian (Virupaksha), red in color and holding a dragon.
Northern Guardian (Vaisravana), green and holding a pagoda.

In Dunhuang, the Four Heavenly Kings are depicted in cave murals and statues, with the earliest examples appearing in the Sui Dynasty's Cave 472. These figures often resemble real soldiers or generals, embodying a more personalized and dynamic representation compared to later exaggerated temple depictions.

Flying Apsaras： Originally deities of music and dance, flying apsaras (Kinnara) are depicted as celestial dancers who scatter flowers and perform at Buddhist gatherings. Early representations in Dunhuang featured a more austere, male appearance with short ribbons. By the Northern Wei period, influenced by Han culture, the apsaras became more feminine, with elongated bodies and flowing ribbons to emphasize their graceful movements. During the Sui Dynasty, flying apsaras were depicted with clouds to enhance their flying appearance. By the Tang Dynasty, they had transformed into idealized, ethereal female figures with more realistic and fluid designs(Figure 72).

Figure 71 Sketch of the flying line of Dunhuang.
Source:Niu Yusheng, Line Drawings of Dunhuang Figures.

Celestial Horse：The celestial horse is a composite creature with a horse's body, deer antlers, and a lion's tail. On patterned tiles, it is often shown in a galloping pose, with ribbons flowing from its neck and wings decorated with honeysuckle patterns. This design merges animal and plant motifs, symbolizing speed and vitality while reflecting a longing for lush oases and reverence for water and life(Figure 73).

Figure 72 The celestial horse pattern from the Western Wei Dynasty at the Mogao Grottoes in Dunhuang.
Source:Dunhuang Research Institute.

Four Symbols： The Four Symbols represent mythological creatures in Chinese culture:

Dragon: A symbol of power and good fortune, dragons in Dunhuang art are depicted dynamically with flowing clouds, curled bodies, and simplified features. The dragon symbolizes divine authority, prosperity, and protection.

Tiger: Usually portrayed as a white tiger with an imposing stance, it represents bravery and strength. The white tiger is often seen in military contexts to boost morale and symbolize victory over evil.

Phoenix: Known as the Vermilion Bird, the phoenix is a symbol of virtue and beauty. In Dunhuang art, it is shown with detailed plumage and flowing ribbons, often holding a ribbon as a messenger of good fortune and auspiciousness.

Tortoise-Snake : Combining a turtle's hard shell with a snake's flexible body, Xuanwu symbolizes stability and protection. It often appears on architectural bases to ward off evil and reinforce structures.

These deities and symbols not only enrich the artistic landscape of Dunhuang but also convey deep cultural and spiritual meanings through their intricate designs and symbolic significance(Figure 74).

Figure 73 Rubbings of the four sacred animals.
Source:Dunhuang Research Institute.

Dunhuang's Buddhist patterns are rich in symbolic meaning and artistic diversity. From tile patterns featuring lotus flowers and abstract geometric motifs to caisson and aura designs that incorporate elaborate lotus and fire elements, these patterns collectively reflect the spiritual and cultural values of the Buddhist tradition. Each design element is carefully crafted to enhance the overall aesthetic and spiritual significance of the cave temples.

3.2.4 Integration of Indigenous Chinese Patterns and Buddhist Patterns

Though Dunhuang is located in the Hexi Corridor, it has been an essential part of Chinese civilization. The integration of Dunhuang with Chinese civilization is a result of favorable historical, geographical, and human conditions. Beginning with the Yongjia Rebellion of the Western Jin Dynasty, Central China experienced nearly 200 years of turmoil and instability. To ensure their survival, many people from Central China migrated to new regions. Dunhuang, relatively distant from the chaos and with fewer conflicts, provided a stable environment. Its natural resources, including glacial meltwater, fertile soil, and ample sunlight, made it suitable for agriculture.

Migration brought not only people but also their culture. Those who moved to Dunhuang were primarily prominent families from Central China, who brought their lifestyles, culinary habits, literary pursuits, and aesthetic preferences—essentially, the essence of Chinese civilization. The inherent inclusiveness of Chinese civilization, rooted in its theoretical foundations and cultural confidence, allowed it to embrace and integrate foreign cultures. Buddhism, with its focus on transforming this life and the next, and its inherent non-aggressive nature, naturally integrated into the local

culture. The Buddhist teachings offered solace to the war-weary people of Dunhuang, making them receptive to Buddhist culture.

The convergence of Chinese cultural inclusivity and Buddhism's non-aggressive approach led to a flourishing of Buddhist art in Dunhuang. This fusion brought together early Indian religious art and Gandhara art, evolving through imitation to high-level transformation. Over time, these influences absorbed and integrated elements of traditional Chinese folk art, resulting in patterns that merged the form, color, and texture of traditional Chinese cultural concepts, thus creating uniquely Chinese traditional graphic elements. These ancient Buddhist patterns, rich in religious and multicultural meanings, enriched the traditional Chinese graphic styles and spiritual connotations. They continue to provide abundant creative material and concepts for modern design.

The development of Chinese culture has long involved the integration and adaptation of diverse external cultures. Buddhist patterns, significantly impacting Chinese culture, illustrate this characteristic. From the Han and Tang dynasties to the Ming and Qing periods, the integration of Confucianism, Buddhism, and Daoism shows Buddhism's deep integration into Chinese culture. Patterns, as the most effective visual form of Buddhist culture, were applied to Buddhist statues, temple decorations, and ritual objects, including motifs like lotus flowers, canopies, dharma wheels, and honeysuckle.

Before Buddhism's introduction, Chinese decorative patterns primarily featured mythical figures, divine beasts, and cloud motifs. As Buddhism took hold, plant-based motifs suitable to Chinese aesthetic preferences gained popularity. These patterns were incorporated into traditional symbols such as “Fu” (happiness), “Lu” (prosperity), “Shou” (longevity), and “Xi” (happiness), creating traditional graphic structures like the “Endless Knot,” “Swastika,” “Pancake Pattern,” “Square Victory,” and “Linked Trees.” The mutual influence and infiltration of Buddhist aesthetics and Chinese traditional culture have played a significant role in the development of Chinese ethnic art. For example, the Tang Dynasty's development was closely linked to the transmission of Western cultural influences, and the “Tang Grass” (or “Curled Grass Pattern”) in Dunhuang reflects the transformation of early Buddhist patterns into distinctly Chinese decorative motifs.

The auspicious pattern of “Bao Xiang Hua” (Precious Flower) is derived from the lotus flower in Indian Buddhism. It blends the prosperous peony design from Central China with the pomegranate pattern introduced from Persia, gradually forming a symbol of Chinese national style. The lotus, originally a symbol of nirvana and enlightenment in Indian Buddhism, represents purity and noble character in Chinese culture. Consequently, the transformed lotus motif of the Bao Xiang Hua was imbued with deeper meanings and became widely disseminated in ancient China.

3.2.5 Depictions of Secular Everyday Life

When people think of Dunhuang art, the first image that often comes to mind is the myriad of gods and Buddhas. However, Dunhuang art also features numerous depictions of everyday life, capturing scenes of human activities from ancient times. These depictions serve not only as valuable historical and archaeological sources but also showcase the artistry of ancient painters who employed accessible folk techniques to create works that reflect real-life emotions and exhibit enduring vitality.

Agriculture

China, as a major agricultural country, places significant emphasis on agricultural life. The Mogao Caves contain over 80 murals depicting agricultural scenes, preserving details of farming tools and labor practices from the Northern Zhou to the Western Xia period.The painted portrait bricks of Dunhuang tiles also contain many scenes depicting the production and work of ancient people(Figure 75). These painting portray scenes of men, women, and the elderly working in the fields, and oxen laboring in plowing. Accompanying text on the margins provides valuable primary data for agricultural archaeology and technological research.(Zhao X.Y,2007,81)

Figure 74 Painted brick painting of oxen plowing in the Wei and Jin Dynasties.
Source:Dunhuang Research Institute.

Entertainment

Music and dance were crucial forms of entertainment in Dunhuang. Festivities such as banquets, weddings, and gatherings often featured musical performances and dances(Figure 76). Dunhuang murals vividly depict these scenes, such as the Hu Xuan dance popular during the Tang Dynasty, shown in Cave 220. The murals illustrate dancers with a band of around 20 musicians. The musicians are arranged according to the pitch and resonance of their instruments, creating a visually balanced layout that enhances the acoustic effects. The band includes percussion, plucked, and wind instruments, arranged in a semi-circular formation to optimize resonance.

Figure 75 The picture bricks of the Wei and Jin Dynasties depict the entertainment life of ancient people playing musical instruments and barbecuing.
Source: Du Yongwei,2005.

Dunhuang art also depicts scenes of "hundred plays" (Bai Xi), which were folk performances held in areas known as "wa she" (tile houses) and "gou lan" (performance sheds). These performances, often involving acrobatics and stunts, are shown in murals with detailed portrayals of performers and their acts. Musicians and storytellers often accompanied these performances, and the audience is depicted seated on the ground, enjoying the entertainment.(Zhao X.Y,2007,83)

3) Food

Daily diets in the Northwestern regions, which are still influenced by Tang Dynasty practices, included various staple foods. The murals in Dunhuang illustrate popular foods of the time, such as oil cakes, fried dough, steamed buns, and noodles. Cave 61 portrays scenes of dairy product preparation, reflecting the region's diverse dietary habits influenced by its multi-ethnic population. Cave 296 includes a fishing scene with two figures preparing to cast a net, indicating that fish was a common ingredient. The incorporation of Western spices like cumin in cooking methods is also depicted, showing the blend of local and foreign culinary traditions.

Additionally, Cave 3 in the Yulin Caves features a brewing scene from the Western Xia period, revealing ancient distillation techniques. The mural depicts a two-tiered vessel over a fire, likely an early distillation apparatus. Despite China’s focus on brewing rice wine, the foreign wine-making technique took root in Dunhuang, as evidenced by Tang poet Wang Han's verse about grape wine.

4) Clothing

Dunhuang murals vividly reflect the attire of different social classes, including emperors, officials, nobles, monks, laypeople, soldiers, merchants, and attendants. The restored sketches reveal the clothing styles of the Tang Dynasty, with men wearing caps, round-collared robes, leather belts, and black boots, while women donned skirts, half-sleeved jackets, and adorned themselves with accessories like phoenix crowns, flower hairpins, and jade combs(Figure 77). The high-waisted skirts and some female attendants' adoption of men's clothing styles offer unique insights into fashion trends of the time.(Zhao X.Y,2007,83-84)

Figure 76 The painting looks like bricks. The costumes of the two scholars in the painting reflect the clothing style and aesthetic taste of ancient people.
Source:Yanda Du.

Overall, the murals depicting secular life in Dunhuang serve as a microcosm of societal diversity, preserving and reflecting the multifaceted nature of ancient society. They are invaluable historical documents that offer a glimpse into the daily lives of people from different walks of life during that period.

Table 5 Classification of common patterns of Dunhuang flower tiles and their symbolic meanings

typology	photograph	Symbolism and cultural values
Vegetative:		
lotus flower		Cleanliness and Integrity: The lotus flower symbolizes cleanliness and integrity because “green lotus” and “cleanliness” are homophonic, and because the lotus flower grows in the mud but remains clean, it symbolizes the quality of cleanliness and integrity. This quality is often used as a metaphor for those who are dedicated to serving the people. Happiness and love: The lotus flower is often used to symbolize good love, especially the parallel lotus, which symbolizes the love and affection of husband and wife. In ancient literature, the lotus is often used to describe a loving husband and wife relationship. Glory and wealth: The lotus flower also symbolizes glory and wealth. In ancient times, people liked to add lotus flowers to gifts, such as adding peonies and lotus flowers together, which means “glory and wealth”. In addition, the lotus seed and lotus seed symbolize “having many

		children", which expresses people's expectation of wealth and grandchildren. Purity: The lotus flower symbolizes purity and innocence. The ancients believed that the lotus flower "comes out of the silt but does not get stained, and the cup is clean but not demonic", and this quality is compared to the gentleman among flowers, symbolizing the ultimate goodness and beauty. High purity and holiness: In Buddhism, the lotus flower symbolizes purity, holiness and good fortune. In Buddhism, there are often descriptions of "feet on the lotus" or "sitting on the lotus", symbolizing the purity and immaculate nature of the Buddha and Bodhisattva. The inhabitants of Elysium are also born from the lotus flower, so the lotus flower is highly symbolic in Buddhism.
persimmon tip		Since "persimmon" and "matter" have the same sound, the persimmon pattern is often used as an auspicious pattern, and combined with other patterns, it conveys a variety of beautiful meanings. It represents

		the four directions, symbolizing the power that encompasses the heavens and the earth, and signifies firmness, permanence, and durability. The four petals of the persimmon motif symbolize symmetry and balance, implying a sense of unity and happiness. In addition, the persimmon pattern also symbolizes the strong roots of the persimmon and the longevity of the persimmon tree, thus also implying strength, permanence and durability.
honeysuckle		The Lonicera pattern symbolizes longevity, resilience and good fortune, reflecting the ancient reverence for life and nature. It symbolizes the concept of “reincarnation” and “endurance of suffering and transcendence in the next life”, which is preached by Buddhism, and is also in line with the doctrine of “compassion and universality of all sentient beings”.

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Paeonia suffruticosa		The peony flower has a gorgeous and complicated style, so when folk use the symbolism of peony, they mostly adopt its symbolism of wealth and prestige in the hope of gaining wealth and status. It is also commonly used to describe a woman's makeup or dress, which is gorgeous and beautiful.
zigzag pattern		Lianzhu pattern as a typical auspicious pattern, Lianzhu pattern not only has the characteristics of auspicious and beautiful, unity, meaning happiness and peace, but also through its unique decorative effect, beautify life and pray for happiness and peace.
Baoxiang Flower		The Poinsettia is not a real plant that exists in nature, but one that was invented in the development of Buddhism by blending together the characteristics of several real plants. It represents solemnity, dignity and holiness, in line with Buddhist teachings.
Animals:		
horse		In ancient mythology, the horse was closely associated with ancient wars and heroic deeds, and was regarded as the mount of the god of war or the spirit of the warriors. It is not only a symbol of speed and

		strength, but also the embodiment of the god of war and heroes. It is the embodiment of the god of war and the hero. It carries people's beautiful fantasies and aspirations for extraordinary power.
cranes		The crane symbolizes longevity, good fortune and elegance in Chinese culture, and was already embroidered on the uniforms of officials during the Tang Dynasty, so it also represented very high political power.
secular life:		
agricultural production		A Wei and Jin dynasty portrait brick showing a man operating a ploughing ox wearing agricultural implements used to grow crops.
lifestyles		A Dunhuang flower brick unearthed in the Yuan Dynasty depicts a mother teaching her son. From a very famous Chinese story about filial piety.
diet		Wei and Jin portrait bricks showing people cooking roasted and boiled meat.
outfits		Wei and Jin portrait bricks, ancient noblewomen are having a banquet, from the bricks you can see the mainstream women's clothing of the upper

		class at that time.
entertainment		A portrait brick from the Wei and Jin dynasties, showing a man playing a musical instrument.

3.3 Compare with other traditional arts

In order for us to understand the uniqueness of Dunhuang culture, through various ways such as interviewing the Chinese Arts and Crafts Master, Mr. Du Yongwei, and consulting references. Distinguishes the similarities and differences between several different art types in Dunhuang art.There are many similarities between Dunhuang flower bricks and other art forms in Dunhuang, such as murals and sculptures, in terms of style of expression, cultural connotations, and production techniques, but they also show their own unique cultural values and artistic charms. Further analysis of the similarities and differences between these art forms and their unique cultural significance will help to better understand the position and role of Dunhuang flower bricks in the entire Dunhuang art system.

3.3.1 Shared cultural backgrounds and decorative styles

As an important hub of the ancient Silk Road, Dunhuang has long been a place where East meets West, and its art style naturally reflects the fusion and evolution of multiple cultures. Dunhuang flower bricks, along with other art forms such as Dunhuang murals and sculptures, are heavily influenced by Buddhist culture, presenting a strong religious atmosphere and symbolism. Whether it is the flying skies and bodhisattvas in the frescoes, or the lotus flower pattern and the curly grass pattern on the flower bricks, these patterns are not only the embodiment of artistic beauty, but also the symbolic expression of the spirit of Buddhism. For example, the eight-petaled lotus flower has an important position in flower bricks, murals and sculptures, symbolizing the purity and wisdom of Buddhism and representing the pursuit of transcendence and liberation.

In addition, the decorative styles used in these art forms share obvious similarities. The geometric patterns, animal motifs, plants and flowers commonly found on flower bricks are similar to the painting style used in frescoes. In particular, the naturalistic representation of plants on the flower bricks, common ones such as grapes, lonicera, and lotus flowers, demonstrates the craftsmen's high sensitivity to natural details, which is also reflected in the frescoes and sculptures(Figure 78). This naturalistic style is closely linked to the Buddhist concept of cosmology and harmony with nature, emphasizing the spiritual core of Dunhuang artworks.

Figure 77 Dunhuang flower tiles and lotus flowers on Dunhuang frescoes.
Source:The image on the left is from the illustrated book of Chang Shana's writings, Decorative motifs from Dunhuang, China, through the ages. Right image courtesy of the Dunhuang Academy.

3.3.2 Similarities in artistic expression

The similarity between Dunhuang bricks and murals and sculptures in terms of artistic expression is further reflected in their production techniques and craftsmanship. Brick artisans used techniques such as carving, molding, and relief carving to make bricks that were not only functional, but also highly decorative. The techniques used in Dunhuang mural paintings, such as using line drawings to outline the contours and then filling in the colors to reveal depth and layers, are quite similar to the process of engraving patterns on flower bricks(Figure 79). The color treatment in the frescoes is also similar to the gloss on the glaze of the tiles, both of which emphasize the balance and harmony of the colors, conveying emotion and atmosphere through the color changes.(Junrong Zhao,fellow,Dunhuang Research Institute in Gansu,16:00 p.m on April 6, 2023.Interview.)

Figure 78 Line drawing and color filling on painted portrait bricks and frescoes.
Source:Ma Ruiqiang and Du Yanda.

It is worth noting that although Dunhuang flower bricks are mainly used for architectural decoration, their production process is no less skillful than that of frescoes and sculptures. Through fine carving and complex mold making, the craftsmen gave the bricks a rich artistic expression, especially in the fineness of patterns and three-dimensional shaping, demonstrating their high level of craftsmanship.

3.3.3 Embodiment of multicultural integration

Dunhuang flower bricks and the murals, sculptures and other art forms of the same region all show strong pluralism in their cultural backgrounds, reflecting the combined influences of the Central Plains, Western cultures, and even Persian and Greek cultures. For example, the common curly grass pattern, animal face pattern and geometric pattern on flower bricks can find similar design elements in Dunhuang murals and sculptures. This cultural fusion is manifested in the pattern design, such as the flying sky pattern not only appears in Dunhuang murals, but also appears on the flower bricks through simplification or deformation, making it a visual symbol of the interaction between Chinese and Western cultures.

For example, two of the more common terms in Dunhuang studies, the Gandhara style and the Mathura style. One of them, the Mathura style, originated in India and was one of the main styles in the early days of Dunhuang art in China. This style is characterized by thick lines on the clothes of the figures(Figure 80). Later, this style was applied to Chinese paintings by Cao Zhongda, a painter of the Northern Qi Dynasty, and became a typical feature of Cao's school of painting, which is called “Cao's clothes out of the water”, meaning that the clothes of Cao's school of painting look like the figures have just come out of the water, and that the clothes' lines are thick and like they are absorbed into the human body. The lines of the clothes are thick and as if they are adsorbed on the human body.

Figure 79 The picture on the left is Dunhuang Mogao Grottoes Northern Wei period grotto statues. The right picture is the sculpture unearthed in India.
Source:Dunhuang Research Institute.

3.3.4 Cultural Identity and Symbolism

Dunhuang flower bricks, like Dunhuang murals and sculptures, are more than just works of art; they all assume the role of spreading culture and transmitting the spirit. The cultural identity they carry is reflected in the symbols and imagery they display. For example, the Buddhist lotus pattern and the image of flying sky on the flower bricks not only have a decorative effect visually, but also symbolize the core values of Buddhist culture, reflecting people's reverence for religious beliefs at that time(Figure 81). This symbolic cultural heritage is more obvious in murals and sculptures, and these works of art convey deep cultural memories and spiritual connotations through visual language.

Figure 80 Reliefs and paintings of flying images.
Source:Dunhuang Research Institute.

The cultural identity of Dunhuang flower bricks is also expressed in the philosophy of life and aesthetic ideals it conveys. (Li D.X&Chu Y.L,2023,52)The buildings adorned with flower bricks, whether temples or homes, reflect people's pursuit of the aesthetics of life. This aesthetics of life, combined with the religious aesthetics of Dunhuang murals and sculptures, further emphasizes the overall style and cultural consensus of artwork in the Dunhuang region.

3.3.5 Cultural identity of Dunhuang

As one of the treasures of ancient Chinese culture, Dunhuang art not only carries a long historical memory, but also reflects the unique cultural value of multi-ethnic and multi-cultural fusion. Dunhuang art is an important cultural carrier on the ancient Silk Road, which records the convergence and fusion of Buddhism, Taoism, Confucianism, and other diverse cultures from Central Asia, India, and Persia. This multicultural background has enabled Dunhuang art to transcend geographical and ethnic boundaries and become an important symbol of global cultural exchange. Its unique art forms, rich cultural connotations and exquisite techniques not only express the spiritual pursuit of ancient Chinese society, but also reflect China's tolerance and absorption of foreign cultures.

Cultural identity in Dunhuang art is largely reflected in its images, symbols and architectural decorations. These art forms are not only the embodiment of religious beliefs, but also the centralized expression of the social order, cultural ideology, and values of the time. For example, the Buddhist murals at Dunhuang not only conveyed the religious belief in the world of the Pure Land, but also reflected the people's yearning for peace, happiness and a better life at that time. This expression made Dunhuang art an artistic manifestation of the social life and spiritual world of the time, and thus became one of the symbols of ancient Chinese cultural identity. At the same time, the continued development of Dunhuang art is a testament to how Chinese culture has absorbed and integrated foreign cultures into the local cultural

system over the course of history, ultimately resulting in an inclusive and unique artistic style.

Cultural identity is also reflected in the preservation and transmission of Dunhuang art. Today, Dunhuang art is not only an important part of China's cultural heritage, but also an indispensable part of the world's cultural heritage. The preservation and inheritance of Dunhuang art reflects contemporary society's recognition of and respect for traditional cultural values. This cultural identity is not only a review and tribute to history, but also a confirmation and insistence on one's own cultural identity in the context of modern society.(Huang W,2017,268) In the process of modernization, the cultural value of Dunhuang art, through its unique artistic expression, conveys an aesthetic value that transcends time and space, prompting people to rethink the relationship between tradition and modernity.

In modern art creation and design, symbols and patterns of Dunhuang art are often reinterpreted and integrated into contemporary design. This is not just a simple reproduction of ancient art, but an innovative means of combining traditional culture with modern aesthetics to adapt it to the needs of modern society. Through this innovative application, the cultural identity of Dunhuang art has been further spread and continued, while also providing a rich source of inspiration for modern cultural creation. The cultural symbols in Dunhuang art, such as the flying sky, the lotus flower, and the auspicious beasts, have been transformed into new vitality through modern design, which is not only the inheritance of traditional culture, but also the re-creation of its cultural value.

In conclusion, Dunhuang art, as a treasure of Chinese culture, its cultural identity and cultural value are not only embodied in its artistic form and historical background, but also continued to be inherited and developed through modern creation and design practice. It is not only a witness to history and culture, but also an important resource for modern cultural creation, carrying cultural identity and values across generations and cultures. Dunhuang art has thus become a symbol of Chinese culture and occupies an important position in the global cultural system.

Summary:

This chapter explores the multi-dimensional artistic characteristics and cultural significance of Dunhuang flower tiles in depth, providing a comprehensive understanding of this ancient art form from historical background, artistic style to cultural symbolism.

1. Historical Background and Artistic Evolution

The historical background of Dunhuang flower tiles reveals the evolution of its artistic style and craftsmanship. Early flower tiles were dominated by simple geometric patterns, which gradually developed into complex and diverse animal, plant and Buddhist patterns. This evolution reflects the social aesthetics and technical levels of different historical periods, and also reflects the cultural exchange and integration of Dunhuang as an important node on the Silk Road.

2. Artistic Characteristics and Cultural Symbolism

The artistic characteristics of Dunhuang flower tiles show rich decorativeness and symbolism. The symmetrical design and meticulous craftsmanship on the brick surface show the ancient craftsmen's pursuit of beauty and emphasis on order. The

patterns on the bricks are not only decorative, but also carry profound cultural symbols, such as the Buddhist lotus and auspicious animal patterns, which reflect the religious beliefs and spiritual pursuits of the society at that time.

3. Depiction of Secular Life

Chapter 3 describes in detail the representation of secular daily life in Dunhuang art. Whether it is agricultural production, entertainment activities, food culture or clothing style, these depictions not only provide rich historical data, but also show the diversity and vitality of ancient society. These images are not only a record of ancient social life, but also reflect the values and aesthetic tastes of people at that time.

4. Cultural significance and social value

Dunhuang flower tiles are not only the product of ancient architectural decoration, but also the carrier of culture and art. They reflect the exchange and integration of Chinese and Western cultures, embody religious beliefs and social ideals, and are also a combination of traditional art and innovation. The natural patterns and religious symbols in these bricks not only show the awe of nature and the celebration of life, but also reflect the ancient people's pursuit of harmony and order.

5. Cultural inheritance and innovation

Dunhuang flower tiles inherit the traditional art style while constantly absorbing foreign cultural elements, forming an artistic style with local characteristics. This process of inheritance and innovation has enabled Dunhuang flower tiles to not only preserve the essence of traditional culture, but also integrate the development of the times, so that they still have important artistic and cultural value in modern society.

This chapter demonstrates the important position and far-reaching influence of Dunhuang tiles in ancient Chinese society through a comprehensive analysis of the historical background, artistic characteristics, depiction of secular life and cultural symbols of Dunhuang tiles. They are not only witnesses of history, but also symbols of artistic creation and cultural exchange, reflecting the ancient society's profound understanding of beauty, religion and social ideals. As a cultural heritage, Dunhuang tiles not only reflect the social outlook of the past, but also provide precious cultural resources and artistic inspiration for modern society.

Chapter Ⅳ

Creation of Dunhuang tiles patterns conforms to modern artistic aesthetics and needs

4.1 Dunhuang Flower Tile Creation

In the process of designing the Dunhuang Flower Brick artwork, in order to ensure that the artwork possesses both the deep connotation of traditional culture and is able to meet the aesthetic demands of modern design, I chose different categories of Dunhuang motifs as the reference prototypes for the design, and invited five experts to provide guidance and make the selections. The core purpose of this process is to carefully select the patterns and motifs through the professional opinions of the experts to ensure that the design respects the tradition and can be innovatively combined with modern art, and at the same time, the selected patterns are also common or familiar to ordinary people in their daily lives, so using such prototypes as the design references will be more likely to be perceived and recognized by the audience.

First of all, the nine patterns of Dunhuang paving tiles are the result of my careful selection. These patterns represent the diversity of styles and themes in Dunhuang art. From a historical and cultural point of view, Dunhuang paving bricks have assumed an important decorative function in Dunhuang architecture, and they are not only practical building materials, but also the embodiment of cultural symbols.The lotus pattern is the most representative of Dunhuang art and Dunhuang tiles of artistic characteristics.So, we selected the design prototypes from the nine lotus or lotus derivation patterns that are more mainstream in Dunhuang flower tiles.(Figure 82)

Figure 81 The more dominant of the nine lotus or lotus-derived patterns in Dunhuang flower tiles.
Source:Chang Shana, Decorative Patterns of Dunhuang in China through the Ages.

Secondly, about the Dunhuang kabuki patterns, I have selected 12 kinds as the preliminary design reference. The kabuki patterns in Dunhuang murals show the multi-ethnic cultural fusion and the prosperity of religious art during the Silk Road period, and the kabuki images not only have high artistic value, but also convey the expression of music, dance and other cultural elements in ancient Dunhuang art. (Yongwei Du,Mogaoli Artisan Village, Xindun Village Group 3, Mogao Town, Dunhuang City,10:30 a.m on April 6, 2023.Interview.)Therefore, I chose 12 kabuki patterns, which include different movements, costumes, and forms of expression, and can fully demonstrate the dynamic beauty and diversity of Dunhuang kabuki. The reason for choosing these 12 patterns is that kabuki patterns not only inject traditional artistic expression into modern art design, but also satisfy the demand for vigor and dynamism in modern decorative design by capturing dynamic beauty.(Figure 83-84)

Figure 82 Line drawing of Dunhuang flying kabuki.
Source:Niu Yusheng, Line Drawings of Dunhuang Figures.

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Figure 83 Line drawing of Dunhuang flying kabuki.
Source:Niu Yusheng, Line Drawings of Dunhuang Figures.

Finally, the choice of the 3 representative patterns of the Dunhuang relief image bricks is based on their unique values of history and culture. Dunhuang cameo portrait bricks are a very characteristic architectural decorative material in Dunhuang, which expresses rich patterns and stories on the brick surface through the cameo process, presenting a three-dimensional visual effect. I have chosen 3 representative patterns that not only reflect the outstanding achievements of Dunhuang relief bricks in terms of technique and expression, but also provide references with depth and historical thickness for modern design. These three patterns are highly symbolic, carrying the cultural symbols of Dunhuang art, and at the same time have a strong visual impact, making them suitable for use in modern design as elements of decoration and to convey historical and cultural connotations.(Figure 85)

Figure 84 Dunhuang relief portrait bricks, from top to bottom: dragons, horses, and a hu-man holding a camel.
Source:Du Yanda.

4.1.1 Prototype of the Dunhuang Flower Tile Design Selected by the Expert Group

The five experts are: Dunhuang art color sculpture expert, Chinese arts and crafts master, Mr. Du Yongwei. Mr. Zhao Junrong, Dunhuang painting expert and researcher of Dunhuang Academy. Mr. Kou Kehong, an expert in Dunhuang cultural relics. Mr. Wang Yongsheng, Dunhuang modern media expert. Mr. Du Yongsi, architect.

Mr. Du Yongwei, 64, used to be a researcher at the Dunhuang Academy. He specializes in Dunhuang colored sculptures and has a deep understanding of other Dunhuang arts.

Mr. Zhao Junrong, 69 years old, researcher of Dunhuang Academy. He specializes in Dunhuang painting and has been painting Dunhuang murals for 47 years.

Kou Kehong, 62, director of the Gaotai County Cultural Relics Bureau. He specializes in cultural relic identification and period art analysis.

Wang Yongsheng, 61 years old, is a teacher at the Art College of Lanzhou Jiaotong University. He specializes in new media communication and all kinds of high-tech display software, and also has a better understanding of all kinds of Dunhuang art.

Du Yongsi, 60 years old, architect. He specializes in the design and display of museums and exhibition halls, and has presided over the design of as many as fifty museums in China so far.

The selection of experts plays a crucial role in the design of Dunhuang flower tiles. From a variety of perspectives, including artistic value, cultural symbolism, and applicability, experts select the most representative and applicable patterns to ensure that these designs respect Dunhuang's artistic traditions while also playing a unique role in modern decoration. Next, I will discuss the criteria and reasons for the experts' selection of these motifs in relation to the various types of motifs.

First of all, regarding the selection of the Dunhuang paving tiles, the experts finally chose one of the nine patterns. The experts' criteria for choosing this pattern are firstly its universality and decorative nature. This pattern has a strong sense of visual hierarchy and can be combined with the minimalist style of modern architecture. At the same time, the choice of this pattern also takes into account the typical artistic symbols of Dunhuang paving tiles, i.e., the eight-petaled lotus flower, and at the same time, the decoration of the lianzhu pattern. In addition, this pattern inherits the artistic characteristics of Dunhuang tiles, with a typical Dunhuang decorative style, showing traditional aesthetics, but also able to resonate with modern decorative needs, and has become the preferred choice of experts.

Second, in the process of selecting the Dunhuang kabuki patterns, the experts chose four of the 12 patterns I provided. The criteria for this selection were based primarily on the dynamic expressiveness and cultural symbolism of the motifs. Dunhuang kabuki motifs are full of life and dynamic beauty with dance and music as the theme. The four motifs selected by the experts not only demonstrate the dynamic beauty of the kabuki figures in Dunhuang murals, but also reflect the details of the figures' modeling and the subtlety of their movements. These patterns can well convey the sense of rhythm and elegance in Kabuki patterns, which is in line with the

pursuit of dynamism and vigor in modern decorative design. At the same time, the experts also considered the cultural symbolism of these kabuki patterns, the selected patterns have a high historical status in Dunhuang art, reflecting the multi-cultural exchanges and fusion during the Silk Road period, and therefore can be well continued in modern design.

Finally, the selection of representative patterns for Dunhuang relief bricks has its own unique criteria. Among the three kinds of relief patterns, experts finally chose one as a design reference. The main reason for this choice is its three-dimensionality and visual impact. The pattern chosen by the experts has more complex details and distinctive layers, which can add artistry and depth to the decoration in modern design. At the same time, the relief pattern of “Hu people holding camels” also has strong cultural symbolism, and the content presented is closely related to the integration of ethnic cultures in Dunhuang, which can convey the cultural connotation of Dunhuang art in modern decorative design.

Overall, the experts adhered to the principle of combining tradition and modernity when selecting these patterns. They not only assessed the visual expressiveness of each pattern from an artistic and aesthetic point of view, but also thoroughly analyzed the cultural symbols and historical values behind the patterns to ensure that the selected patterns could effectively continue the cultural tradition of Dunhuang flower bricks in modern design, while meeting the practical and aesthetic needs of modern decoration.

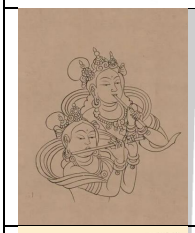
Table 6 The five expert members of the panel, each scored the patterns and motifs I provided. 1-5, with 1 being the lowest and 5 being the highest. The final average score was taken.

icon	value of a score					average score
	1	2	3	4	5	
			3	2		3.4
		1	4			2.8

			2	3			2.2
			1	1	3		3.4
		1	3	1			2
		2		2	1		2.4
				1	3	1	4
				2	2	1	3.8

				2	3	4.6

Table 7 The five expert members of the panel, each scored the patterns and motifs I provided. 1-5, with 1 being the lowest and 5 being the highest. The final average score was taken.

icon	value of a score					average score
	1	2	3	4	5	
		2	1	1	1	3.2
				3	2	4.4
	1	2	2			2.2
			1	2	2	4.2
	2	1	2			2
		2	3			2.6

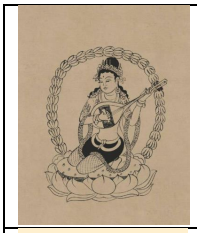
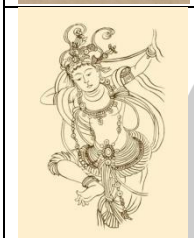
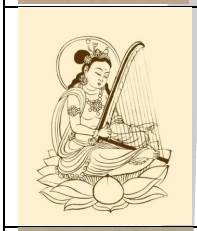
			1	1	3	4.4
		4	1			2.2
		1	2	2		3.2
		2	3			2.6
				4	1	4.2
	1	1	3			2.4

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Table 8 The five expert members of the panel, each scored the patterns and motifs I provided. 1-5, with 1 being the lowest and 5 being the highest. The final average score was taken.

icon	value of a score					average score
	1	2	3	4	5	
			2	3		3.6
				3	2	4.4
		1	2	2		3.2

Table 9 The final selection of six Dunhuang flower bricks to create a design reference prototype

4.2 Modern artistic needs

In my research, the creation of Dunhuang flower bricks decorative products has always been centered on modern artistic needs, taking into full consideration the contemporary audience's knowledge of traditional cultural elements, aesthetic preferences, and the actual application scenarios of decorative products. Through a variety of research methods, such as literature analysis, field survey, questionnaire survey and case study.

4.2.1 Explore the needs of modern art

In my research, the target audience can be mainly categorized into the following groups:

Art and culture enthusiasts: This group has a strong interest in traditional culture and is willing to establish a connection with traditional Chinese art through modern decorative products. They expect to see innovative designs that retain the historical connotations of the culture, but also have a modern sensibility. I have clearly positioned this group as the core consumers of Dunhuang tile creations, and their needs drive the balance between cultural heritage and innovative design.

Designers and architects: This group needs decorative materials and products that can be adapted to modern architectural and interior design styles. They are concerned with the combination of functionality and aesthetics of products, especially in public spaces, residential or commercial environments. Therefore, I give special consideration to the multifunctionality of decorative products in my creations, so that they not only have aesthetic value, but also blend with the design style of modern architecture.

Consumers of cultural and creative products: This audience tends to buy small decorative products, handicrafts or souvenirs, aiming to show their personal taste and cultural identity through these products. Through market analysis, I found that this audience pays more attention to the uniqueness and cultural connotations of the products, so in my design, I created miniaturized and portable derivatives of Dunhuang flower bricks to satisfy their demand for personalized cultural symbols.

Younger Generation Consumers: These audiences are particularly interested in design styles that are simple, environmentally friendly and functional. They want decorative products that reflect a combination of traditional and modern elements that are not only aesthetically pleasing but also environmentally friendly. I have emphasized eco-friendliness and sustainability in my materials and design concepts to ensure that Dunhuang Flower Tile products meet the expectations of young consumers for eco-friendly and minimalist design.

4.2.2 How to understand the needs of your target audience

In order to accurately understand the needs of these audience groups, I adopted a variety of research tools:

Questionnaire survey: By designing questionnaires for different audience groups, I collected detailed data on their perceptions, preferences, and needs for decorative products of Dunhuang flower tiles. The results of the questionnaire show that modern consumers pay attention to the combination of simplicity, practicality and cultural significance in terms of aesthetics, especially in the application of home decoration and commercial space, and they expect that the products can convey the traditional culture with modern style at the same time.

Fieldwork and Interviews: Through in-depth interviews with craftsmen, designers and consumers, I further understood their actual needs and feedback when using Dunhuang Flower Brick decorative products. These interviews revealed that many people want traditional cultural elements to be reinterpreted in modern environments and to be able to integrate with modern lifestyles. They are not only looking for aesthetics in terms of appearance, but also want these products to be functional and environmentally friendly.

Market Analysis: I also conducted a research on the existing traditional decorative products in the market and analyzed the purchasing behavior and preference of consumers. By analyzing similar cultural and creative products on the market, I found that modern consumers have increasingly high expectations for a sense of design, material innovation and cultural connotations. Especially for products that incorporate traditional cultural elements, consumers expect them to reflect the foresight and uniqueness of contemporary design.

4.2.3 An expression of modern design tastes and stylistic needs

By analyzing the needs of the target audience, I found that the connection between their taste and modern design style is mainly reflected in the following aspects:

Modern minimalist style: Many audiences, especially the young group, prefer modern minimalist style with clean lines, light colors and prominent design. They tend to choose decorations that are both functional and aesthetically pleasing. In my Dunhuang tile creation, I simplified the traditional complicated tile patterns by extracting the core elements of Dunhuang patterns and presenting them in more minimalist lines and graphics. At the same time, I focus on the modernity of the colors, choosing more contemporary monochromatic or muted tones instead of the traditional colorful designs, making them more adaptable to the decorative needs of modern homes or public spaces.(He Jiayi,2023,94-96)

Eco-design: Modern consumers are increasingly demanding sustainable and environmentally friendly materials. I incorporate eco-design concepts into the design of my Dunhuang tile products, choosing environmentally friendly materials and minimizing carbon footprints and waste emissions during the manufacturing process. In addition, I have explored the use of recycled materials to ensure that the products are not only aesthetically pleasing but also meet contemporary environmental standards. This design philosophy is particularly favored by the younger generation of environmentally conscious consumers.

Modern transformation of Chinese style: Many audiences have a strong interest in traditional Chinese culture, but they expect this culture to be presented in a more contemporary way. Therefore, I fused traditional Chinese elements with modern design aesthetics in the design of Dunhuang Flower Tiles. In terms of subject matter, I retained the essence of Dunhuang's traditional motifs, such as the lotus flower, ninja and other symbolic motifs, but through innovative combinations and the use of modern materials, I was able to make these motifs compatible with contemporary decorative styles. This not only preserves the traditional cultural connotations, but also gives the product new vitality and modernity.

4.2.4 Embodiment of needs in the creation of Dunhuang flower tiles

Modern design tastes and styles are well represented in my Dunhuang Flower Tile decorative products:

Functional and decorative at the same time: many modern consumers are concerned with practical functionality when purchasing decorative products. I have enhanced the multifunctionality of my products by designing Dunhuang tiles to be used both for floor or wall decoration and as daily-use living objects, such as tabletop ornaments and lamp bases. This design concept not only meets the aesthetic needs of consumers, but also enhances the practicality of the product.

Fusion of Culture and Contemporary Design: I am bold and innovative in my design, trying to combine the traditional art of Dunhuang flower tiles with modern design needs. For example, in some wall hanging and floor tile designs, I simplified the classic patterns in Dunhuang frescoes into modern geometric patterns so that they can adapt to the decorative styles of modern spaces while retaining their cultural connotations. This design not only meets the demand for cultural identity, but also conforms to contemporary people's design taste for simplicity and fashion.(Cai Sihui,2016,34-37)

Innovative materials and processes: In order to better meet the needs of modern consumers for environmental protection and material innovation, I have adopted modern ceramic technology and introduced new environmentally friendly materials into the production process, making the products lighter and more durable. In addition, I combine modern laser engraving with traditional handcrafts, and through this cross-generational fusion of craftsmanship, I have achieved a finer expression of the pattern of the tiles, while at the same time improving production efficiency and reducing costs.

In summary, my Dunhuang tile decorative products are not only based on traditional culture, but also closely match the needs of modern audiences, integrating contemporary design styles such as minimalist style, eco-design and modern Chinese style, successfully realizing the organic combination of cultural heritage and modern innovation. This design concept not only adds unique cultural connotation to modern decoration, but also injects new vitality into the traditional art form of Dunhuang tiles.

4.3 The creation of Dunhuang tile patterns

The patterns of Dunhuang patterned tiles are a significant part of traditional Chinese decorative art, characterized by their diverse content, extensive historical span, and vivid reflection of cultural exchanges and integrations. They possess immense cultural and artistic value. Today, many artistic design creations are increasingly seeking a sense of belonging from their ethnic and traditional cultural heritage. This chapter will analyze, from the perspectives of aesthetics, design, and craft art, why the creation of Dunhuang patterned tile designs aligns with the demands of modern artistic aesthetics and how it achieves this alignment.

4.3.1 The artistic characteristics of Dunhuang tiles

Dunhuang patterned tiles can be classified into three types based on their decorative nature: paving tiles, relief image tiles, and painted image tiles. Their content encompasses plants, animals, figures, and geometric patterns. As a unique ethnic visual language, the patterns of Dunhuang patterned tiles have undergone a series of developmental changes, reflecting the distinct aesthetic concepts and

emotional imagery of various historical periods of Chinese civilization. The alignment of these patterns with aesthetic principles is primarily manifested in four aspects.

1)Creative Themes

Dunhuang patterned tiles enrich the subject matter of modern artistic creation. They encompass a variety of themes, including geometric shapes, geometric patterns, secular figures, secular flora and fauna, and deities. These tiles reflect both real and imaginative aspects, incorporating fictional, mythical, and religious elements, as well as preserving some historical facts. Geometric patterns and designs offer artists space for creative expression and imagination; deity patterns include images of mythical creatures and flora such as the Celestial Horse and the auspicious flower from religious evolution and mythology (Figure 86). The secular life depicted in relief and painted image tiles includes various aspects of daily life such as farming, hunting, funerals, and travel, as well as agricultural techniques like land cultivation and animal husbandry (Figure 87). Dunhuang patterned tiles provide a rich source of material for modern artistic creation, offering inspiration and nourishment for artists' creative work and theoretical research.

Figure 85 Dunhuang Pegasus relief brick.
Source:Dunhuang Research Institute.

Figure 86 A brick with portraits from a tomb of the Wei and Jin dynasties.
Source:National Museum of China.

2) In terms of color

Dunhuang patterned tiles provide a model for modern artistic creation. The National Museum of China once held an exhibition titled "The World of Pictures," showcasing 258 exhibits, among which many were colorful image tiles that left a deep impression (Figure 88). These image tiles are diverse in form and rich in content, covering a range of themes including deities and mythical beasts, mulberry farming, travel and hunting, banquets and daily life, theatrical performances, clothing and carriages, and architectural dwellings, reflecting a strong sense of the era and a harmonious blend of ethnic characteristics (Figure 89). Although the colors used are limited and primarily warm tones, modern artistic creation can draw inspiration from their color application or combinations, as well as methods using plant or mineral dyes, to develop color use in contemporary art.

Figure 87 Hexi Picture Brick Exhibition.
Source:National Museum of China.

Figure 88 The Wei and Jin portrait bricks in the exhibition.
Source:National Museum of China.

3) In terms of composition

Dunhuang tiles are a classic paradigm of modern art creation. Due to the different decorative positions and forms, the brick surfaces of Dunhuang tiles vary in size, which determines the diversity and harmonious unity of Dunhuang tiles in terms of composition. Among them, the floor tiles have a relatively fixed composition, which basically adopts central symmetry or central axis symmetry, but the symmetry of floor tiles is not rigid symmetry (Figure 90). We all know that symmetrical design is a very classic and commonly used modeling design method. The ancient Greek philosopher Pythagoras once said, "Beautiful lines and all other beautiful shapes must have symmetrical forms." Symmetry is the earliest law of formal beauty mastered by humans. Symmetrical graphics have the characteristics of beauty, balance, and stability. Symmetrical designs make people feel very comfortable and make people feel the beauty of order, solemnity, integrity, and harmony. The color, shape, and structure of things are all unified and harmonious phenomena. Symmetrical things can give people a sense of "quiet" and seriousness, which not only contains the solemnity of Buddhism, but also contains the "golden mean" of the Chinese people in dealing with the world. But if we look closely at the Dunhuang floor tiles, we will find that under the symmetrical form, there are still slight differences in the details of each area, such as the different angles of the petal tips; the different fatness and thinness of the branches and leaves, etc. Although from the perspective of Dunhuang tiles alone, it is difficult to say whether the slight differences are intentional or unintentional by the craftsmen, other art forms in Dunhuang art also have similar characteristics. Considering the same source, the Dunhuang tiles have symmetry first, and then try to destroy the strict symmetry, destroy the strict balance, and seek asymmetry in symmetry. The characteristics should be intentional from the level of composition. In addition, the Dunhuang tiles can be called a flexible symmetrical composition method by adjusting the proportions and moving the positions to adjust the overall harmony with local changes.

Figure 89 Dunhuang Flower Brick Topiary.
Source:Chang Shana, Decorative Patterns of Dunhuang in China through the Ages.

4) In terms of aesthetics

Dunhuang flower tiles provide a paradigm for aesthetic pursuit in modern art creation. Dunhuang flower tile art draws on the strengths of many others, absorbing and gathering the aesthetic connotations of different times, nationalities, and regions, forming rich aesthetic concepts, including harmony, vividness, charm, artistic conception, and sublimity. Harmony refers to diversity and unity. Dunhuang tile art integrates the content, color, composition, etc. of fine arts into one, coexists harmoniously, and highlights individual characteristics in commonality; expressiveness refers to both form and spirit. Each character in Dunhuang tile art is different. Through the external image of painting art, the thoughts, emotions, expressions, and different characteristics of each character are expressed; spirit refers to vivid spirit. Dunhuang tile art uses beautiful lines, superb skills, and flexible techniques to create vivid artistic expressions; artistic conception refers to the charm outside the rhyme. Whether it is the creation of the celestial horse or the four spirits in Dunhuang tile art, it will lead the viewer into the image outside the painting and understand its meaning outside the painting; sublime refers to the realm of heaven and earth. Dunhuang tile art is closely related to religious art. Buddhism advocates moving from suffering to nirvana, which is a sublime expression of suffering. Modern art creation can draw on the rich and profound aesthetic concepts of Dunhuang tile art, and pursue this to continuously deepen the contemporary aesthetic intention.

5) It is of vital importance to the construction of Chinese art theory system and Chinese art history

From the perspective of the history of art development, European art has a clear main line of development, and artistic innovations are breakthroughs based on the art forms of the time. This development model has a great influence on my country's art world. Many people are keen to learn art skills and techniques in Western countries. In addition, they have also achieved high artistic attainments. After the May Fourth Movement, a wave of critical reflection on Chinese traditional culture was set off, and the art world was also deeply affected. Many outstanding artists at the time began to think about the future of Chinese artists. At this time, the criticism of my country's art at the time was mainly based on the Western realistic art style as a comparison. It was believed that most of the ancient Chinese art works reflected the leisure and elegance of literati and did not have too many practical functions, which did not meet the needs of social reform at the time. People yearn for an art that can reflect the spirit of the times and the real life of society. This point was put on the agenda when China was invaded by foreign enemies and ethnic conflicts were intensified. Some leaders in the art world advocated the use of Western art expression methods to innovate Chinese art. At that time, Xu Beihong and Chang Shuhong represented the emergence of realism to save the past situation of Chinese art that was far from reality and formalized, and opened up a path to improve Chinese art; Lin Fengmian and Liu Haisu focused on the combination of Chinese and Western art, and tried to explore the artistic creation of the combination of Chinese and Western in painting, which was called the "New School of Painting". The discovery of Dunhuang art solved this endless struggle. Dunhuang art runs through the route of literati art and popular art complementing each other. From Dunhuang art, we can see the aristocratic life and understand the lifestyle of the folk masses at that time. It has given people a new understanding of traditional Chinese art, and from Dunhuang art, we can see the significance of traditional Chinese art that was ignored in the past. It is an important supplement to the blank of medieval art history in Chinese art history, and it can even be said that it is a history of Chinese medieval art. Dunhuang art can be said to be a rare and great artistic relic. It is religious art, but also national and folk art.

Dunhuang art has the greatest impact on the study of Chinese art history. It is no exaggeration to say that the discovery of Dunhuang and the study of Dunhuang art in the late 19th and early 20th centuries changed the traditional Chinese view of art history. Chang Shuhong and art workers of all generations spared no effort to protect and study Dunhuang art, providing valuable physical materials for art workers to create and systematically learn theoretical knowledge. The discovery and study of Dunhuang art have allowed us to see the artistic works and development context of medieval China, which have allowed the fragmented research on Chinese art history to be re-integrated and complete. It can be said that the study of Dunhuang art has filled the gap in the study of Chinese art history, clearly showing the development of traditional Chinese popular art and the changes in its style of the times, and also provided materials for the creative style and inspiration of modern art creators. It has important theoretical value for the Chinese art world, and also has a wide range of application value.

4.3.2 The creation of Dunhuang tile patterns conforms to the design concept

The decorative patterns of Dunhuang tiles from different dynasties reflect the modeling, color, organization, and style characteristics of different dynasties and historical stages, the collision and integration of Chinese and Western cultures, and the rich design aesthetics contained in ancient Chinese pattern art. In particular, the design features, expressions, and formal aesthetics of the geometric and plant patterns of Dunhuang tiles are exactly what we should focus on in modern design, and it is extremely necessary to conduct in-depth analysis, speculation, and study.

1) Structure and vision

The structure is the skeleton of the pattern, and the form, color, content, etc. of the pattern must change on this basis. It plays a vital role in shaping the sense of movement of the pattern. According to the Gestalt theory in Gestalt psychology, people prefer simple-structured graphics. Only artistic styles that conform to this law can be called beautiful and pleasing graphics. The structure of many Dunhuang patterns is relatively simple, and patterns are often drawn in squares and circles. Therefore, when we appreciate Dunhuang patterns, no matter how complex its structure looks or how rich its colors are, we will not feel that the pattern is messy and chaotic. This is because Dunhuang patterns usually have a relatively simple and reasonable internal organizational structure. According to the principle of gamma motion, there is a tension inside the figure, and the direction of this tension depends on its internal organizational structure. As shown in (Figure 91), we can see the existence of tension in various simple shapes. It is like a radiating line emanating from the center, expanding outward along the main axis of the geometric body. To make a work dynamic, it is only possible when the movement of all the details of the work is strictly consistent with the movement of the entire composition. Any work of art is organized around a main movement melody, and the rest of the activities radiate out to all the surrounding corners based on this, just like blood flowing from the aorta to every tiny capillary.

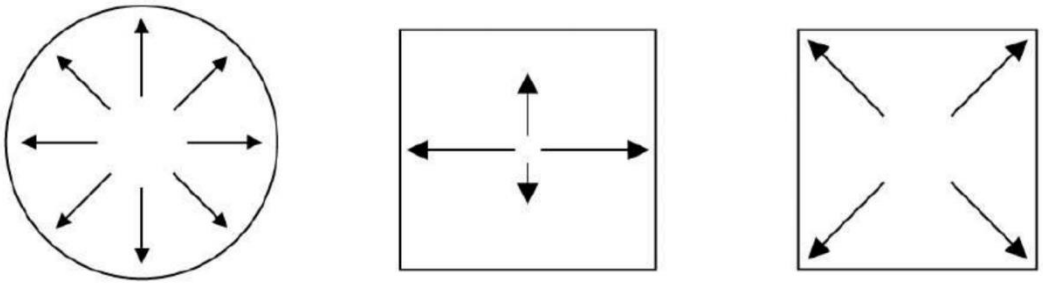

Figure 90 Tension radiation lines of common patterns on Dunhuang tiles.
Source:Du Yanda.

The shapes of the Dunhuang floor tiles are mostly square or nearly square. The patterns are distributed symmetrically. The symmetry line and the center line of the tile are combined into one, forming a "rice grid" structure with the invisible diagonal line. These four structural lines intersect at the center point of the tile, dividing the entire pattern evenly into eight parts. The central intersection is like an invisible magnetic field, gathering the surrounding decorations together and becoming the

center position for visual guidance (Figure 92). This structure will unconsciously place people's visual center at the center of the pattern, and then spread to the surroundings. Tiles with the "rice grid" as the basic structure will generally first determine the center position of this visual guide, and then organize and change it internally to produce a rich and gorgeous melody. Tiles with the "field grid" and "nine-square grid" as the basic structure also use such organizational changes and layouts. In the basic shape of the square suitable pattern, the tile pattern not only uses some traditional layout forms such as "field grid", "rice grid", and "nine-square grid", but also manifests itself in the clever application of suitable patterns. Or a unit pattern can form a suitable pattern by itself; or different patterns can be cleverly arranged in a strict shape to form various suitable patterns, some of which are geometric shapes such as circles, squares, and polygons; some are natural images or the outer corridors of utensils such as peaches, pomegranates, and ruyi shapes. At the same time, in patterns of various shapes, the skeleton structure of the unit pattern maintains relative balance, symmetry, and clear levels.

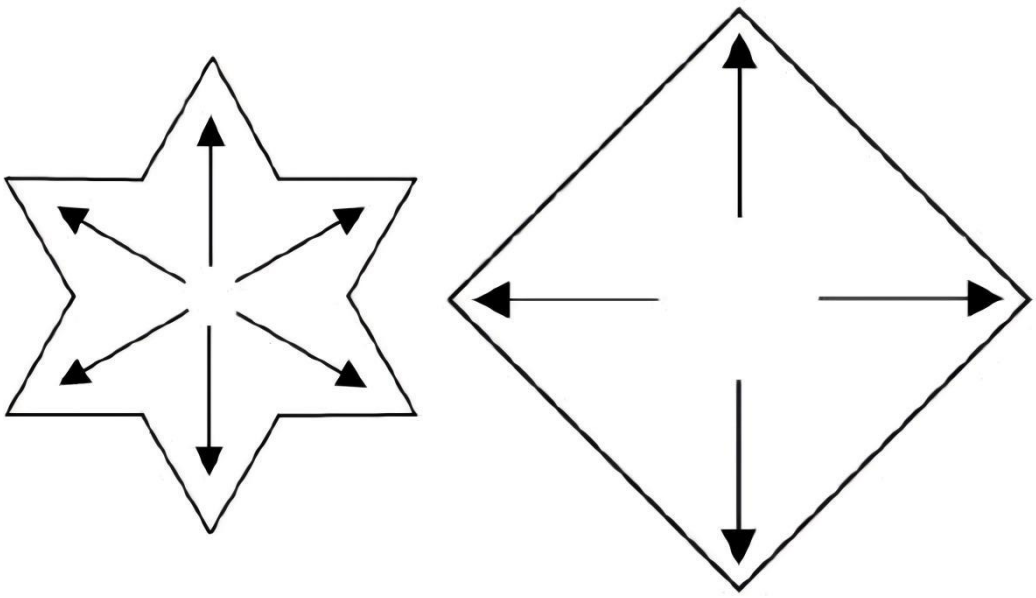

Figure 91 The diagonal division of Dunhuang tiles guides the visual center.
Source: Du Yanda.

2) Change and unity

Change and unity are important in the law of formal beauty. The most direct manifestation of change in decorative patterns is richness and diversity, which is mainly reflected in the shape, color, organization form and expression techniques of the pattern. The change of shape mainly refers to the size, width, thickness of the outline of the block surface, etc. The color refers to the change of light and dark, cold and warm, and light and dark. The organizational form is the arrangement law of fingerprints in a limited area. Unity is the opposite of change, but not completely opposite. If the pattern always pursues change, it will only backfire and cause the picture to be mixed and disordered, but if it pursues unity too much, it will become dull and boring.

The beauty of change and unity can be seen everywhere in Dunhuang tiles in various periods. Even the simplest lotus petals will use different shapes and layers of

petals to produce changes, making the visual language of the picture richer. However, the changes are not arbitrary and chaotic. We can also find commonalities and connections between individuals, such as the lotus linked bead pattern commonly seen in Dunhuang tiles. Although there are differences in the form of each group of linked bead patterns, they are all embedded around the lotus, and the changes are also subtle (Figure 93). The overall visual effect formed in this way is still a manifestation of harmony and unity.

Figure 92 A rubbing of a Dunhuang brick with a lotus-bead pattern.
Source:Chang Shana, Decorative Patterns of Dunhuang in China through the Ages.

3)Strengthen and weaken

Strengthening and weakening refer to emphasizing the most typical features of the image, while weakening unimportant, atypical, and redundant factors. In terms of modeling, the main image is reflected in: enlarging the area occupied, thickening the outer contour, and carefully depicting the details. For the secondary image, the area occupied is reduced, the contour line is weakened, and the details are pushed back visually. In essence, it is to highlight the theme, create the first visual perception, and hide the details in the back, guide the viewer to explore, and strive to make the work beautiful and durable. Many artists at home and abroad in ancient and modern times have been constantly pursuing and exploring this kind of movement in the picture when creating art. In the works of art, the composition elements are arranged in a certain way, and the artist controls and forces the viewer's eyes to move around the composition of the picture (Figure 94). For example, the eye will move along a specific path, such as between fixed or scattered lines, and sometimes it will move between more subtle paths, such as from larger elements to smaller elements, from dim elements to bright elements, from colored to colorless, from irregular shapes to

regular shapes, etc. The size, repetition of shapes, and the size of related elements can induce the generation of a sense of movement. It can be said that movement is the result of a variety of elements working together in a work of art.

Figure 93 Dunhuang brick rubbings, which have a clear direction of movement.The red arrow was drawn later to facilitate the observation of the direction of movement. Source:Chang Shana, Decorative Patterns of Dunhuang in China through the Ages.

4) Rhythm and rhythm

Rhythm and rhyme originate from the expression of the strength of the musical beat. Here, the visual elements of the decorative pattern are described in a certain orderly expression. The various changes of visual elements in the picture will form a relative regularity, so that the viewer can feel visually and psychologically comfortable and pleasant. The composition of the decorative pattern is equivalent to a piece of music score, and the various elements in the decorative pattern are equivalent to the notes in the score. Under the author's intentional arrangement, they follow certain rules to produce strength, size, density, gathering and dispersion, overlap, circulation, reciprocation, etc., making the visual effect full of rhythm. The control of rhythm also depends on the complexity of the visual elements. The more diverse and complex the elements are, the more complex and changeable the rhythm is; the fewer elements are, the simpler they are, and the rhythm is also simple and bright. Rhythm is generated by the harmony and regularity of rhythm. Rigid rhythm or chaotic rhythm will not produce "rhythm". Rhythmic music is pleasant to the ear, and rhythmic pictures are pleasing to the eye. At the same time, they give people a good feeling not only in terms of senses but also in psychology, making the aesthetic artistry of the work reach a higher level.

5) Contrast and harmony

Contrast is the comparison and conflict between two or more objects that present different personalities, effects, and feelings when placed together. In visual art, only with contrast can there be change, and only with contrast can the beauty of both sides of the contrast be highlighted, the richness of the work be increased, and the artistic appeal of the work be enhanced. The opposite of contrast is harmony, which means that two or more objects have the same or similar characteristics and are placed together to produce a harmonious and consistent effect. In fact, in visual art, harmony can create a harmonious, quiet, and soft artistic effect. Contrast is reflected in the square, size, and wholeness of the pattern shape in decorative patterns; the complexity and density of the composition; the thickness, hardness, and straightness of the lines, etc., which can increase the changes in the picture, make the picture visually diverse, and full of appeal (Figure 95). The relationship of harmony, like contrast, also exists in all aspects of pattern design. In decorative pattern design, contrast and harmony are equally important. Over-emphasizing contrast will make the elements in the picture too contrasty, too conflicting, and visually chaotic and disordered; over-emphasizing harmony will make the elements in the picture monotonous, lack artistic expression, and be too bland. There is also an intrinsic connection between the principles of "contrast and harmony" and "change and unity" and "rhythm and rhythm". The pictures that emphasize contrast have rich changes and produce dynamic and exciting rhythms; the pictures that emphasize harmony have fewer changes and produce static and soft rhythms. When designing, we should focus on one aspect and make the two harmonious and unified.

Figure 94 Some of the simpler graphic Dunhuang tiles also have a strong sense of geometric drawings.
Source:Chang Shana, Decorative Patterns of Dunhuang in China through the Ages.

Since geometric patterns are simple and rational, they pay more attention to the overall sense of consistency. Therefore, they are generally rigorous and unified in shape and composition, maintaining consistent size and direction to create a harmonious beauty. The contrast effect is generally reflected in the contrast between local images, lines and blocks. While contrasting local areas, more attention is also paid to the harmony of the overall feeling.

6) Proportion and trade-offs

Proportion and balance refer to the relationship between the whole and the part or each part of the image, which is mainly reflected in the area, size, and quantity. If these relationships are handled properly and harmoniously, the beauty of balance will be formed. Things in nature are naturally coordinated with the golden ratio , and the ingenious workmanship of nature handles the size, positive and negative space, combination and interlacing, and color coordination between the various parts of these things very comfortably and properly, reflecting the beauty of coordinated proportion and balance(Figure 96). However, in the process of our artistic creation, we need to subjectively handle the proportional relationship to highlight the main image or emphasize a certain local factor. In this way, the use of exaggerated changes can make the work more interesting and decorative. However, it is not advisable to over-exaggerate the contrast and make the picture lose balance. It is necessary to use the various size, color, positive and negative relationships between the elements of the picture to balance the picture in order to achieve proper handling of artistic techniques. In fact, there is an intrinsic connection with "change and unity" and "strengthening and weakening". The proportion and balance are mostly reflected in the decorative patterns of Dunhuang tiles. The main image occupies a larger area, while the secondary image appears half or is relatively reduced. But at the same time, the secondary image will also use other factors to connect and echo with the main image, so that the overall picture still ensures balance and unity.

Figure 95 Dunhuang flower tiles that are nearly perfectly symmetrical in the center and on the central axis.
Source:Chang Shana, Decorative Patterns of Dunhuang in China through the Ages.

7) The creation of Dunhuang tile patterns has a strong adaptability to modern art aesthetics

Dunhuang art is a brilliant treasure house of art. It is not only a solemn Buddhist country, but also a "world of flowers and a paradise of beauty". The flower brick patterns show the exquisite and diverse patterns, the brilliant colors and the fantastic ideas of design conception. Almost all the spaces in the Dunhuang Grottoes are covered with kaleidoscope-like decorative patterns. The richness of the patterns can be said to be inexhaustible, providing our design research with historical background, academic support and unlimited creative inspiration. Nowadays, Dunhuang decorative patterns are widely used in visual communication, clothing, architecture and other different design fields. However, most of these decorations are direct applications of Dunhuang patterns. The author believes that although it is not impossible to directly use Dunhuang flower brick decorative patterns, it still lacks novelty and does not conform to the rapid development of the times. Using a new vision and design first to interpret, using modern aesthetic concepts to express national style, reflecting its contemporary and fashionable side, is more in line with the needs of modern art aesthetics and the innovative spirit of art practitioners.

Adaptability of plastic arts:The basic elements of decorative modeling are points, lines, and planes. Points, lines, and planes are the most basic image units that constitute graphics. They are not only the basic means of forming abstract and semi-abstract forms, but also the modeling elements of expressing concrete forms. If we

take apart the Dunhuang floor tiles, its modeling elements are mainly flat geometric figures. Figures of different shapes can be roughly regarded as planes in the composition elements, and points are the rich details in the tile patterns. The Dunhuang tile patterns simplify the material form sense such as texture, body sense, and volume sense. Deconstructing the Dunhuang tile patterns will form geometric forms such as circles, squares, triangles, crescents, lines, and points. These deconstructed and disassembled geometric blocks not only retain the original image characteristics of the tile patterns, but also have a special geometric beauty and abstract beauty (Figure 97).

Figure 96 The common Dunhuang flower tile pattern contains not only lines, but also conforms to the design elements of dots, lines and surfaces.
Source:Chang Shana, Decorative Patterns of Dunhuang in China through the Ages.

Applicability of planarization:The visual revolution triggered by modern Western painting is to simplify and compress the three-dimensional space of the three-dimensional light and shade modeling of classical art and academic art into a two-dimensional space, which is called "planarization". Planar decoration is to explore beauty through planar means to achieve a planar effect. The composition, modeling, and color of planar patterns often have a stylized aesthetic image, which can be continuously extended and has a strong decorative effect. From today's visual perspective, we look at the flatness of the Dunhuang flower tile pattern. Although its planar effect is different from the original position and purpose of the flower tile for floor paving and wall decoration, it gives us practical inspiration. Exploring the factors that adapt to the aesthetic trend of modern art in Dunhuang flower tiles, there are two main aspects that drive the flatness of the visual effect of Dunhuang flower tiles: one is function, and the other is material. In terms of function, because

Dunhuang flower tiles transmit information in a flat or semi-flat way, it must first visually attract people's eyes with the most intuitive image. The typical and intuitive appearance of the Dunhuang flower tile pattern allows people to feel more strongly what the flower tile wants to convey. The previous article mentioned the geometric shape and abstraction of the tiles. This implicit geometric modeling method also makes them look flat.

Adaptability of decorative themes:The subject of decoration is the main content that Dunhuang tiles want to depict and express. It can be said that it is a means of expressing people's aesthetic interests and aesthetic ideals. Dunhuang tiles can show their inner integrity, rhythm and order by expressing different themes, and get people's inner aesthetic requirements through different means and techniques of expression. Generally speaking, the themes of Dunhuang tiles can be roughly divided into conceptual themes and realistic themes. Most of the floor tiles belong to conceptual themes, often with the image or variant of different plants as the main body of decoration. From the perspective of composition, they are mostly expressed in points, lines and surfaces. Their abstract characteristics are in line with the conceptual themes of modern decoration and have a modern design sense. Relief portrait bricks and painted portrait bricks are mostly based on realistic themes, including things and plots. Things can be specific to: animals, plants, people or scenery, etc.; plots are mostly based on the scenes of people's production and life as the theme of expression. There are many kinds of plants, animals, landscapes, buildings, tools, etc. in Dunhuang tiles. The images of plants generally have the characteristics of simplification, flatness, order and typicality of decorative language. The number of plant patterns ranges from single plants to multiple plants, the types range from few to many, and the shapes range from simple to complex. Different techniques are used to express them, forming an overall elegant style and a strong sense of rhythm. In the image of animals, emphasis is placed on expressing the characteristics and dynamics of the form, focusing on exploring the formal laws of animals and studying the common beauty of animals.

Adaptability of formal beauty:Dunhuang flower tiles use the rules of generalization, change, exaggeration and abstraction to create a formal beauty that is orderly, regular, abstract and stylized. The decorativeness of formal beauty is an artistic feature that cannot be ignored. In the final analysis, Dunhuang flower tiles are still a kind of decoration with certain realistic characteristics. On the premise of expressing the content to be expressed, the treatment methods of plants, animals, characters and even pattern shapes are exaggerated and deformed. After sorting and processing, it creates its rich decorative interest, thus reflecting the unique charm of religious art. Because Dunhuang flower tiles need to conform to religious doctrines and record the secular life of a few upper classes and the general public, they generally use three composition forms of symmetry, balance and concentricity to achieve a solemn and magnificent decorative effect to achieve the function of preaching (Figure 98). But no matter what class it is attached to, its formal beauty contains a profound cultural heritage and spiritual connotation. It can be said that this is the fundamental emphasis of modern decorative art and the expression of the will of national art.

Figure 97 The patterns in Dunhuang brick rubbings have more obvious and typical religious tendencies.
Source:Chang Shana, Decorative Patterns of Dunhuang in China through the Ages.

8) The creation of Dunhuang tile patterns is highly adaptable to modern interior design

Dunhuang art originated in China and is a treasure of Chinese art. However, the Dunhuang tile decorative pattern is not suitable for all design works. It also has certain limitations and cannot be forcibly applied to decorative spaces of various styles. In order to better design decorative works with the theme of Dunhuang tile decorative patterns that fit modern interior design, the style of the works and the adaptability of modern interior space also need to be explored. In the research, the author found several interior design styles suitable for matching with Dunhuang tile decorative patterns, namely Chinese style, new Chinese style, Japanese style, and modern minimalist style, which will be explained one by one below.

Chinese style:The patterns of Dunhuang tiles and Chinese architecture are originally from the same source, and the matching of its decorative patterns and Chinese interior styles has a direct connection from the historical background. In the Chinese-style interior furnishings, the essence of the interior design concept of the Ming and Qing Dynasties is basically inherited. The materials are mainly wood. The form and spirit of traditional interior decoration are absorbed in terms of furniture, furnishings, colors, etc., and the feudal hierarchy and hierarchy in the original layout are abandoned. The classic elements in the furnishings are often refined and used. The overall layout pays attention to symmetry and balance, uprightness and stability, attention to details, and rich changes (Figure 99). The patterns in Dunhuang tiles are just like this feature of Chinese style, focusing on the symmetry of the pattern and rich

details. The overall style of Chinese style is elegant, containing Chinese traditional cultural ideas and aesthetic spirit. The mature and stable owner and elegant aesthetic taste can be well reflected from the Chinese-style interior design. The colors of Chinese style are strong and deep, which are relatively bright, such as black, red, purple, dark wood color, etc., and are matched with elegant lighting. The furnishings of furniture are mostly symmetrical, with Ming and Qing furniture being the main ones. The interior space is decorated with Chinese window grilles, flower grids, and antique shelves, and is embellished with exquisite craft ornaments such as calligraphy and paintings, screens, ceramics, plaques, bonsai, and antiques. Although there are not many of them, they have the effect of adding the finishing touch, and they also show the interest and taste of the owner of the room. The decorative patterns are mostly dragons, phoenixes, bats, deer, turtles, fish, mandarin ducks, plums, orchids, bamboos, chrysanthemums, and pomegranates. Most of them also have symbolic meanings. For example, fish can be compared to surpluses every year, mandarin ducks symbolize the love between husband and wife, and pomegranates represent many children and grandchildren (Figure 100). Each pattern has been carefully crafted and looks magnificent and ingenious. The auspicious animal and plant patterns in the decorative patterns of Dunhuang flower tiles are consistent with the decorative patterns commonly used in Chinese style. Patterns such as dragons, phoenixes, and pomegranates can be seen everywhere, and they also have beautiful meanings.

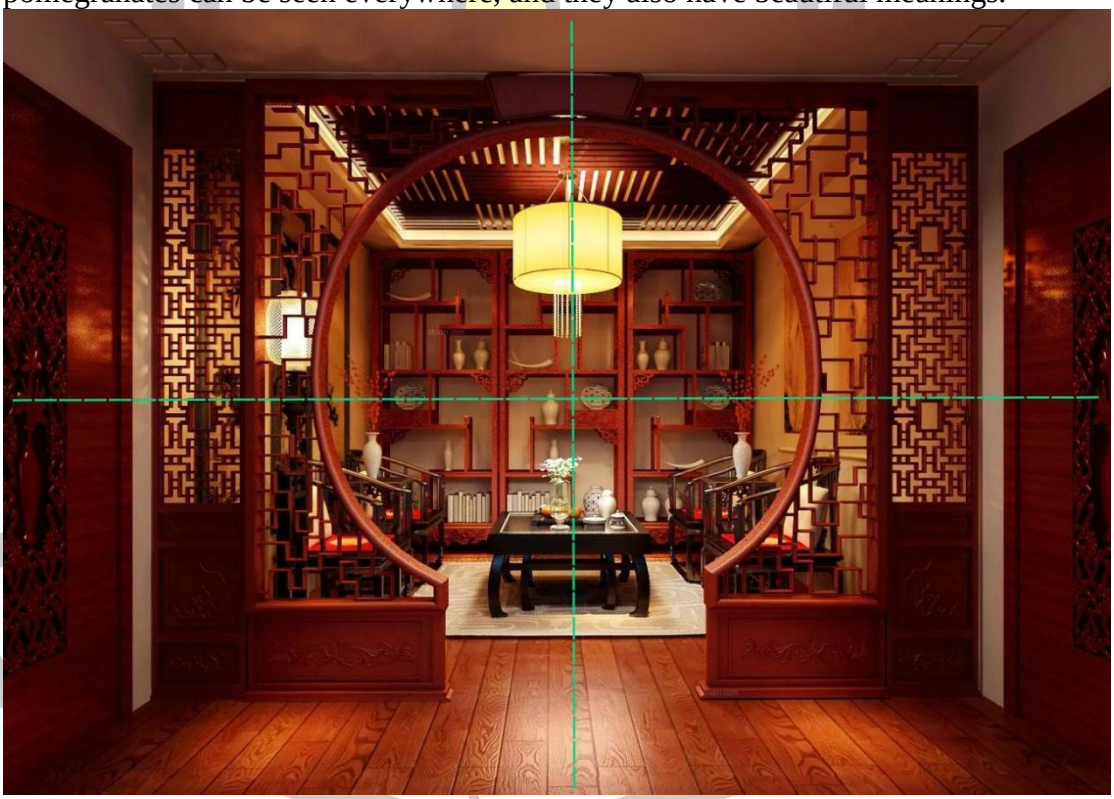

Figure 98 Chinese style generally emphasizes symmetry and uniformity.
Source: Yanda Du.

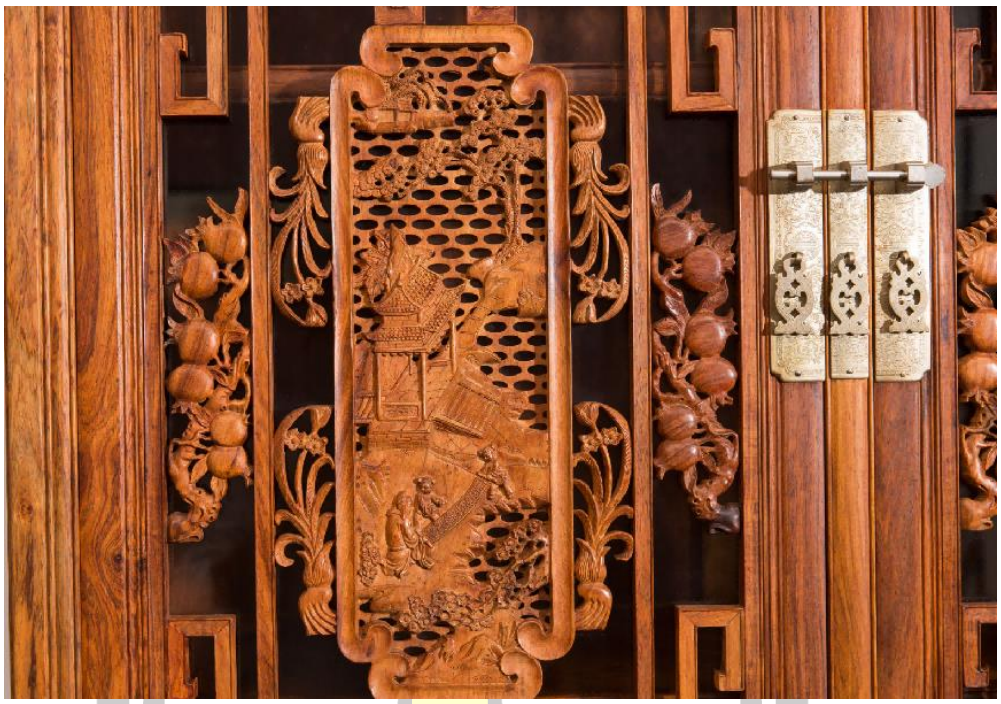

Figure 99 Pomegranate patterns, which often appear in Chinese-style architecture and interior decoration, symbolize many children and good fortune.
Source:Yanda Du.

New Chinese style:The new Chinese style refers to a new interior decoration style that is created by refining the essence of Chinese style and life symbols and integrating them into the living environment under the aesthetic habits of modern people. The interior space of the new Chinese style has modern characteristics such as grandeur, simplicity, and fashion, while making modern rooms more traditional cultural. The selection of materials is relatively extensive compared to the traditional Chinese style, and the decoration is fashionable. It can also be said that the new Chinese style is a Chinese interior style that holds modern life concepts and is more in line with the lifestyle of modern people. It allows the perfect combination of tradition and modernity to coexist. Some people simply understand the new Chinese style as adding modern interior decoration elements to the traditional Chinese style. Therefore, we must explain the intention of the new Chinese style in depth. It cannot be interpreted as the result of adding modern elements. It should comprehensively consider the coordination of its functions, materials, economy, aesthetics, cultural connotations and other levels. Simplify and adjust the complex traditional elements, keep their inner essence, and combine the structure, materials, technology and modern production and processing methods to recreate, otherwise it is easy to draw a tiger but not a cat. The shape of new Chinese style interior furniture is simple and generous, generally adopting the form of combining ancient and modern. Ming-style furniture can be seen in classical furniture. Among them, antique tiles, wood, stone, glass, textiles or silk and yarn are common decorative materials in the new Chinese style. In addition to ink paintings, Buddha heads and hands, and Chinese flower windows, some furnishings with religious significance are also often used (Figure 101).

Each decorative style actually has a specific cultural background to support them. The cultural root of the new Chinese style is the traditional Chinese style. The decoration of the new Chinese style generally uses the method of "leaving blank" to control the overall rhythm, and the focus is on the creation of artistic conception. (Dai Yong,2018,28-31)This unique aesthetic concept of the Orientals can reflect the rich oriental beauty, and the rhythm and position of the tiles on the wall should be considered according to the environment, and the number should not be too much. In the design of the new Chinese style decoration, the Dunhuang flower tile decorative pattern should pay more attention to the re-interpretation of the pattern to reflect its hidden contemporary nature.

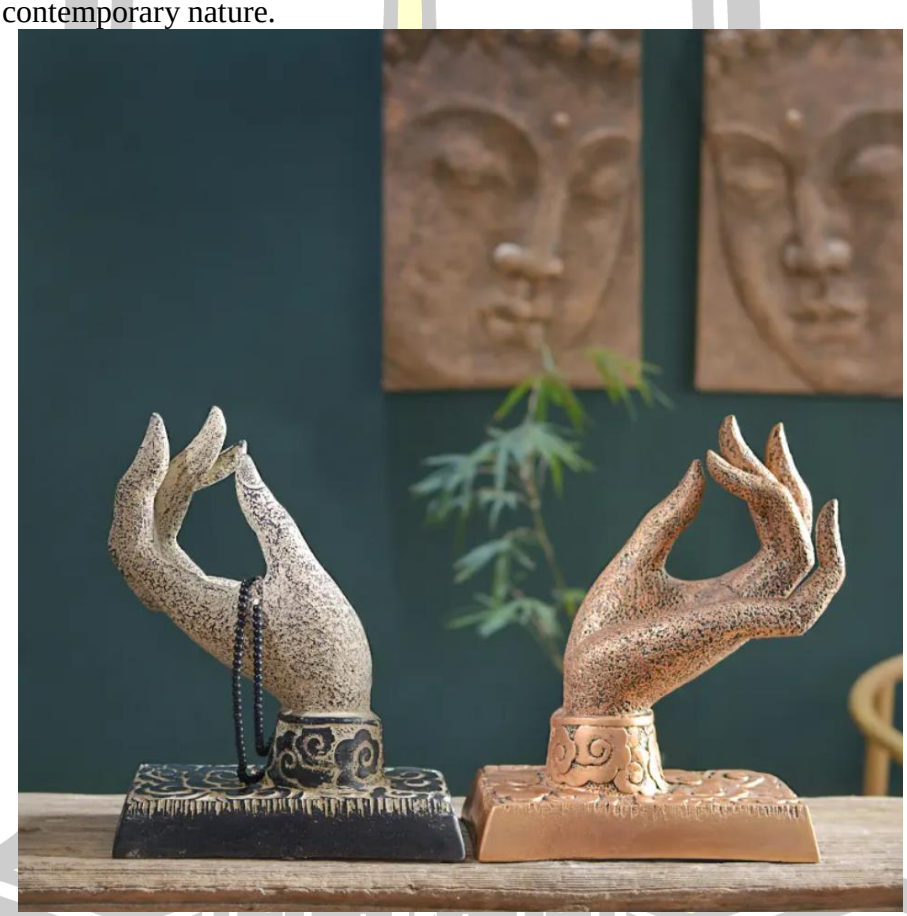

Figure 100 Buddha's hand is a common accessory in the new Chinese style, which has a certain religious color.

Source:https://www.zhe2.com/note/606619080823

Japanese style:Japanese style is also called Japanese style. The essence of Japanese style mostly comes from Chinese traditional culture. Japanese culture and Chinese traditional culture have a harmonious origin. Japan is a country that is good at absorbing foreign civilizations extensively. The beauty of Japanese art and culture comes from both its own culture and the "hybridization" with foreign cultures, thus forming the unique artistic characteristics of the Japanese nation. The close relationship between Japanese culture and Chinese culture can be seen from Japan's traditional architecture, clothing, writing and diet. For example, the Japanese people's

admiration for Zen is deeply influenced by Chinese Zen culture. Another example is the lattice doors and windows commonly used in Japanese-style interiors, which were introduced to Japan during the Song Dynasty and are still used today. The overall decoration style of Japanese interiors is elegant and full of Zen, and the extensive use of natural materials is a unique part of its interior design. Japanese design attaches great importance to practical functions and allows people to experience a sense of elegance and restraint. Therefore, the Japanese-style interior space can always put the atmosphere in a profound realm of deep Zen. Colors are mostly natural colors with neutral tones, warm and soft, mainly beige, wood color, gray and brown as the main colors. In addition, rattan, hemp and bamboo are also frequently used color series (Figure 102). Then use elegant florals to embellish, giving people a simple and natural look and feel. Typical indoor elements include tatami, platform, sky bag, ground bag, niche, painted door, sliding door, and accessories are mostly cushions, lucky cats, sword-wielding warriors, Japanese dolls, Japanese paper lanterns, Edo wind chimes, carp flags, fan-shaped paintings, traditional maid paintings, etc. Sometimes even a stick of incense or a flower can be a furnishing item in a Japanese-style interior. Japanese-style interior space emphasizes flow and separation. The function of sliding doors can divide a room into several different functional spaces, and it can also be used as a circulation room, which is full of Zen. Modern Japanese homes often adopt a "combination of Japanese and Western" living style. Generally, modern furniture such as sofas and chairs are used in open spaces such as living rooms and dining rooms, while traditional Japanese furniture such as tatami, paper-covered lattice sliding doors, and gray sand walls are used in private spaces such as bedrooms. This dual structure of "Western-style" and "Japanese-style" is accepted by the vast majority of Japanese people.

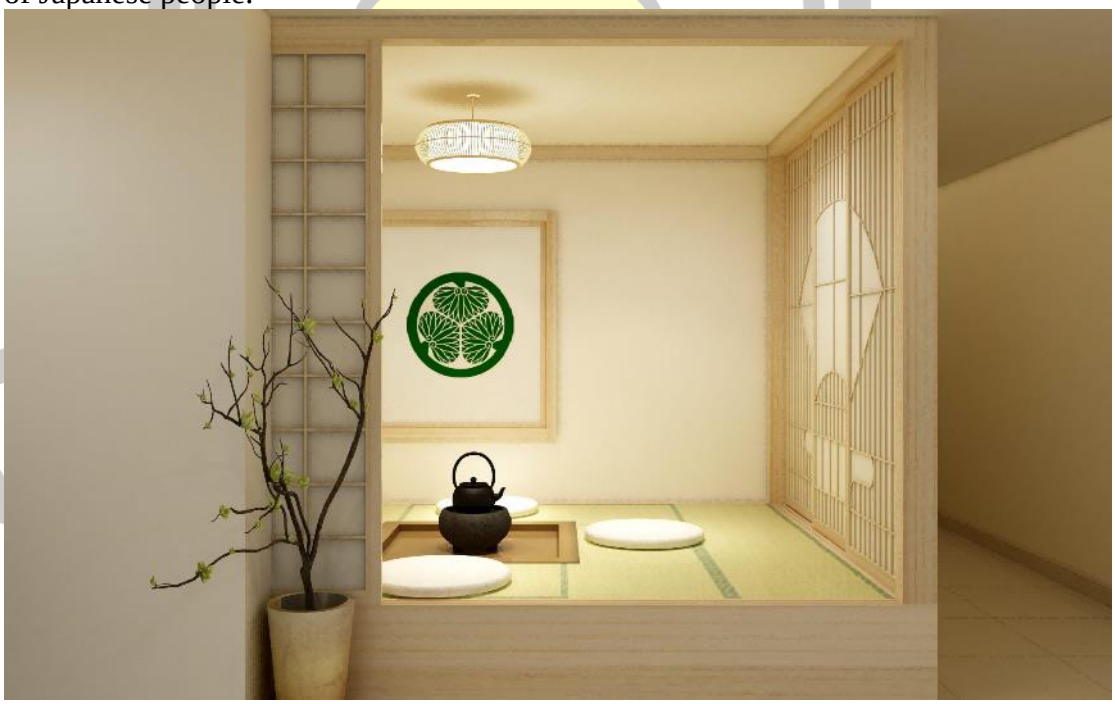

Figure 101 Japanese style is often dominated by beige and wood color, pursuing a simple, natural, and Zen atmosphere.
Source:Yongsi Du,2023.

The Tang Dynasty was the heyday of Dunhuang murals. At this time, Japan was vigorously learning and imitating China's system and culture in all aspects. The architecture, clothing, folk customs and folk customs of the Tang Dynasty in Dunhuang murals are rarely seen in my country, but they have been well preserved and inherited in Japan. The source of this can be found in Japanese paintings. The Japanese-style "Chuji painting" learned from Chinese Buddhist paintings and integrated with Shinto to form "local Chuji". Japanese ink painting was deeply influenced by the ink painting of the Song and Yuan Dynasties. After integrating the local "empty" artistic spirit, it formed a Japanese-style ink painting style with deep Zen, showing a kind of tranquil beauty. The rock color used in Japanese Ukiyo-e also has the same origin as Dunhuang art (Figure 103). Therefore, the Dunhuang flower brick pattern decoration is bound to adapt to the Japanese interior design style in this regard.

Figure 102 The picture on the left is a Japanese ukiyo-e by Utagawa Kuniyoshi.The picture on the right is a mural of ladies of the Tang Dynasty in the Mogao Caves in Dunhuang.
Source:Dunhuang Research Institute.

Modern minimalist style:Modern minimalism originated from Western modernism in the early 20th century. Modern minimalist style advocates function first, proposes furniture shapes suitable for assembly line production, and borrows simplicity in architectural decoration. The characteristics of minimalist style are simple shapes, respect for the characteristics of materials, opposition to unnecessary decoration, and focus on simplifying all aspects of interior design elements to the

extreme. For example, the selection of decorative materials, lighting design and colors in the interior space emphasizes the connection between design and modern industrialized production, achieving the effect of simplicity over complexity or less over more. However, minimalist style cannot be simply regarded as simple and economical. The pure texture of the material and the permeability of the room space are very particular about modern minimalist style. Less is more, more is less. Modern minimalist style takes "better to lack than to abuse" as the essence of design, simplifies the complex, removes the false and retains the true.(Dai Yong,2018,28-31) Under the requirements of function, the room is reasonably simplified with the most concise strokes, and people, objects and space are reasonably combined to achieve the refinement of life from simplicity and comfort.

The interior colors of modern minimalist style are low-key and bold, often with black, white and gray as the main tones, and small areas are decorated with bright colors such as bright red, bright yellow, bright blue, banana purple and green apple green, so that the overall color tone of the interior is unified but flexible and jumping, and the personality can be displayed (Figure 104). The design of furniture places great emphasis on functionality, and often has simple shapes and smooth lines. Stainless steel and tempered glass are commonly used auxiliary materials. Due to the concise lines and few decorative elements in the shape of furniture, only with suitable soft decorations can the modern minimalist style shine. For example, the bed should be matched with sheets, the sofa should be matched with cushions, and the dining table should be matched with tableware and tablecloths. The perfect match of soft decorations is the key to modern style decoration. Its furnishings are mostly simple glass, metal lamps or utensils, and modern industrial products with exquisite details, which create a fashionable and avant-garde temperament for the interior space of modern minimalist style. The formal beauty of Dunhuang flower tile patterns embodies some composition rules of modern decorative art. Modern minimalist style decoration is mostly reflected in simple, abstract and rhythmic forms. The decorative patterns of Dunhuang tiles are broken up and reconstructed, and the refined pattern elements are applied. Their flatness and decorativeness will provide new inspiration for the innovation of modern minimalist style decoration.

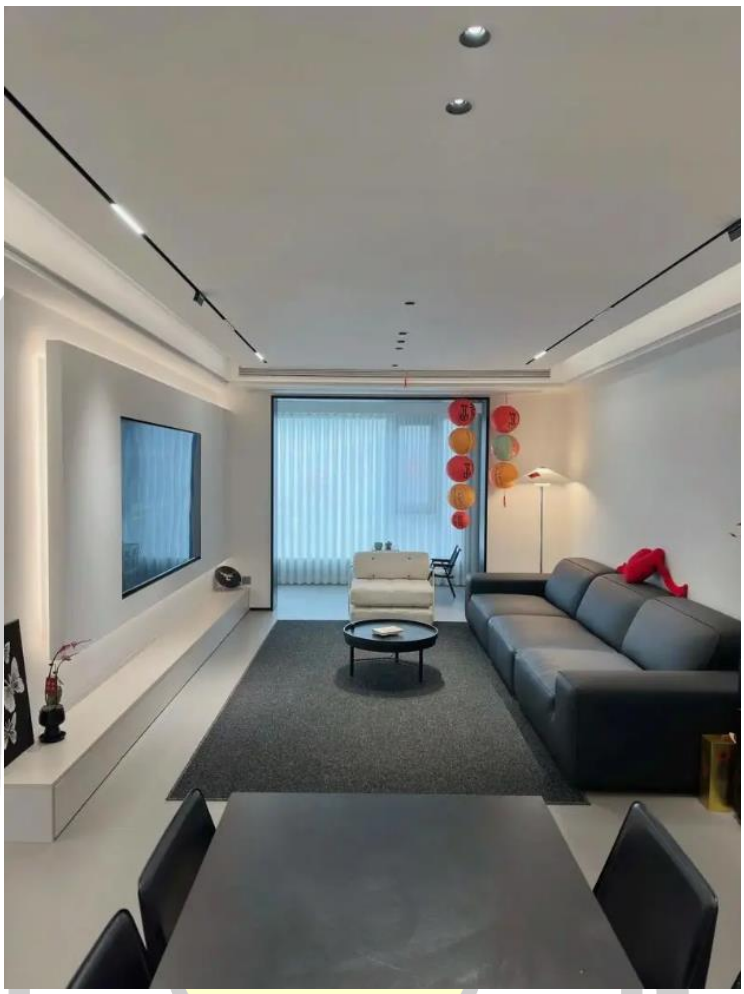

Figure 104 The modern minimalist style uses large areas of black, white and gray, with only a small amount of bright colors to embellish it, making the space bright and lively.

Source:Yanda Du.

4.3.3 The creation of Dunhuang tile patterns is in line with the concept of arts and crafts

Today, arts and crafts mainly study the basic knowledge and skills of aesthetics, color composition, three-dimensional composition, arts and crafts, and carry out the design, color matching, production, protection and restoration of handicrafts. Arts and crafts can be regarded as a branch of fine arts, which includes both aesthetics and design, and places great emphasis on craft skills. However, there are subtle differences between the arts and crafts recognized by China and Western countries, which requires mentioning the Arts and Crafts Movement.

The Arts and Crafts Movement was a design improvement movement that originated in the UK in the second half of the 19th century, also known as the Arts and Crafts Movement. The theoretical guide of this movement was John Ruskin, and the main practitioner of the movement was the artist and poet William Morris. The 19th century was a period full of contradictions for Britain. On the one hand, Britain was the region with the highest level of mechanical civilization in the world at that time; on the other hand, Britain was the birthplace of arts and crafts. However, the purpose of the Arts and Crafts Movement itself is to emphasize the positive value and significance of "handmade" and "non-mechanized" elements in art design and manufacturing. The origin of the movement was partly due to the dissatisfaction of some artists and humanities intellectuals at that time with the way people lived and worked at that time. This group of people had an idealistic sentiment for life, a strong nostalgia for traditional culture and the original ecology of people, and intended to awaken the beauty of the original ecology of life that was gradually submerged by the rapid development of industry at that time through artistic techniques. Another reason for the origin of the movement was the reflection on a series of problems caused by the new mechanical industrial civilization. The spread of various thoughts such as liberalism, retro sentiment, aestheticism, national sentiment, and mercantile thoughts. The intersection and fusion of these various thoughts is one of the reasons for the origin of the Arts and Crafts Movement. The concept of Arts and Crafts is an artistic attitude and also a philosophical proposition. Its basic logic is that the essence of human social existence lies in the construction and maintenance of social emotions, and all other civilized means must "serve" this fundamental purpose; and the emergence of the mechanical industrial revolution has precisely led to the shock of the social emotional system, in which life ideals and moral demands face a huge impact before commercial desires; as a result, on the one hand, the so-called capitalist class, which accounts for only a small number of the total population of society, was born, and on the other hand, countless poor people and their increasingly deteriorating living conditions were caused. In the eyes of arts and crafts artists, although the dynamic new engines and fast transportation tools are typical representatives of "modern efficiency", they are just that. They have no other value besides efficiency, such as social emotions and life virtues. In the United States, the Arts and Crafts Movement had a great influence on the Chicago School of Architecture, especially its representatives Louis Sullivan and Frank Lloyd Wright were greatly influenced by the movement. At the same time, the Arts and Crafts Movement also had a wide impact on some countries in continental Europe. The Arts and Crafts Movement was a huge reflection on industrialization at the time and laid the foundation for the subsequent design movement.

On the other hand, the development of arts and crafts in China did not produce such a clear development context as that of arts and crafts in Western society, or even the key representatives of a certain faction. In essence, it is because Chinese arts and crafts appeared very early, and can even be traced back to the Shang and Zhou dynasties. Therefore, in China, arts and crafts are passed down as traditions and customs. Therefore, if we want to trace its development context, we can only start from the timeline. For example, in the early Shang Dynasty, the multi-molding method was used to manufacture large bronzes. By the late Shang Dynasty, bronze

casting technology was highly developed. The bronze craftsmanship in the Spring and Autumn Period and the Warring States Period has undergone tremendous changes from casting technology to artistic style. The casting process has developed from traditional gradual casting to wax modeling, welding, inlaying and other processes. (Ye X.L&Pan L.Y,2022,111)The shape has changed from traditional ritual vessels to daily life utensils. The mysterious religious color has gradually disappeared, and it has been replaced by a new style of ease and freedom, and many exquisite bronze crafts have appeared.

In the Qin and Han Dynasties, from the overall trend of the development of ancient Chinese bronze crafts, the Qin and Han Dynasties were a period of decline. Compared with the Warring States Period, the number and types of bronzes in the Qin and Han Dynasties decreased. One of the more important reasons for this phenomenon was the development of other crafts.(Chen J.Q,2023,161) The Tang Dynasty was unprecedentedly strong and became the most stable and powerful country in the world at that time. This made the arts and crafts of the Tang Dynasty colorful. The most famous is Tang Sancai, which is a kind of low-temperature lead-glazed pottery fired, which is a good proof that the scientific firing technology at that time promoted the improvement of the craftsmanship. The porcelain art of the Song Dynasty developed by leaps and bounds, and the application of porcelain in life increased significantly. Food utensils, tea sets and wine sets were the most heavily used Song porcelains (Figure 105). In the Liao Dynasty, the overall layout of the building was designed based on the visual range of the building volume. Buddhism was the state religion of Western Xia, and the printing industry was very developed, and movable type printing technology was used. In the late Jin Dynasty, ceramics also developed. The Yuan Dynasty was an era of multi-cultural convergence. The Mongolians from the grasslands loved gorgeous decorations and precious craft materials such as gold. The Ming Dynasty was another prosperous era in Chinese history. The arts and crafts of the Ming Dynasty inherited the aesthetic pursuit since the Song Dynasty, and had aesthetic characteristics such as dignity, simplicity, and solidity. The various categories of ancient Chinese arts and crafts were further improved in the Qing Dynasty, and their variety and richness of techniques far exceeded those of previous dynasties.

Figure 105 Chinese Song Dynasty porcelain vase. China is considered to have two greatest inventions in arts and crafts, one is silk and the other is porcelain.
Source:Yanda Du.

It can be seen that Chinese arts and crafts have a long history. Today, the field of Chinese arts and crafts is usually divided into traditional arts and crafts and modern arts and crafts. Traditional arts and crafts refer to works that use the themes of ancient arts and crafts and use little or no modern technology and materials; modern arts and crafts refer to works that use modern and contemporary art themes and use modern technology and materials. However, in fact, this distinction has not been clearly defined so far. It is only judged based on the proportion of ancient and modern themes, technology and materials. It is a conventional way of judgment for Chinese artists. Dunhuang flower bricks have been passed down for thousands of years. From the perspective of today's arts and crafts, it is a kind of traditional arts and crafts (Figure 106). Since Dunhuang flower bricks are arts and crafts, it is natural to regard them as traditional arts and crafts or to integrate modern new themes, new technology and new materials into modern arts and crafts. We can also cross-verify this point from the characteristics of arts and crafts. The most basic feature of arts and crafts is the unity of practicality and aesthetics. Whether it is used as a daily life product or a decorative appreciation product, it can meet people's material and spiritual needs in life.

Figure 106 The Dunhuang tiles I made are based on the shape of a galloping horse. The outer mold is made of gypsum and the inner mold is made of industrial-grade silicone. Its production technique is essentially a kind of arts and crafts. Source:Yanda Du.

Secondly, arts and crafts have a certain practicality, which is also in line with the original anti-slip feature of Dunhuang floor tiles. Philosopher Marx once said: "Technology can reveal the relationship between people and nature and society. It is the direct production process of people's lives and the process of direct production of spiritual concepts in social life." It can be seen that arts and crafts have an inseparable internal connection with people's life practice activities, and more of a manifestation of practical value. Arts and crafts are maternal and original art and culture. At the beginning of creation, they must first meet people's own practical functional needs, which determines that arts and crafts have certain characteristics and requirements in terms of system and skills. In order to further realize the practical characteristics of arts and crafts, artistic conception and technology are often used to increase their beauty. For example: Grosse mentioned in "The Origin of Art" that polishing utensils to make them smoother and more beautiful was originally intended to be more practical. Symmetrical weapons are more convenient to use than asymmetrical ones, and smooth arrows and guns are easier to penetrate. It can be seen that arts and crafts have practical characteristics. And its practicality is more reflected in people's daily

necessities or beautifying the living environment, including furniture, ceramic utensils, clothing, etc.

Arts and crafts can also improve people's aesthetics. Although arts and crafts have great practicality in people's lives and are therefore sought after by people, their various shapes, exquisite patterns, bright colors, different materials and unique skills also have considerable aesthetic value and can add more beauty to people's lives. The outstanding social role of arts and crafts is that they can educate people in art and beauty. While adding highlights of beauty, they can continuously improve people's aesthetic taste, inspire people to pursue life and beauty, and actively create a better future. Especially with the continuous development and progress of historical society, many arts and crafts have been separated from the practicality at the beginning of production and transformed into art appreciation products mainly for appreciation and collection.(Ye X.L&Pan L.Y,2022,113) In this regard, it is also very consistent with the characteristics of Dunhuang relief portrait bricks and painted portrait bricks. Chinese artist and scholar Peng Jixiang once defined the concept of practical art in "Introduction to Art Studies": Practical art is a spatial art that combines practicality and aesthetics, including architectural art, arts and crafts, garden art, modern design, etc. It can be seen that arts and crafts are not only practical, but also have the characteristics of combining practicality and aesthetics. Through these cross-verifications, we can be sure of the feasibility of Dunhuang tiles as arts and crafts. However, since Dunhuang tiles are arts and crafts, how can they be presented as handicrafts in modern times? How can they conform to the trend of modern art aesthetics? To answer these questions, we must first clarify the following two questions:

1) The relationship between craft and art

To answer this question, we must first consider what the evaluation criteria for arts and crafts are. So far, no one has established it, and no one has thought about this question. In fact, each art form should have its own evaluation system and evaluation criteria. If there is no evaluation standard of its own, it is meaningless to make a work like a work of art through craftsmanship. Arts and crafts should have evaluation criteria that conform to their own laws. In the most fundamental sense, arts and crafts are the products of traditional handicrafts that have artistic tendencies. In the final analysis, they are still handicrafts. The craftsmanship of handicrafts is determined by the materials. The concept of traditional handicrafts is: the process and result of applying a certain means (or multiple means) to a certain material (or multiple materials) in the form of manual labor to change its form. The key words here are materials, craftsmanship and form. The most important thing in engaging in traditional handicrafts is to study materials. The problem of materials can be said to be the first problem that needs to be solved in traditional handicrafts. Only by having an accurate understanding of the materials and mastering the characteristics of the materials can we use our skills to deal with the materials accurately and change their form with accurate craftsmanship. In this way, materials, crafts, and forms are the important foundations for establishing the evaluation standards of traditional handicrafts. Traditional handicrafts need to establish their own evaluation standards, and need to build their own theoretical system and process technology system, which requires long-term efforts. Therefore, we should advocate in-depth research to study

whether we have a completely accurate understanding of materials when engaging in the production of traditional handicrafts; whether we can freely integrate our mind and hands to complete the craft; and whether we have a set of process technology standards, rather than art standards. The clarification of these issues involves whether we can establish the self-confidence of traditional handicrafts and the future development direction.

2) The relationship between innovation and tradition

Innovation is one of the popular words in Chinese society in recent years. It has become fashionable because it is often mentioned. Of course, the concept of innovation is good, especially in the field of science and technology, where innovation has become a sign of whether a business is vibrant. However, how to implement innovation in the field of traditional handicrafts is probably a big problem. In the traditional handicraft industry with thousands of years of tradition and profound cultural accumulation, inheriting tradition is not a simple matter. Innovation can only be carried out on the basis of inheritance. Innovation that completely abandons tradition is bound to cause problems. The innovation of arts and crafts must conform to its laws in order to be accepted by the industry, and then accepted by society and recognized by history. Such innovation requires studying the laws of arts and crafts, studying the traditions accumulated over thousands of years, and studying the original appearance of things reflected in tradition. Such a task is arduous and glorious at the same time. It requires long-term practice and understanding, and also requires serious thinking, the so-called "think twice before acting". Many innovations in arts and crafts today are unsuccessful. The reasons are: on the one hand, they do not study traditions and think that they are too complicated and heavy; on the other hand, they are influenced by the economy and public opinion.

Therefore, to study the tradition of arts and crafts, we must first figure out what is the authentic tradition. In fact, the content of tradition itself is worth our lifelong efforts to study and learn. Should we start from the inside of tradition or learn from the outside of tradition? According to the characteristics of arts and crafts, the order should be from the inside to the outside. The first thing to solve is the tradition of arts and crafts itself - craft technology and culture. We must have confidence in our own traditions. Only with confidence in tradition can we move forward steadily on the road of tradition. When we have a thorough understanding of tradition, innovative ideas will come unexpectedly, and it will be smoother when put into practice. For the arts and crafts industry, innovation on the basis of inheritance will never be out of date. Therefore, we must spend a lot of time and energy to study tradition, authentic tradition. Only by drawing nutrition from authentic tradition can we make correct innovation. In fact, the issue of innovation has great limitations in the arts and crafts industry. As mentioned above: the keywords of the concept of traditional handicrafts are materials, crafts and forms. The craftsmanship of handicrafts is determined by materials. However, can traditional materials be innovated? Even if they can be innovated, they are very limited and it is impossible to make subversive innovations. If the material of ivory carving is replaced by cow bones, it becomes bone carving. If you change the material, the name of the craft category will have to change. If you can't innovate the material, there is not much room for innovation in crafts. Now some people are starting to use mechanical tools to replace hand tools. The advantage is that

it improves efficiency, but the disadvantage is the loss of hand feel. The loss of hand feel will lead to the regression of handicraft technology. The only thing that can be innovated is the form, but such innovation requires thinking. For example, if you want to innovate Dunhuang tiles, if the work you make has nothing to do with Dunhuang or tiles in form, such innovation is a failure; if the finished product looks like Dunhuang tiles, but is more reasonable in structure and details, and surpasses tradition, this is innovation in the true sense. The basis of such innovation is to have an accurate understanding of the material, to be able to use the craft completely freely, and to have new high requirements for the standard of form and structure. In short, there is not much room for innovation in arts and crafts. The basic requirement is to inherit the tradition. Only by inheriting the tradition can there be innovation. It is extremely difficult to open a new path. The safest way is to move forward along the traditional path, and you can also learn a lot of new things. Moving forward all the way, reaching the level of similar works in history, and then surpassing it, this is innovation.

It can be seen that the dialectical relationship between Dunhuang tiles and arts and crafts lies in the standards of art and crafts, as well as the exploration of innovation and tradition, learning from tradition for practical use or innovation. This is also the reason why the older generation of Dunhuang scholars and artists spent most of their life-long explorations copying and reproducing.

4.3.4 Analysis of importance in the restoration and use of Dunhuang tile art

1) Cultural heritage and protection of historical memory

Dunhuang flower bricks are not only a concrete expression of architectural decorative art, but also an important carrier of ancient Chinese culture, uniting the social background, religious beliefs, lifestyles and artistic styles of different times. Through the restoration of Dunhuang bricks, these precious historical and cultural information can be better preserved. Dunhuang flower bricks are the extension and expansion of Dunhuang cave art, which carries unique cultural symbols and historical memories in the Dunhuang art system. If these cultural heritages cannot be effectively restored and protected, it will not only lead to the destruction of art treasures, but also cause a break in cultural inheritance.

Through restoration work, this historical memory can be continued and passed on to future generations. This restoration work is not only the recovery of the material form, but also the continuation of cultural identity. In the process of historical and cultural inheritance, the restoration of Dunhuang flower bricks can make the descendants intuitively feel the rich history and cultural deposits of the Dunhuang area, thus enhancing the sense of national pride and cultural identity.

2) Source of artistic research and cultural innovation

The restoration of Dunhuang bricks is not only a restoration of cultural relics, but also an important part of artistic research. As an important part of Dunhuang art, Dunhuang flower bricks have high artistic and academic research value. Through restoration, researchers can better understand its composition, technique, color application and craftsmanship level, so as to analyze its artistic characteristics and cultural background. The themes, patterns and techniques of Dunhuang flower bricks have strong regional and contemporary characteristics, and their restoration helps us to study the development of Dunhuang art and its evolution more comprehensively.

On the basis of artistic research, the restoration and utilization of Dunhuang bricks also provides a rich source of inspiration for contemporary art creation. The patterns and techniques of Dunhuang bricks have great potential for application in modern art, and restored Dunhuang bricks can be used as elements in cultural design, architectural decoration, and other fields, integrating them into modern design and creating a fusion of tradition and modernity. For example, the innovative design of flower bricks combined with modern decorative needs, applied to interior design, architectural decoration and public art works, which not only makes the traditional art new life, but also broadens the creative space of modern art.

3) Tourism development and economic value of Dunhuang culture

The restoration of Dunhuang flower bricks also helps to promote the tourism development of Dunhuang culture and the development of cultural industries. Dunhuang, as a world cultural heritage site, attracts a large number of domestic and foreign tourists every year, Dunhuang flower bricks as an important cultural element, its restoration and display to attract tourists and enhance the tourism experience has an important role. The restored flower bricks can further expand their economic value through museum display, cultural and creative product development and other forms. In the modern cultural consumer market, cultural and creative products with historical background and artistic value are favored by more and more consumers. Dunhuang flower bricks and their derivatives can realize the commercial transformation of traditional culture and bring practical benefits to the local economy by combining with modern design.

At the same time, the artistic restoration and utilization of Dunhuang flower bricks can also contribute to local cultural education and social benefits. Through the restoration and display of cultural heritage, the public can more intuitively understand the cultural history of the Dunhuang region, enhance the social and cultural identity, and thus form a stronger cultural consciousness and cultural confidence.

4) Technical heritage and craft protection

The restoration of Dunhuang flower bricks not only involves material restoration, but also includes the inheritance of traditional crafts. In the process of restoration, craftsmen and researchers can learn and inherit ancient production techniques, realize the essence of traditional crafts, and apply them to modern restoration techniques. The production process of Dunhuang flower bricks is complex, involving a variety of traditional crafts such as firing, carving and painting. Through restoration practice, it can promote the reproduction and inheritance of traditional skills and avoid the extinction of these ancient skills with the passage of time.

In addition, modern technological tools such as 3D scanning, digital restoration and material analysis can also help to improve the precision and efficiency of Dunhuang flower bricks restoration, making the restoration work more scientific and comprehensive. This combination of technology and traditional craftsmanship will not only better protect Dunhuang bricks, but also provide technical experience for the restoration of other cultural relics.

5) Enhanced cultural exchange and global influence

As one of the representatives of Chinese culture, the restoration and display of Dunhuang art plays a positive role in promoting cultural exchange. As an important part of Dunhuang art, Dunhuang flower bricks can become an important symbol of Chinese culture for foreign display through restoration and innovative utilization. Through the restoration of Dunhuang brick art, it can show the world the superior skills and cultural depth of ancient Chinese arts and crafts, and enhance the international influence of Chinese culture.

At the same time, through modern restoration and utilization, Dunhuang bricks can not only play a role in the domestic art market and tourism industry, but also have a global impact through cultural export. For example, artwork and decorations derived from Dunhuang bricks can be sold in the international market, promoting the spread of Dunhuang culture around the world and enhancing the global recognition and influence of Chinese culture.

4.4 The process of creating Dunhuang tile patterns

4.4.1 Concepts of Creation

In the framework of my thesis, Dunhuang Flower Brick, as an important representative of traditional art, its creation and inheritance in modern decorative design is crucial. Under the conceptual framework, the creation of traditional art is not only the inheritance of history and culture, but also contains the in-depth exploration of its modernization transformation and innovation. As a researcher, I am committed to combining the traditional patterns, techniques and cultural symbols of Dunhuang flower bricks with the needs of modern decorative design according to the rich information and suggestions provided by experts, so as to form a concept of modern decorative pattern creation that combines both tradition and innovation.

1) Combining traditional and modern pattern innovation

After accepting the advice of experts, I realized that the patterns in Dunhuang flower bricks not only have high historical and cultural value, but also show a distinctive aesthetic style. These traditional patterns contain a wealth of symbolism, such as lotus flowers and scrolling grass patterns, and these elements represent good fortune, prosperity and cultural heritage. However, in the face of modern decorative design needs, merely reproducing traditional patterns is not enough. In order to make these motifs dynamic in modern design, I have to integrate them with the styles and concepts of contemporary art design.

Therefore, my creative concept is based on an in-depth analysis of the traditional patterns of Dunhuang flower tiles, and through the modernization of the pattern lines, forms and compositions, I am able to retain the essence of traditional aesthetics, while at the same time conforming to the simplicity of modern decorative styles, functional designs and ecological concepts. For example, when creating the eight-petal lotus pattern, I not only retained its symbolic meaning, but also combined it with the modern minimalist design style, simplifying and abstracting the lines and forms of the lotus so that it is more in line with the aesthetic needs of modern interior decoration. This fusion not only satisfies modern people's pursuit of beauty, but also strengthens the visual expression of traditional culture.

2) Innovative path guided by experts' opinions

During my exchanges with experts in Dunhuang art, I received a great deal of valuable advice and suggestions. The information provided by these experts not only helped me gain a deeper understanding of the history and cultural connotations of Dunhuang flower bricks, but also opened up many possibilities for modernization and transformation. For example, the experts suggested that in creating modern decorative motifs, I should not only focus on the decorative nature of the motifs, but also take into account the continuity of their cultural symbolism. This inspired me to pay more attention to the spiritual connotations embedded in Dunhuang flower tile patterns and express them through modern design language.

At the same time, experts also pointed out that the demand for decorative arts in modern society is becoming increasingly diversified, and consumers are not only pursuing aesthetics but also cultural resonance when choosing decorative products. Therefore, I added more humanized design thinking in the creative process, combined with the aesthetic preferences of different audience groups, and designed decorative patterns with cultural heritage and in line with the modern lifestyle. For example, by combining Chinese style with modern minimalist style, I soften the complex geometric patterns in Dunhuang tiles to make them more modern and suitable for use in modern home decoration, wall hangings, flooring and handicrafts.

(3) The multifunctionality of modern decorative patterns and ecological design considerations

When creating modern decorative patterns, I not only focus on their aesthetic value, but also on their multifunctionality and eco-friendliness. Based on expert advice, I realized that modern consumers' demand for decorative products is no longer limited to visual appeal, but also requires products with environmental characteristics and functionality. Therefore, I have adopted a creative process that is more in line with modern eco-design concepts.

Firstly, I choose simple and repetitive geometric shapes when creating patterns, which are not only easy to mass produce, but also reduce the waste of materials and meet the requirements of environmental protection. Secondly, I used eco-friendly materials, such as low-pollution terra cotta or recyclable materials, in my choice of materials, based on the advice of experts and actual market demand, to ensure that these design works comply with the principle of sustainable development. In addition, I have included the expression of natural elements in the pattern design, for example, combining traditional patterns such as curly grass patterns with modern eco-design concepts, so that they are not only aesthetically pleasing, but also express the concept of environmental protection. This kind of design meets the needs of today's society for sustainable development and provides innovative possibilities for the modernization and transformation of traditional art.

4) Diversified design combining market and cultural needs

The expert's advice helped me to clarify the diversity of audience target groups, enabling me to define the needs of different audience groups more clearly in the creative process. According to the feedback from the experts and market research, my audience mainly includes the following groups: art lovers who have a high sense of identification with traditional culture, modern consumers who pursue unique

cultural experiences, and home design enthusiasts who emphasize simplicity and functionality.

In order to meet the needs of different groups, I have designed a variety of styles of decorative patterns. For example, for consumers who are passionate about traditional culture, I retained a large number of classic pattern elements of Dunhuang tiles and tried to maintain consistency with traditional craftsmanship in terms of color and material. For those consumers who pursue modern minimalist style, I pay more attention to the simplification of lines and geometric patterns in the design to make it more in line with the needs of modern home decoration. In addition, I also designed some small artifacts, such as ornaments and wall hangings, which incorporate the cultural symbols of Dunhuang flower bricks, but also have a modernized sense of functionality and fashion, which can attract those consumers who want to incorporate traditional cultural elements in their lives.

5) Specific steps to implement the creative concept

During the creative process, I formulated specific implementation steps based on the above concept. First, I studied the historical and cultural background of Dunhuang flower bricks in depth through literature research and field trips to ensure that I fully understood their traditional artistic characteristics in the creation. Secondly, under the guidance of experts, I categorized and refined the traditional patterns of flower bricks and chose the most representative patterns as the basis of creation.

Next, I modernized these traditional patterns according to the needs of modern decorative design, especially in the lines, colors and structures of the patterns, and made adjustments to meet contemporary aesthetics. Finally, in the actual product design and production process, I took into account the sustainability of the materials, the feasibility of production and the acceptance of the market to ensure that these works could meet the needs of modern consumers and at the same time pass on and carry forward the cultural values of Dunhuang flower bricks.

Throughout the research and creation process, I combined the opinions of experts with the needs of modern decorative design, and organically combined the traditional artistic characteristics of Dunhuang flower bricks with modern design concepts. Through innovative exploration of patterns, techniques, materials and audience needs, I have not only modernized Dunhuang bricks, but also opened up new possibilities for their application in contemporary decorative design. This creative concept not only continues the vitality of traditional art, but also enhances its value and influence in modern society through innovative design.

4.4.2 Inspiration from traditional art

Throughout the research and creative process of my thesis, Dunhuang flower bricks, as a valuable heritage of traditional art, provide a rich source of inspiration for modern design. Based on the patterns of traditional art, I transformed and reused them through modern design methods to create works applicable to modern decorative styles. This combination process reflects the dual pursuit of respect for traditional culture and innovative design.

1) Drawing inspiration from traditional patterns

The patterns and decorative elements in Dunhuang bricks are the core of their traditional cultural values, including a large number of patterns full of symbolism, such as lotus flowers, scrolling grass patterns, geometric shapes, etc. These patterns not only have a decorative function, but also carry rich cultural connotations and religious meanings. These patterns are not only decorative, but also carry rich cultural connotations and religious symbolism. For example, the lotus flower symbolizes purity and beauty, while the scroll pattern represents the prosperity and continuity of life. As a designer, I have studied the historical background and cultural significance of these traditional motifs in order to preserve their cultural heritage to the greatest extent possible in my creations.

In the modern design, I do not simply copy these traditional patterns, but rather adjust and redesign them appropriately, taking into account modern aesthetic needs. In this process, the symmetry, repetition and complex decorative structure of the traditional patterns became the starting point for my modern creations. These elements not only construct the basic form of the pattern, but also provide the basis for simplification and innovation in modern design.

2) Combining modern design methods for innovation

In order to adapt the traditional Dunhuang flower tile pattern to the modern decorative style, I have used a variety of modern design methods in my design, especially the innovative application of patterns and colors.

Reconstruction of modern patterns: In the design of patterns, I simplified and abstracted the complex geometric patterns common in Dunhuang bricks to make them more in line with the simple style of modern decoration. For example, when I designed the eight-petaled lotus flower, I no longer retained all the details of the traditional petals, but used simple lines and geometric shapes to represent its outline. This simplified pattern is more in line with the minimalist style common in modern design, while still having the traditional flavor and symbolism through appropriate retention and transformation.

In addition, in order to attract the attention of the modern audience, I have introduced contrasting geometric elements in the design process. For example, in the traditional scroll pattern, I geometrically processed the original curves and details to make them more linear and concise, and broke the traditional symmetrical aesthetics by arranging them irregularly. This treatment not only makes the pattern more modern, but also adds a sense of visual dynamics to the overall decorative design, forming a strong contrast.

Modern use of color: In terms of color, traditional Dunhuang flower bricks usually use more calm and classical tones, such as the brownish-gray color of the clay itself, which have a heavy sense of history and religious symbolism. However, in modern decorative design, the use of color is more inclined to produce strong contrasts. In order to adapt Dunhuang flower bricks to the color needs of modern decoration, I redesigned and adjusted the traditional colors.

I chose more modern color contrasts, such as the contrast between the black grain lines and the terra cotta backing, to give the overall design a more contemporary feel through these contrasts in color and texture.

Introduction of Minimalist Geometric Shapes: To further attract the visual attention of the modern audience, I also introduced minimalist geometric shapes into the design. Geometric shapes are a common visual language in modern design, capable of conveying rich aesthetic messages through simple shapes and lines. I combined these geometric shapes with traditional motifs when creating the modern decorative products of Dunhuang Flower Tiles. For example, I combined traditional scrolling and floral patterns with simple geometric elements such as rectangles and circles, making these decorative motifs more minimalist in contemporary design.

In this process, I not only retained the cultural symbols of Dunhuang flower tile patterns, but also enhanced the visual expression of the design through the introduction of geometric shapes. The vividness and simplicity of this pattern form makes it more suitable for modern wall decoration, flooring design and small crafts, which can attract more attention from modern consumers.

3) Pattern contrast and vividness enhancement

In order to make the traditional Dunhuang flower tile pattern more vivid in modern decoration, I put special emphasis on the use of contrast effect in the design. Contrast is not only reflected in the color, but also in the form and arrangement of the pattern. By combining the traditional symmetry and regularity with the asymmetry and dynamism of modern design, I have enhanced the overall design's sense of hierarchy and expressiveness.

For example, in the pattern of Dunhuang Kabuki, I adopted a design with more dynamic curves of the figures, making the pattern, which was originally inclined to be static, more flexible and changeable, and giving people a vivid visual experience. Make the pattern visually more impactful and attractive. Such a design maintains the essence of traditional art while satisfying the modern audience's demand for vividness and artistry in decorative design.

In summary, by combining the artistic essence of traditional Dunhuang flower bricks with modern design methods, I have successfully modernized the transformation of patterns and decorative styles while retaining traditional cultural characteristics. I not only simplified and geometrized the traditional patterns, but also enhanced the visual expression and modernity of the patterns through modern colors and design techniques. This design idea not only opens up new possibilities for the application of Dunhuang flower bricks in modern decoration, but also provides a new path for the modernization and transformation of traditional art.

4.4.3 Sketch design New creative patterns

For the sketches, I used the program “procreat” to create six hand-drawn sketches.(Figure 107-112) It allows you to draw by hand with a capacitive stylus on a tablet computer. It is closer to hand-drawing and easy to modify.

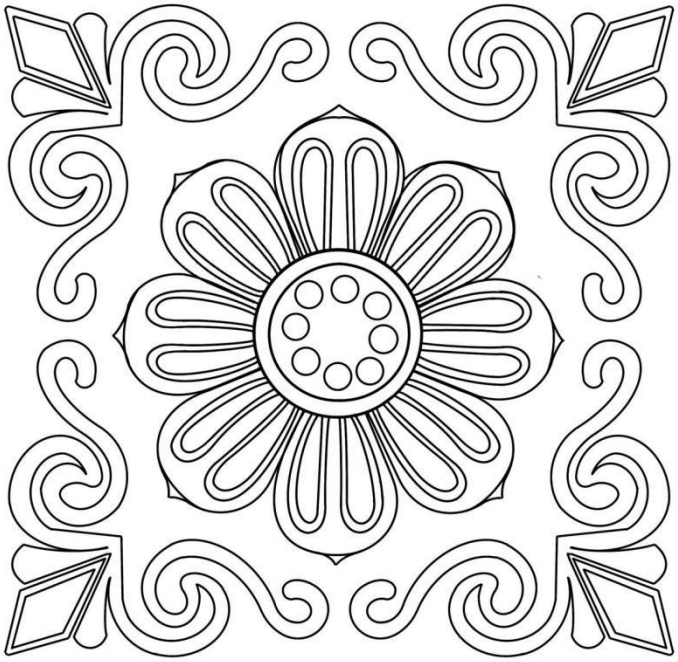

Figure 103 Designed and hand-painted Dunhuang flower tiles.
Source:Yanda Du.

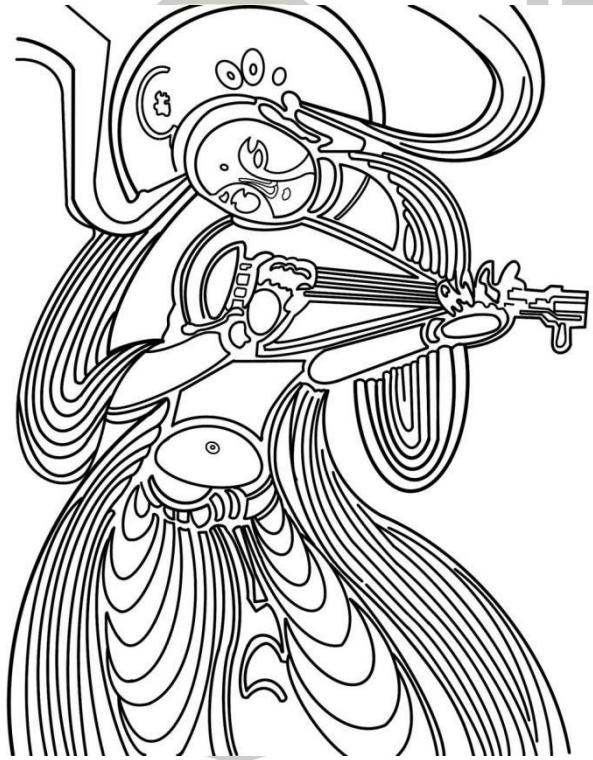

Figure 104 Designed and hand-painted Dunhuang flower tiles.
Source:Yanda Du.

Figure 105 Designed and hand-painted Dunhuang flower tiles.
Source: Yanda Du.

Figure 106 Designed and hand-painted Dunhuang flower tiles.
Source:Yanda Du.

Figure 107 Designed and hand-painted Dunhuang flower tiles.
Source:Yanda Du.

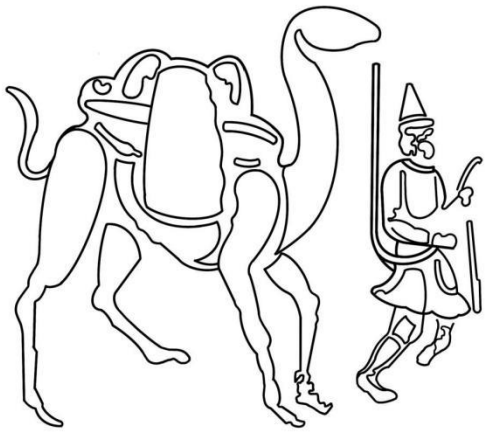

Figure 108 Designed and hand-painted Dunhuang flower tiles.
Source:Yanda Du.

4.5 The Process of Creating Dunhuang Flower Tile Patterns

During my research and creative process, the patterns of Dunhuang flower bricks served as core elements that provided rich inspiration and materials for the design prototypes of architectural decoration and interior decoration. The design of these patterns not only embodies the essence of traditional art, but also combines modern aesthetics and technical requirements, which are continuously optimized and adjusted to meet the needs of modern architecture and interiors after suggestions and feedbacks from a panel of experts.

4.5.1 The process of creating the pattern of Dunhuang paving tiles

In accordance with the design reference prototype selected by me and the experts, the eight-petal lotus flower is still used as the centerpiece of the new Dunhuang brick pattern. But in the design of the lotus blades, I stretched and spread them out in all directions to create a deeper visual effect. At the same time, the combination of the lotus pattern is narrowed down and converged in the center to strengthen the visual effect of the center point of the dot, and the leaves are extended to the eight directions to give it a more geometric look.

For the surrounding corners, I used the combination of Lonicera and Rhombus, which on the one hand makes it more closed and gives a smooth feeling. On the other hand, it continues to emphasize the geometric decoration.

Finally, abandoned the traditional Dunhuang tiles more complicated small flowers and leaves embellishment decoration, the overall sensory more simple, in line with the characteristics of modern minimalist decoration. It also makes it more flat and geometric.(Figure 113)

Figure 109 Comparison of prototype and hand-drawn drawings.
Source:Yanda Du.

4.5.2 Dunhuang Kabuki Flower Brick Creation Process

Based on four Dunhuang Kabuki creation archetypal patterns selected by me and my experts. In creating the design, I first enhanced the dynamic range of the figures, which are in the shape of an “S”, reflecting the dance dynamics of the Dunhuang kabuki as it is played.

Secondly, I tried to simplify the lines of the characters' costumes as much as possible. On the one hand, this is more in line with the characteristics of minimalist decoration, and on the other hand, from the aspect of craftsmanship, too complicated lines may lead to a low yield rate in the final production of the finished product.

Finally, in the design of the figures, I combined the characteristics of the early Dunhuang style, especially the Northern Wei style. However, in the design of the costumes, I drew on the Dunhuang style of the Tang Dynasty and blended it together. A special Dunhuang artistic style was produced.

The group believes that after the Ming and Qing Dynasties, including the current artistic expression tends to be rigid, and that the expression of character dynamics is insufficient. The creation of the Dunhuang Kabuki is applied to the Dunhuang Flower Brick, on the one hand, it complements the creation of the Dunhuang Kabuki, and on the other hand, it is a kind of innovation to the theme of the Dunhuang Flower Brick. Therefore, it confirms my design idea of enhancing the dynamics of the character's “S” shape to make it look more rhythmic. As well, I was especially commended for my idea of incorporating dance elements into the new design. The complex lines and squares have been weakened and replaced with rounded and streamlined geometric shapes, making it look closer to the minimalist style of modern decorations that emphasize geometric shapes.(Figure 114-119)

Figure 110 Comparison of prototype and hand-drawn drawings.
Source:Produced by Yanda Du.

Figure 111 Comparison of prototype and hand-drawn drawings.
Source:Produced by Yanda Du.

Figure 112 Comparison of prototype and hand-drawn drawings.
Source:Produced by Yanda Du.

Figure 113 Comparison of prototype and hand-drawn drawings.
Source:Produced by Yanda Du.

Figure 114 Dunhuang dance performance.
Source:https://www.sohu.com/a/140894933_475362

Figure 115 In creating the design, the main figure favors the early Wei and Jin styles, but the figure's sash and jewelry favor the Tang Dynasty style.
Source:Niu Yusheng, Line Drawings of Dunhuang Figures.

4.5.3 The Creation Process of Dunhuang's Cameo Picture Bricks

We have redesigned the bricks with this theme by using the prototype of the creation and design “Humans holding camels”, which was chosen by me and the experts as a reference. Experts believe that the “hu man holding a camel” is the most representative of Dunhuang relief image bricks, on the one hand, it has the most national characteristics and characteristics of the times, the most reflective of the era of the ancient Silk Road, on the other hand, it is also more familiar to the general public. However, the original pattern, limited by the aesthetics of the era, in today's art aesthetics looks, lack of dynamics and scenes. Therefore, when I was creating the design, the first thing I considered was to strengthen its dynamics and weaken its sense of the times. Specific painting design, to emphasize the expression of camel and human walking gait, to strengthen its sense of dynamics and scenarios, so that it looks as if it is really walking on the Silk Road.(Figure 120)

Figure 116 Comparison of prototype and hand-drawn drawings.
Source:Yanda Du.

4.5.4 suggestions and corrections

In the process of creating the architectural and interior decoration prototypes, I sought advice and suggestions from a group of experts in the field of Dunhuang art in a variety of areas. The group of experts spoke highly of my design and made a number of constructive comments, which centered on the following areas:

1) Detailed treatment of the pattern

The experts suggested that the practicalities of modern craftsmanship should be taken into account when maintaining the original fineness of the Dunhuang flower tile pattern. For example, in the relief design, experts pointed out that the lines of some traditional patterns were too complicated for large-area architectural decoration applications. Therefore, I simplified these patterns by transforming the complex patterns and details into more concise and modern geometric forms, while retaining the core elements of their traditional art. This treatment not only makes the patterns more adaptable to the craftsmanship requirements of modern architecture, but also enhances the visual impact of the decorative effect.

2) Craft selection

In the choice of process, experts pointed out that the traditional flower bricks used in the process compared to the modern process is inefficient, and can not meet the objective situation of Dunhuang flower bricks laid over a large area in large quantities. Therefore, I introduced more modern materials and processes into the design, such as high-density gypsum, epoxy resin and other environmentally friendly composite materials, to enhance the practicality and sustainability of the product. The expert's advice helped me to better combine traditional art and modern technology in the design process, ensuring that the work has both artistic value and commercial viability.

3) Combination of decorative function and practical needs

The experts also emphasized the integration of decorative functions with practical needs. They suggested that I should not only consider the visual effect, but also pay attention to the actual functionality, to ensure that the pattern design fits with the spatial application. Based on this advice, I strengthened the practicality of the patterns in my design, especially in the decorative design of the floor and wall, taking into account the durability, anti-slip and cleaning and maintenance of the environment

in which they are used. These adjustments make the Dunhuang Flower Tile pattern not only decorative and aesthetic, but also practical and easy to use in daily use.

4) Improved design results

By incorporating the suggestions and feedback from the expert group, I made several adjustments and optimizations to the architectural and interior decorative prototypes of Dunhuang bricks to make the design more in line with modern decorative needs. The final results include relief decorative motifs for interior walls, modern flower tile floors, and the application of motifs in small desktop decorations. These works have taken into account the simplicity, practicality and artistry of modern design while inheriting Dunhuang culture.

4.6 Copying of Dunhuang flower tiles

The ultimate goal of copying is inheritance and innovation. Generally speaking, copying is the main means of inheriting Dunhuang art. For decades, copying has been one of the important tasks of the Dunhuang Research Institute and Dunhuang artists. Therefore, to explore the issues related to the inheritance and innovation of Dunhuang tiles, we must understand the relationship between copying and inheritance and innovation.

What is the purpose of copying? This is the most important question, which involves why some copiers can innovate while others find it difficult to innovate. Mr. Duan Wenjie has repeatedly emphasized the purpose of copying Dunhuang art: "As the Dunhuang Cultural Relics Research Institute, the purpose of copying is to reproduce cultural relics. Copying is both a copy for protection and a means of dissemination. It is a medium for promoting Dunhuang mural art at home and abroad. Copying is reproduction for cultural relics workers. The copies can be preserved as copies and introduced as exhibits at home and abroad, killing two birds with one stone ." Mr. Shi Weixiang also believes that "the role of copies in exhibitions is to let more audiences recognize the value of Dunhuang art and an aspect of the cultural tradition of the motherland." At the same time, he emphasized: "Copying is an important method for studying Dunhuang art... From copying, we can discover the secret of the beauty of Dunhuang art. In copying, we can find the rules of operation techniques in different eras. ” Mr. Li Qiqiong also said: “Copying Dunhuang murals also has a purpose: first, it is for protection... copying them for easy preservation; second,... copying them can be exhibited...; third, for art workers, copying is an important method to learn national art heritage. Through copying, we can critically inherit national art traditions, innovate and create new socialist art. ”

Artists and researchers in Dunhuang hope to innovate through copying, but the purpose is also to reproduce cultural relics and make exhibits. The purpose of copying determines the copying method. Therefore, for decades, the Dunhuang Research Institute and Dunhuang artists have adhered to three main copying methods. "The first is objective copying, that is, to reproduce the existing ancient cultural relics faithfully, old if old, broken if broken, without any subjective changes. The second is to copy the old colors completely. It is used to copy a set of materials, such as boats, carriages, dances, music, and costumes of various dynasties. In order to facilitate research, after investigation, the broken parts are made complete, while the texture and color are still old. The third is restoration copying, that is, to restore the bright and dazzling new

appearance of the artwork when it was first created. Obviously, this strict copying method, especially the objective copying, requires copiers to abandon any personal subjective interests, and this kind of copying that does not allow personal subjective interests to be mixed has not only been passed down to this day, It has almost become the only copying method currently used by the Dunhuang Research Institute and Dunhuang art workers, because the other two copying methods of "complete copying of old colors" and "restoration copying" have been rarely used in recent years.

The copying method that the Dunhuang Research Institute and Dunhuang artists have long adhered to is mainly "objective copying", while "sorting copying" and "restoration copying" have not been promoted and popularized. The purpose of "sorting copying" is to sort out valuable image information and provide first-hand data for the research of related content. Therefore, when making a line drawing, it is necessary to make a purposeful choice, not only to preserve the current incomplete appearance of the cultural relics, but also to restore the main image part of the selected picture. While expressing the integrity of the image, the current texture states such as detachment, damage, and discoloration are selectively expressed according to the needs of the overall coordination of the picture; the purpose of "restoration copying" is to "remove the traces of damage given by history and accurately and scientifically reproduce the original appearance of the cultural relics. This work requires the copier to have the ability to conduct in-depth research on the content, background of the times, artistic form, and style characteristics of the murals. When copying, you must stand from a historical perspective, enter the inner world of the original author through the picture, and trace the thoughts and ideas of the artists at that time when they created the murals.

Obviously, both of these copying methods may carry more personal subjective interests, and the copies produced by them may also contain certain innovative meanings. Some copies can also be regarded as innovative works. For example, Mr. Duan Wenjie copied "The Lady of the Governor, Wang of Taiyuan, Worshiping Buddha" (Figure 121). This mural was originally painted in the heyday of the Tang Dynasty, but was later covered by the Western Xia mural. After being peeled out in the early 1940s, it was buried in quicksand for a long time, severely eroded by moisture, and the colors faded and were seriously damaged. If Mr. Duan had not used the "restoration copying" method to reproduce it in the world, this large-scale and rich female donor's journey picture would probably have been lost to us forever. Regardless of how much personal subjective interest Mr. Duan has in this painting, from the perspective of the relationship between nothing and something, this copy can obviously be regarded as an innovative work.

Figure 117 Mr. Duan Wenjie copied the "Lady of the Governor Worshiping Buddha" from Cave 130 of Mogao Grottoes.
Source:Dunhuang Research Institute.

Therefore, I think that many of the copies in the study and imitation of Dunhuang art can be called innovative works. Because most of these copies not only incorporate the author's personal interests and hobbies, but also the selected or enlarged pictures give the viewer a refreshing feeling, which is impossible to have when viewing the original work. In particular, the copying method of arrangement or restoration actually incorporates a certain sense of innovation.So, are the purpose and method of copying the only or main factors that affect innovation? In fact, not necessarily. The factors that affect innovation should also include the creator's talent, effort, interest, ability, social environment and political environment. Since there are many and complex factors that affect innovation or the success of artists, we cannot simply say which factor is the most important, nor can we say which factor is the main reason why the innovative development of Dunhuang art has been based on copying for decades. It's just that the inheritance and innovation of all Dunhuang art has always started from copying, and Dunhuang tiles are no exception. At the same time, it also reminds us to think about the relationship between inheritance and innovation of Dunhuang art from all aspects.

4.6.1 Copying of Dunhuang tiles

In this copying of Dunhuang tiles, we mainly selected the more representative patterns and designs of Dunhuang tiles.

Floor tiles

Among the patterns to be copied, "Tile with Pattern of Sharp-pointed and Multi-petalled Lotus" was selected. The reference used for refining the model mainly came from the rubbing patterns compiled by Chang Shana(Figure 122-123).

Figure 118 Dunhuang Flower Brick Topiary.
Source:Chang Shana, Decorative Patterns of Dunhuang in China through the Ages.

Figure 119 In order to make the finished Dunhuang tiles I imitated look closer to the ancient times, I gave the surface an antique treatment.
Source:Yanda Du.

1)Relief brick

The relief portrait bricks mainly reproduce the images of the four spirits mentioned above(Figure 124-125).That is, the dragon, tiger, phoenix and Xuanwu mentioned above.The Dunhuang tiles that reproduce the images of the Four Spirits are mainly used for wall decoration, so the thickness is roughly controlled between 1.5 cm and 2 cm. On the one hand, it is helpful to reduce the load-bearing burden after being installed on the wall. On the other hand, since most wall decorations are array combinations, a large number of them are required, and thin tiles are also convenient for transportation and storage.

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Figure 120 There are many rubbings of the images of the Four Spirits in Han Dynasty flower tiles, which makes it easier to find details when copying.
Source:Dunhuang Research Institute.

Figure 121 The Siling tiles are made using the traditional Dunhuang tile production process and fired at low temperature to form pottery.
Source:Yanda Du.

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1) Painted bricks

The reproduction of the painted bricks mainly adopts the theme of Dunhuang flower bricks from the Wei and Jin Dynasties.(Figure 126-127)

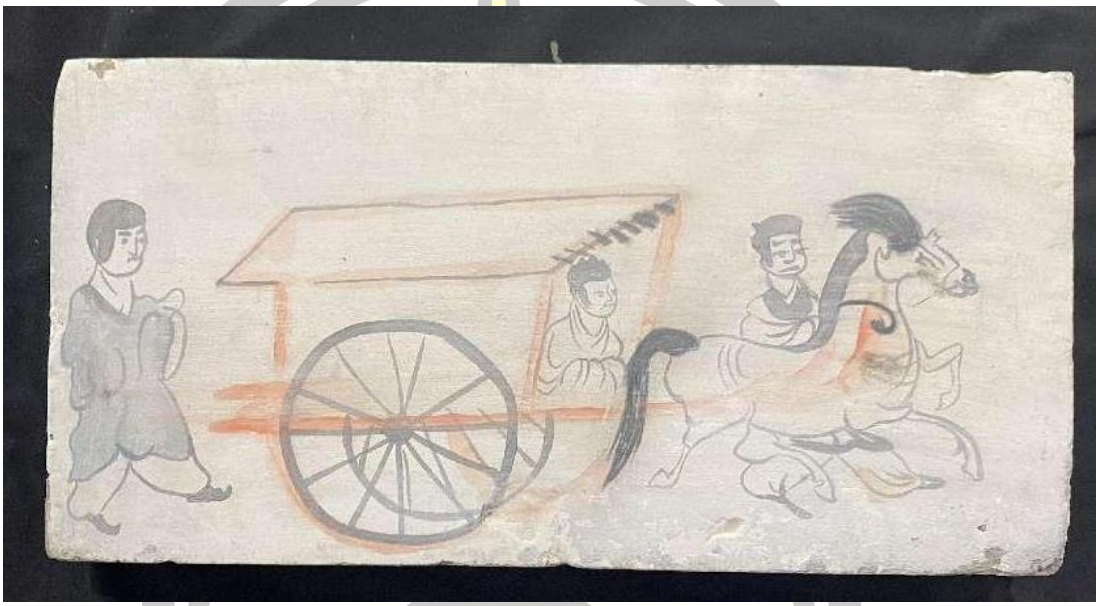

Figure 122 The Copying and reproducing Dunhuang painted portrait bricks.
Source: Du Yanda.

Figure 123 The Copying and reproducing Dunhuang painted portrait bricks.
Source:Du Yanda.

Summary:

In Chapter 4, I explore the new knowledge generated during the research and creative process, the creation of innovative models, the experimentation with new materials, and the role of the evaluator of creative works. This research not only enriches the theoretical study of Dunhuang flower tiles, but also provides practical innovations for their modern application in the following ways:

1. Generation of new knowledge

In the course of my research, I combined the historical and artistic background of Dunhuang flower bricks, and by analyzing their traditional patterns and styles, I proposed a theoretical framework for combining these traditional elements with modern design. This process produced the following new knowledge:

Modern interpretation of Dunhuang flower bricks patterns: I deconstructed and reorganized the traditional Dunhuang flower bricks patterns, innovatively combining them with modern minimalist styles, so that the traditional cultural elements could be integrated into contemporary art design.

Fusion of modern aesthetics and traditional motifs: By combining traditional cultural symbols (such as the lotus flower and the curly grass pattern) with modern geometric forms, I explored how to preserve traditional cultural imagery in modern interior design.

New ways of applying Dunhuang tiles: Through experimental research, new ways of applying Dunhuang tiles in architecture and interior design, such as relief walls, parquet floors and small decorative objects, were explored.

2. Creation of innovative models

During the design phase of the study, I used innovative design software and graphic design programs to create patterns, which not only improved the efficiency of design, but also enhanced the flexibility of creation. The specific process included:

Pattern creation using design software: I designed and modified patterns by using hand-drawn software, such as Procreate, in conjunction with digital technology.The flexibility of Procreate allowed me to quickly experiment with, adjust, and edit patterns, and the use of this tool significantly sped up the creative process and allowed for continuous optimization of the design.

Pattern experimentation and editing: In the digital environment, I was able to experiment with multiple combinations of colors, shapes, and styles, and make the transition from traditional to modern patterns by quickly adjusting the details of the pattern. This digital design process brought great convenience to me in my research and made experimental design more efficient.

3. Experiments using new materials

In order to further promote the application of Dunhuang Flower Brick patterns in modern decoration, I conducted experiments with a variety of new materials in my research and combined them with modern production processes in order to enhance their practicality and aesthetics in contemporary design. Specifics include:

Using modern production processes to create patterns: Through my research and experimentation with materials, I chose new processes that possessed the characteristics of being lighter, more durable, and environmentally friendly, and used

coating techniques to enhance contrast. The combination of lightweight materials in the flooring design makes the pattern not only beautiful, but also suitable for practical decorative needs in modern living environments.

Use of more durable materials: In order to ensure the longevity of the design in practical application, I use environmentally friendly wood and glass frames in small desktop crafts, which not only enhance the visual effect of the pattern, but also adapt to daily use and maintenance.

4. Evaluator of creative works

In the process of designing and evaluating the creative works, I invited a number of experts and designers with extensive experience in the fields of Dunhuang art, architectural decoration, and modern design. Through the experts' suggestions and feedback, I further refined the creation of the work to ensure that the design was in line with the spirit of traditional culture and could be adapted to modern decorative needs. Specifically included:

Experts in the field of Dunhuang art: Several experts in the field of Dunhuang art, including Du Yongwei and Zhao Junrong, have studied the history and cultural connotations of Dunhuang flower bricks in depth. I presented the design results to them and received feedback on the historicity and artistry of the pattern. With their suggestions, I further enhanced the expression of the traditional elements in the design, while adapting to the need for simplicity in modern design.

Modern Architecture and Interior Designers: Designers such as Du Yongsi, who has been involved in the design of many museums, exhibition halls, and other projects, have used the decorative elements of Dunhuang flower bricks in these projects. Starting from the needs of actual projects, he provided valuable suggestions on the operability and visual effect of the patterns I designed in architectural decoration and pointed out the details that needed to be improved. Based on their feedback, I made adjustments to the scale, use of color and choice of materials of the pattern to make the work more in line with the needs of modern projects.

Through the collaboration and feedback from all these parties, I continued to optimize the design results and finally achieved the goal of combining traditional Dunhuang tiles with modern decorative styles. This not only provides an innovative solution for the application of Dunhuang tiles in modern design, but also creates new possibilities for the integration of traditional art heritage and modern design.

Dunhuang tiles for modern decoration in line with the characteristics of aesthetics, design and arts and crafts

As a classic work of ancient art, the Dunhuang flower brick pattern not only demonstrates the superb craftsmanship and profound cultural connotation of ancient craftsmen, but also embodies many characteristics that conform to the aesthetics of modern art. First of all, the design of the Dunhuang flower brick pattern combines symmetry and asymmetry, abstraction and concrete visual forms, which coincides with the geometric trend and abstract art concept in modern design. Through the refinement and simplification of natural forms, the flower brick pattern maintains the characteristics of simplicity and elegance in modern visual language, which meets the modern people's aesthetic requirements for concise, bright and expressive visual design.

Secondly, the pattern matching of the Dunhuang flower brick pattern is bold and expressive, and is full of unique oriental aesthetic laws, which is highly consistent with the concept of graphic innovation and self-expression in modern art. Modern art encourages the free use of graphics in emotional expression, and the pattern system of Dunhuang flower bricks, whether abstract geometric patterns or concrete object shapes, provides inspiration and reference for modern designers.

In addition, the patterns of Dunhuang flower tiles have a high degree of cultural symbolism, and the patterns incorporate a variety of cultural and religious symbols. This feature provides a rich cultural diversity reference for modern art and meets the contemporary society's demand for cultural heritage and artistic innovation in the context of globalization. Modern art not only emphasizes formal beauty, but also pays more attention to the cultural depth and ideological connotation of artistic works. At this level, Dunhuang flower tiles not only continue the inheritance of historical culture, but also cater to the modern people's demand for artistic diversity and cultural richness with its multi-level cultural expression.

Finally, the patterns of Dunhuang flower tiles show the potential for compatibility between sustainability and modern technology in terms of material application and process innovation. Modern society pursues the combination of environmental protection and process innovation. The natural materials and handmade craftsmanship used in Dunhuang flower tiles just fit the contemporary people's concept of sustainable design.

In summary, the creation of Dunhuang flower tile patterns is not only highly consistent with modern art aesthetics in terms of form, color, cultural significance and process technology, but also fully meets the contemporary art creation's needs for cultural heritage, innovative expression and sustainable development. It is not only the inheritance of ancient art, but also provides an important source of inspiration for modern art design, demonstrating the aesthetic value across time and space.

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Chapter Ⅴ

The application of Dunhuang tiles patterns in modern decoration innovations

5.1 Application in modern decoration

In my research, the application of Dunhuang flower bricks in modern decoration shows unique cultural value and aesthetic potential. I analyzed the practical application of Dunhuang flower bricks in the field of architectural decoration and interior decoration through a survey of the target group. This survey provided a basis for design and helped me to better integrate traditional elements with modern needs.

Architectural decoration

As an architectural decoration material, Dunhuang flower bricks show unique historicity and artistic value in modern architecture. By analyzing the results of the survey of architects and designers, I learned that the target group's demand for architectural decoration has the following characteristics:

1) Combination of cultural heritage and modern aesthetics: The audience groups of architectural decoration, especially those architects who are involved in historical and cultural projects or who have a sense of cultural revival, expect to incorporate more traditional cultural symbols in modern architectural design. Dunhuang flower bricks, with their deep historical heritage, are an important element in this demand. Through my experimental designs, I have applied Dunhuang brick patterns to the wall, floor and façade decoration of large-scale buildings. In these designs, I have retained the traditional lotus and curly grass motifs and other classic patterns, and have moderately simplified and geometrized them to make them more in line with the simple aesthetics of modern architecture.

2)Modernization of materials and processes: The target group puts high demands on the durability and sustainability of building materials. In the architectural decoration, I combined the feedback from the survey and chose lighter and more environmentally friendly modern processes and materials, such as gypsum, epoxy resin, silicone turning and coating techniques, to enhance the practicality and aesthetics of the flower tiles. These materials not only reduce the weight of architectural decorations, but also increase their lightweight and anti-wear properties, adapting to the high-intensity use requirements of modern architecture. (Yongsi Du,architectural designer,Lanzhou Vocational and Technical College, Anning District, Lanzhou City,10:00 a.m on May 10, 2023.Interview.)In addition, architects place special emphasis on the malleability of decorative materials, so I introduced more flexible production processes into the design so that the patterns of Dunhuang flower bricks can be more easily integrated with different architectural styles.

Interior decoration

In the field of interior decoration, the application of Dunhuang tiles is more extensive and diverse. In my research, I found that interior designers and ordinary consumers want interior decoration to show personality and cultural taste, while at the same time both simplicity and functionality. Based on these needs, I have explored the application of Dunhuang tiles in interior decoration as follows:

1) Combination of modern aesthetics and cultural elements: Survey data shows that the target group of interior decoration prefers modern minimalist style, but also has a high interest in decoration with cultural imagery. Based on this, I modernized the pattern of Dunhuang tiles by using simple geometric shape elements, such as circles, rectangles and lines, to represent the traditional Dunhuang pattern. This not only makes the pattern more vivid, but also enhances the visual impact of the decoration, creating a strong contrast between culture and modern design. Such a design is in line with the minimalist aesthetics of modern decoration without losing the unique flavor of Dunhuang culture.

2) Multi-functionality and practicality: Surveys show that the need for functionality in interior decoration is becoming more and more prominent, especially in the decoration of small spaces and multi-functional areas. Based on this feedback, I explored miniaturized and modular Dunhuang tile products in my designs, such as patchwork decorative tiles for interior floors and walls. In addition, I have developed miniature flower tile artifacts for countertop decoration to meet the decorative needs of different scenarios. By modernizing and adapting the craftsmanship and patterns, these products not only convey the Dunhuang culture, but also express a fashionable and unique style in modern homes.

3)Innovation of patterns: Through researching the audience's modern design tastes, I have found that modern interior decoration favors simple and natural color schemes. Therefore, in the creation of the Dunhuang tiles, I adjusted the traditional Dunhuang colors to soft neutral tones and natural hues, while retaining some of the traditional bright colors for accenting and highlighting key areas. For example, in the wall decoration, the overall color palette is dominated by the simplicity of the tan color palette, embellished with red Chinese knot hangings, making the decoration both modern and expressive of the depth and layers of traditional culture.

Through the above efforts, I have not only successfully applied the traditional Dunhuang flower brick pattern in modern architecture and interior decoration, but also enhanced its feasibility and aesthetic value in contemporary decoration through the innovation of modern design techniques and material technology. This research opens up a new path for the application of Dunhuang flower bricks in modern decoration and provides strong support for the modern inheritance of traditional culture.

5.2Examples of the use of Dunhuang tile art to be applied in modern decoration work

The modern creative concept of Dunhuang tiles is mainly reflected in the innovative interpretation of traditional elements and the combination of modern design concepts. When creating Dunhuang tiles, we deeply explore the historical background, artistic style and symbolic meaning of Dunhuang culture, extract the core elements, and use them as the source of design inspiration. Through abstraction, deformation, reconstruction and other methods, these traditional elements are combined with modern design language to give new vitality to Dunhuang culture and allow traditional culture to be innovatively expressed in contemporary life. This creative concept not only retains the profound heritage and unique charm of Dunhuang culture, but also meets the modern aesthetic needs, making the design of Dunhuang tiles both cultural and fashionable. In addition, the modern creative concept also emphasizes the combination of artistry and practicality. Incorporate the aesthetic characteristics of Dunhuang art into product design, such as the use of colors and pattern design, to enhance the artistic style of the product. At the same time, ensure that the product has good use functions and user experience while meeting aesthetic needs, so that cultural and creative products are not only works of art, but also practical and beautiful items in daily life. This creative concept that combines artistic aesthetics and practical functions makes Dunhuang tiles not only a decoration, but also a practical item that can improve the quality of life. In the process of creation, although I combined contemporary art elements and aesthetics, I also deliberately retained the core patterns and symbols of Dunhuang art and Dunhuang tiles, so that people can think of Dunhuang and regard it as Dunhuang art when they see it for the first time.

5.2.1 Examples of the use of Dunhuang tile art to be applied architectural decoration

For the architectural decoration, I chose the floor decoration of Dunhuang flower tiles as my main creation. Floor tiles made with eight-petaled lotus flowers and scrolling patterns.(Figure 128)

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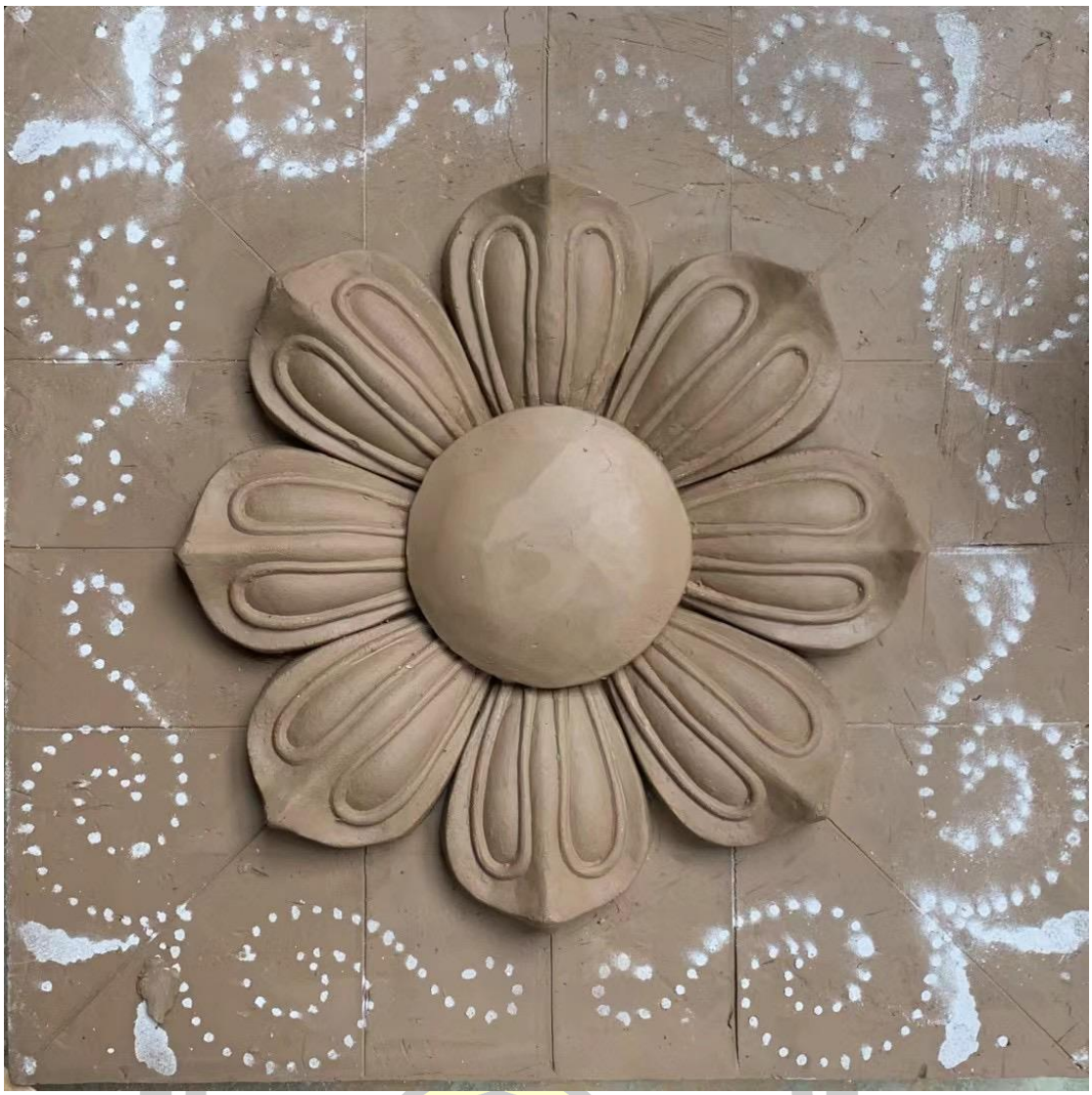

Figure 124 The Dunhuang floor tile patterns I created still largely retain the style of an eight-petal lotus.
Source:Yanda Du.

My design is inspired by the traditional eight-petal lotus pattern in Dunhuang. This pattern has a profound symbolic meaning in Buddhist culture, symbolizing purity, elegance and transcendence. The eight-petal lotus is used as the central pattern, supplemented by the curling grass pattern around it, which not only respects the form of traditional art, but also shows the harmonious beauty of design and nature.

The use of the curling grass pattern shows the common plant patterns in Dunhuang art, which symbolizes the continuation and prosperity of life. By combining the lotus and the curling grass, I intend to present a harmonious beauty that blends tradition and modernity, which not only has the traditional cultural heaviness, but also meets the needs of flow and vitality in modern decorative art.

In the design, I insist on taking traditional Dunhuang art as the basis, while incorporating the aesthetic needs of modern design. The eight-petal lotus pattern in the traditional Dunhuang flower tiles is retained in my design, but I have made innovative treatments on the lotus flowers and leaves. Two protrusions extending with

the leaves are added to the flowers and leaves, and then superimposed with mud strips to form a layered three-dimensional effect. This three-dimensional treatment is not only a breakthrough in traditional two-dimensional decorative patterns, but also more in line with modern people's pursuit of visual impact and artistic texture.

In this way, I hope to respect tradition while making it communicate with contemporary design language. This design concept is not only reflected in the visual effect, but also in the choice of materials and craftsmanship, so that the work can be widely used in modern spaces, forming a design that combines art and practicality.

Modern aesthetics emphasizes simplicity, texture and detail control. My design focuses on the pattern and material of the tiles by reducing complex color expressions. The natural clay material Chengban clay is used, which has a rustic beauty. Therefore, I did not color the clay material in the design, but retained its natural color and texture. The unique texture of Chengban clay adds a primitive vitality to the design. Although Chengban clay does not have strong waterproof properties after being fired into ceramic tiles, its high water absorption brings new possibilities for the decorative application of tiles, especially suitable for dry environments in interior design or spaces that emphasize a natural and rustic atmosphere.

Through the relief design of lotus patterns, I transformed the traditional two-dimensional pattern into a decorative art with a sense of sculpture. The protrusions on the leaves and the superposition of mud strips create a layered effect, which can present different visual perceptions under the changes of light and shadow. This three-dimensional sense not only adds visual impact to the tiles, but also improves its decorative effect, so that it can show a unique beauty under different lighting conditions.

Modern decorative design focuses on the overall atmosphere of the environment, and the Dunhuang tiles I designed are not only suitable for the decoration of traditional buildings, but also can be well integrated into modern homes, exhibition halls or public spaces. Especially in modern minimalist interior design, the texture and simple color of Chengbantu material can contrast well with modern furniture and decorations, highlighting a spatial atmosphere that combines nature and humanity.

Chengban clay is the main clay material used in this design. This natural clay material has good plasticity and natural color, and presents a rustic beauty after being fired into ceramic bricks. The use of Chengban clay, on the one hand, reflects the respect for natural materials, and on the other hand, it also meets the needs of today's society for sustainable and environmentally friendly materials.

During the design and production process, I did not color the clay material additionally, but directly used the natural color and texture of Chengban clay. The fired ceramic bricks have a hard texture, while the surface retains subtle traces of manual work. This imperfect detail adds a unique artistic atmosphere to the work.

In terms of craftsmanship, I used a combination of traditional handcraft and modern carving techniques. The raised part of the lotus flower and leaves is completed by hand carving, supplemented by the mold forming process, which ensures the uniqueness and delicacy of each brick(Figure 129). At the same time, in the process of superimposing the mud strips, the manual operation gives each brick a unique texture and touch. This combination of handcraft and modern carving

technology not only enhances the texture of the work, but also brings it the sophistication of modern craftsmanship.

Figure 125 The Dunhuang floor tile patterns I created still largely retain the style of an eight-petal lotus.
Source:Yanda Du.

The natural color of Chengban clay makes the tiles visually present a low-key and simple beauty. Compared with the bright colors commonly seen in traditional Dunhuang tiles, my design chooses to retain the original color of the material itself to show its pure natural beauty. The colors of Chengban clay after firing are mostly natural colors such as earth yellow and gray brown. This color choice not only conforms to the pursuit of texture in modern design, but also forms a harmonious match with the simple style in modern decorative design.

Through the meticulous treatment of the texture, the surface of the tiles presents a rich sense of texture. Especially in the design of relief and mud strip superposition, this layered texture not only enhances the visual effect of the work, but also makes the touch of the tiles richer. This expression of texture is very important in

modern art design. It provides viewers with a multi-sensory experience and enhances the artistic value of the work.Although in the part of the floor decoration, I only designed and produced this style of floor tiles, but because the decorative form of Dunhuang tiles is a large number of arrays of rows, so this style of floor tiles can be turned over through the mold, to obtain the quantitative advantage, to achieve the purpose of decorating the floor.

Dunhuang tiles are not only decorative building materials, but also works of art that carry rich cultural connotations. Through the design of eight-petal lotus and curling grass patterns, I hope to convey a respect for Dunhuang culture and the continuation of traditional culture. At the same time, through the innovative use of materials and craftsmanship, I try to express the modern translation of culture, so that viewers can feel the integration of Dunhuang art and modern life while appreciating the artwork(Figure 130-132).

Figure 126 Based on the mud bricks, the mold is reproduced using the process mentioned above. Source:Yanda Du.

Figure 127 Based on the mud bricks, the mold is reproduced using the process mentioned above.
Source:Yanda Du.

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Figure 128 The mold retained for this creation can be used and reproduced many times.
Source:Yanda Du.

5.2.2 Examples of the use of Dunhuang tile art to be applied Interior decoration

In the creation of Dunhuang flower brick wall decoration, since wall decoration is different from ground decoration, the patterns need to be diverse in order to bring rich visual experience to the audience. Therefore, I adopted three different ideas in the creative design.

In the Dunhuang tile series I designed, the wall decoration tiles are not only the inheritance of the Dunhuang art tradition, but also the improvement and innovation through modern art techniques. Dunhuang art is a treasure of Chinese culture, and Dunhuang tiles are an important part of it, with rich historical and cultural connotations. However, due to the limitations of social, economic, political and other factors in the historical period, especially in the late Dunhuang art, the artistic expression of some works gradually tended to be dull and static, lacking agility. Therefore, my wall decoration tile design is based on three core concepts: improving the static beauty of historical Dunhuang art, integrating other traditional Chinese cultural elements, and enhancing the expressiveness of Dunhuang tiles through innovative forms.

Improvement of static beauty: Dunhuang art, especially the late art form, has gradually lost the vivid and free expression of the early period due to the limitations of the times. Many works appear to be relatively rigid and lack dynamic agility. Therefore, when I design wall decoration tiles, the first thing I consider is the improvement of these "static beauties". Through in-depth research on the late Dunhuang art form, I have absorbed the patterns and patterns in it, and through dynamic processing, I have made it more expressive in shape. For example, the image of the galloping horse in traditional Dunhuang art gradually lost its initial sense of elegance in the late period, and its posture tended to be rigid. In my design, I redrawn and adjusted these patterns to make the dynamic image lines in the tiles smoother and the posture more dynamic, giving people a vibrant visual experience. In this way, I tried to make it more in line with the aesthetic needs of modern people on the basis of respecting tradition, and enhance the expressiveness and appeal of art(Figure 133-136).

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Figure 129 Create a mold for making galloping horse tiles.
Source:Yanda Du.

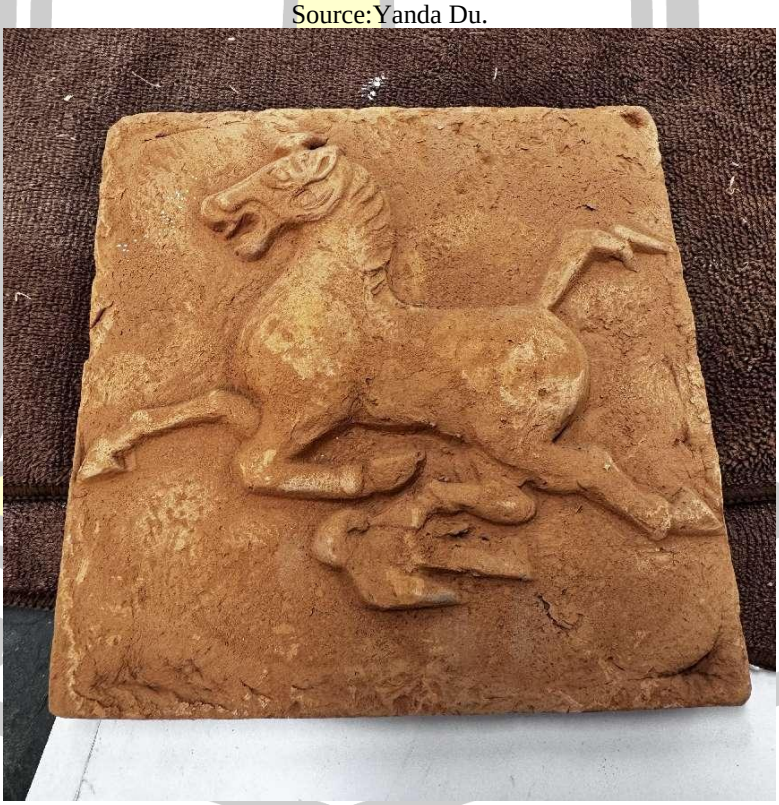

Figure 130 The improved and recreated galloping horse tiles have been fired into ceramic tiles.
Source:Yanda Du.

Figure 131 Dunhuang flower tile wall decoration in the teahouse.
Source: Yanda Du.

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Figure 132 Dunhuang flower tile wall decoration in the teahouse.
Source: Yanda Du.

Integration of traditional Chinese cultural elements: Dunhuang art does not exist in isolation. It is deeply influenced by the culture and art of other historical periods in China, especially in terms of painted pottery and bronze ware. Therefore, in the design of wall decorative tiles, I borrowed some representative cultural elements in Chinese history and integrated them with Dunhuang art. For example, I drew inspiration from the painted pottery of the Neolithic Age and the Taotie patterns in bronze ware, and incorporated these classic shapes and patterns into the design of Dunhuang tiles, giving them a more diverse cultural layering. By embedding the patterns and shapes of painted pottery and bronze ware into Dunhuang tiles, I not only conveyed a tribute to traditional Chinese culture, but also made the tiles more decorative. This design concept of cultural integration aims to promote the spirit of the Chinese nation, while also providing modern spaces with decorative art with profound cultural connotations(Figure 137-141).

Figure 133 The Dunhuang tiles, which were created based on the "Three-legged Sheep-Head Ding" as the pattern prototype, have some innovations and changes in form and structure.
Source:Yanda Du.

Figure 138 The Dunhuang tiles, which were created based on the "Bronze Tripod with Taotie Pattern" as the prototype of the pattern, have some innovations and changes in form and structure.
Source:Yanda Du.

Figure 134 The Dunhuang flower tiles, which were created based on the "Bronze Square Yi" pattern prototype, have some innovations and changes in form and structure.
Source:Yanda Du.

Figure 135 The Dunhuang tiles, which were created based on the pattern prototypes of painted pottery unearthed from famous Chinese sites, have some innovations and changes in shape and patterns.
Source:Yanda Du.

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Figure 136 The Dunhuang tiles, which were created based on the pattern prototypes of painted pottery unearthed from famous Chinese sites, have some innovations and changes in shape and patterns.
Source:Yanda Du.

Innovative combination of relief and painting: Dunhuang tiles not only have traditional flat painting forms, but also rich painted portrait bricks. In the design of wall decoration tiles, I focused on the artistic processing of this flat painting form, and by transforming it into a relief form, I enhanced the visual three-dimensional sense and expressiveness. This innovative expression method enables traditional painted bricks to produce a stronger sense of space in wall decoration. For example, when extracting the figures and scenes in the Dunhuang tiles and painted portrait bricks, I recreated them in the form of relief, so that the original flat pattern presents a multi-dimensional visual effect(Figure 142). The heavy and three-dimensional sense of the relief bricks gives the wall decoration a new artistic expression, which not only retains the spiritual core of the Dunhuang tiles, but also makes it a breakthrough in artistic form.

Figure 137 The Dunhuang tiles, which were created based on the pattern prototypes of painted pottery unearthed from famous Chinese sites, have some innovations and changes in shape and patterns.
Source:Yanda Du.

Strengthening of sculptural and relief effects: The design of wall decorative tiles is not just a two-dimensional expression. Through the pursuit of sculptural sense, I transform traditional patterns into relief forms, making the works more three-dimensional and vivid. In the production process, special emphasis is placed on the plasticity of the clay and the expressiveness of the surface texture. Through the combination of hand-carving and modern craft technology, I give each tile a unique texture and visual impact. The relief effect of wall decorative tiles not only makes the pattern on the brick surface more layered, but also can show rich shadow changes under different light conditions, enhancing the visual appeal of wall decoration. This three-dimensional sculptural design not only retains the classical beauty of Dunhuang art, but also meets the needs of modern decorative art for a sense of space and three-dimensionality.

In reference to the painted pottery and bronze ware in Chinese history, I did not simply copy the images of these traditional objects, but transformed them through modern design language. The shapes and patterns of painted pottery were simplified and abstracted in the design, making them more in line with the needs of modern wall decoration. At the same time, the complex patterns of bronze ware, such as Taotie patterns, were redesigned and carved, and presented on the tiles in the form of relief, retaining their historical sense while making them more suitable for modern decoration. For example, Taotie patterns are one of the representative patterns of Chinese bronze culture, symbolizing the authority and power of ancient society. I appropriately simplified this traditional pattern into a modular abstract form, making it more decorative in modern space, rather than just existing as a historical symbol. This transformed design not only enhances the aesthetic value of the tiles, but also allows traditional culture to be reborn in modern space.

Cultural symbolism in indoor and outdoor decoration: Wall decorative tiles are suitable for various indoor and outdoor decoration scenes, especially in museums, cultural exhibition centers or spaces with historical and cultural atmosphere. Its rich cultural connotations and profound historical background make it a unique art decoration that can add a sense of historical heaviness and cultural symbolism to these spaces.

Artistic embellishment in modern homes: In modern home design, wall decorative tiles can also become a unique artistic embellishment. By combining traditional cultural elements with modern design, wall decorative tiles can create an atmosphere full of cultural atmosphere in a simple space, allowing residents to feel the seamless connection between traditional art and modern life.

Application in public art projects: Because wall decorative tiles have strong cultural symbolism and visual impact, they can also be used in urban public art projects. For example, in museums, cultural squares or historical relics restoration projects, the use of this kind of tile decoration with Dunhuang art symbols can enhance the cultural atmosphere of the overall environment and convey the combination of history and art to the public through these works of art.

The design concept of Dunhuang flower tiles is not limited to large-scale architectural decoration. It can also be made into handicrafts and tourist souvenirs through improvement and reduction. Its rich cultural connotation and exquisite artistic expression make it an important carrier for spreading Dunhuang culture. Especially in

the modern tourism industry, handicrafts with Dunhuang flower tile elements can be used as cultural monuments, which not only have collection value, but also can promote Dunhuang art and traditional Chinese culture.

The Dunhuang flower brick crafts and tourist products I designed and produced this time aim to combine the needs and aesthetics of modern art, inherit the classic elements of Dunhuang art, and make them more suitable for the portability and decorative needs of the contemporary consumer market through innovative design.

This series of design creations uses Dunhuang flying music and foreign people leading camels as themes, representing important symbols and cultural symbols in Dunhuang art. By reducing, simplifying and recreating traditional brick carving styles, we successfully transformed these classic elements into lightweight and portable crafts and tourist souvenirs, conveying the charm of Dunhuang art and forming an organic combination with modern decorative styles.

Consideration of portability and lightness: Since the convenience of handicrafts and tourism products in daily use and carrying is particularly important, I reduced the size of Dunhuang tiles and reduced the thickness to reduce the overall weight of the product. This design consideration not only improves the practicality of the product, but also makes it more suitable for modern market needs. At the same time, the product still retains the basic form of Dunhuang tiles, giving it obvious cultural recognition and unique artistic temperament. By controlling the thickness and size, these small handicrafts continue the texture and texture of traditional brick carvings in terms of vision and touch, ensuring the cultural depth and decorative effect of the product.

Inheritance and innovation of materials: This design still uses "Chengban clay" as the basic material. This clay material makes the details on the brick carving more vivid with its good shaping properties. During the firing process, I did not color these handicrafts and tourist products, but retained the natural texture of "Chengban clay" after firing into pottery, forming a simple clay pottery effect. Through this unmodified natural material, the product conveys a kind of ancient beauty, which fits the cultural charm of the long history of Dunhuang tiles, and also visually highlights the uniqueness of handicraft production.

Combination creation of the theme of flying fairy music: flying fairy music is one of the most representative artistic images in Dunhuang murals, symbolizing auspiciousness and freedom. In the pattern design of handicrafts, I took flying fairy music as the theme and created several flying fairy music shapes, which were combined into a complete set of Dunhuang flower tile flying fairy music combination works(Figure 143). These shapes retain the elegant lines and graceful postures of the Dunhuang flying fairy images, intending to show the dynamic and agile characteristics of flying fairy music through multi-angle design. This diversified combination design not only enriches the decorativeness of the product, but also provides consumers with a variety of choices, enhancing the collection and use value of the product.

Figure 138This is one of the works in the Dunhuang Flower Tiles Flying Apsaras Music Series. It adopts a vertical rectangular layout design, with more space used to express the dense streamers of the Flying Apsaras Music. It is the first work in this series.
Source:Yanda Du.

Blackening and contrasting effects: To further enhance the visual impact, I blackened the lines and blocks of the main figures of the flying musicians on the ceramic tiles. This blackening process forms a strong contrast with the original color of the ceramic tiles, highlighting the outline and shape of the main figures, making the overall pattern more concise and powerful, in line with the modern aesthetic demand for simple and eye-catching effects. The blackening process not only enhances the visual layering, but also gives these works a profound and classical temperament, which complements the traditional image of the flying musicians(Figure 144-146).

Figure 139 The second creation in the Dunhuang flower tile flying musician series: a flying musician playing the flute.
Source:Yanda Du.

Figure 140 The third creation in the Dunhuang tile flying musician series: flying musician playing the harp.
Source:Yanda Du.

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Figure 141 The fourth creation in the Dunhuang flower tile flying musician series: a flying musician playing the pipa.
Source:Yanda Du.

The combination of decoration and practicality: red rope and Chinese knot design. For the Feitian Jiyue crafts, I punched holes on the surface of the ceramic bricks and put red ropes through them to make pendants in the form of Chinese knots. This design makes the product not only ornamental, but also decorative and usable. As traditional Chinese auspicious symbols, red ropes and Chinese knots further enhance the cultural connotation and decorativeness of the products, making these Feitian Jiyue pendants works of art that are both culturally meaningful and modernly practical.

Design concept and artistic inspiration of desktop ornaments:"Hu people leading camels" is a unique cultural symbol on the Silk Road, representing the prosperous scene of cultural exchange and trade between China and the West. The image of Hu people leading camels in Dunhuang art vividly shows the richness and diversity of Silk Road civilization. I use this theme as the main pattern of the desktop ornaments, and transform the image of Hu people leading camels from a flat presentation to a three-dimensional effect through three-dimensional carving technology, making the whole work dynamic, which not only retains the artistic characteristics of traditional flower tiles, but also gives it new vitality through the transformation of form(Figure 147).

Figure 142 Although the "Foreign People Leading a Camel" Dunhuang flower tile was designed and produced as a desktop ornament, I also reserved and installed space for pendants behind the back panel to give it a variety of decorative functions. Source:Yanda Du.

In order to enhance the visual effect of the Hu Man Leading a Camel desktop ornament, I deliberately chose a solid wood base and covered it with royal blue flocking cloth. Royal blue, as a noble and deep color, forms a sharp contrast with the texture of the ceramic tile, highlighting the detailed beauty of the image of the Hu Man Leading a Camel. The soft texture of the flocking cloth also adds a sense of luxury to the ornament, making the entire work more suitable for placement in places such as study rooms and desks, with extremely high decorative and artistic value.

In addition, I also designed a wooden frame stand to display the ceramic tile works of the Hu Man Leading a Camel. The texture of the wooden frame forms a harmonious match with the ceramic tile and the solid wood base, which not only protects the ceramic tile from damage, but also provides a complete display form for the entire work. Through this display method of the wooden frame stand, the Hu Man Leading a Camel desktop ornament has become an independent work of art, which has both decorative effects and highlights its cultural significance.

This time in the creation of wall decorations to meet the richness of wall decorations. There are 12 styles of Dunhuang flower bricks created in the form of paste or inlay, including 10 styles of bas-relief image bricks and 2 styles of painted image bricks. Decorated using the hanging method is the Dunhuang Kabuki Flower Brick Theme Set, which has 4 styles of Dunhuang Flower Brick Hanging Decorations. For the tabletop decorations, one model was designed and created: a camel with a hu-man.

5.3 **Evaluate satisfaction with the results of applications in modern decoration**

In assessing the results of the use of Dunhuang bricks in modern decorative applications, I have analyzed in detail the feedback from three main categories of evaluators: experts in Dunhuang art, architects and target group consumers. These evaluative feedbacks provide valuable references for the creation of this study and reveal the satisfaction level of using Dunhuang tiles in modern decoration.

5.3.1 Satisfaction of Dunhuang art experts

Experts in the field of Dunhuang art expressed high recognition and appreciation for the modern use of Dunhuang bricks. During the evaluation process, Dunhuang scholars such as Du Yongwei and Zhao Junrong believed that these creations not only continued the essence of Dunhuang art, but also were innovative in design and met contemporary aesthetic needs. They particularly mentioned that while retaining the cultural connotation and historical value of Dunhuang flower bricks, I was able to skillfully simplify and modernize the traditional patterns to make them more adaptable to the needs of modern decoration.

The experts also said that the cultural heritage of Dunhuang flower bricks is reflected in the symbolism of their patterns, such as the use of eight-petaled lotus flowers and scrolling grass patterns, which highlight the spiritual connotation of Dunhuang art. And in the design, I enhanced the visual impact of the pattern by reconciling the complexity of the pattern with modern visual needs, so that it retains its cultural depth. Experts were generally satisfied with this fusion of culture and

modern aesthetics, believing that it was not only an inheritance of Dunhuang culture, but also a successful attempt to modernize the expression of traditional culture.

5.3.2 Satisfaction of architects

In the architects' assessment, architects such as Du Yongsi showed high satisfaction with the practical application of Dunhuang bricks. They believe that this design not only adds unique cultural connotations to modern architectural decorations, but also matches modern architectural styles through the geometric treatment of the pattern. For example, in the floor, wall and facade decoration, the simplified Dunhuang brick pattern effectively avoids overly complex visual effects, highlighting the simplicity and functionality of the design, which is in line with the popular trend of contemporary architectural design.

In addition, the architectural designers also recognized the improvement of the process and materials of the flower bricks. Through my use of modern processes and new materials, such as composite terra cotta and blackened coatings, Dunhuang flower bricks show greater durability and flexibility in modern architecture, adapting to the needs of different architectural styles. Designers were particularly pleased with the environmental friendliness and resistance to wear and tear of the materials. Such improvements not only enhance the practicality of the product, but also meet the current demand for sustainable materials in architectural design.

5.3.3 Satisfaction of target group consumers

According to the survey, target group consumers showed equally high satisfaction with the modern decorative applications of Dunhuang bricks. Survey data shows that modern consumers tend to favor designs with both cultural connotations and aesthetic values when choosing decorative materials. My Dunhuang Flower Brick design combines traditional elements with modern style by adjusting colors and patterns, a design strategy that has been widely praised by the target group.

In terms of specific design styles, the target group particularly liked the modern minimalist style adopted in my design, especially through geometric shapes and simplified traditional patterns, which made the decorative product both culturally rich and fashionable. For example, many consumers mentioned in their evaluations that the soft lines and simple patterns of Dunhuang tiles are ideal for modern interior decorating needs, especially in environments such as homes, commercial spaces and cultural buildings. These products convey elegant cultural tastes and meet modern aesthetic requirements for decoration, thus receiving positive feedback in terms of satisfaction.

When using questionnaires for information collection, I created two different questionnaires based on the respondents. They were directed to learners and practitioners of Dunhuang flower tiles respectively.

The first questionnaire was addressed to the learners of the Dunhuang flower tiles. In designing this questionnaire for learners of dunhuang bricks, my main consideration was to fully understand the audience's knowledge background, their perceptions and attitudes towards dunhuang bricks, as well as their perceptions of the practical application of dunhuang bricks in modern decoration：

1）Understanding the audience's knowledge level of Dunhuang art

Questions 1 and 2 in the questionnaire asked about the audience's level of knowledge about Dunhuang art and Dunhuang flower bricks. I set up the questions in this way to clarify the audience's basic knowledge of this traditional art form. Understanding the audience's background knowledge helps the researcher to target and design subsequent communication and promotion strategies. For example, for groups who know less or have not heard of Dunhuang flower bricks, their interest can be increased through enhanced publicity and education.

2）Assessing the Exposure and Practical Application of Dunhuang Flower Bricks

Question 3 asked the audience if they had seen any Dunhuang brick exhibits or crafted decorative items in their lives. This question allowed me to assess the exposure of Dunhuang bricks in everyday life and their practical application as an art form in modern decorative environments. This design will provide data for the study to understand if Dunhuang tiles are limited to specific exhibition spaces or if they have been widely used in modern decoration.

3）Assessing audience preferences and attitudes towards Dunhuang flower bricks

Q.4 Through the audience's preferences towards Dunhuang flower bricks, the popularity of traditional art in the minds of contemporary audiences is explored. Understanding the audience's affective tendencies can provide an opportunity for the researcher to determine whether Dunhuang flower bricks should be promoted as culturally valuable works of art or whether their artistic design should be further enhanced to appeal to modern consumers. It also provides a basis for future creation and promotion.

4）Exploring the value of Dunhuang flower tiles in modern decoration

Question 5 was designed to find out if the audience recognizes the value of Dunhuang flower tiles in modern decorative systems. This question helped me to determine the potential of the traditional art to be used in a modern setting and to provide direction on how to enhance its cultural impact. If the majority of the respondents recognized the value of Dunhuang flower bricks, it would further promote research on their application in public and private spaces.

5）Digging into the difficulties and difficulties in the application

Question 6 deals with the audience's views on the key challenges in the application of Dunhuang flower bricks in modern decorative systems. I set it up in this way to dig out the challenges of Dunhuang flower bricks from different perspectives in terms of theme selection, process technology, and application environment. These data can help researchers more clearly identify the current obstacles encountered in promoting Dunhuang flower bricks and provide guidance on how to address them.

6）Modernization of Subject Matter and Craftsmanship

Questions 7 and 8 explored the audience's orientation towards the subject matter and craftsmanship of Dunhuang flower tiles in modern applications. Through these questions, I want to understand whether the audience tends to keep the traditional elements or is more willing to accept innovative designs that combine traditional and modern elements. This will help the researcher to find out the audience's acceptance of combining tradition and modernity when designing new products, so as to create better innovations.

7）Preferences for Derived Products

Question 9 asked about audience preferences for small artifacts derived from Dunhuang flower bricks, aiming to assess whether the extended design of Dunhuang flower bricks could appeal to modern consumers. If the audience shows interest in small derivative products, it indicates that this traditional art form has extensive commercialization potential and can be further promoted in the development of gifts and souvenirs.

8）Willingness to apply in practice

Question 10 directly asked the audience about their willingness to use decoration in the form of dunhuang tiles in their personal space. Through this question, I wanted to assess the audience's attitude towards the practical application of Dunhuang tiles, especially from the perspective of private decoration. This data helps to determine the actual demand for traditional art in modern living environments, as well as its market prospects.

Overall, these questions were set to comprehensively assess the cognitive and affective attitudes of Dunhuang flower bricks and their application value among contemporary audiences. This information provides a strong support and reference for subsequent research, design and promotion of Dunhuang Flower Brick decorative products.

Below are the statistics and questions asked on the learner questionnaire for the Dunhuang Flower Brick. A total of 45 learners participated in this questionnaire and the statistics are presented as percentages, excluding decimal places.

Table 10 Dunhuang Flower Brick Learner Questionnaire Statistics

Dunhuang flower bricks is a small branch of Dunhuang art, the main role is Dunhuang art floor or wall decoration, now also more and more by the public places decoration or interior decoration. Please fill in the following questionnaire according to your own knowledge, experience and actual situation.Each question is accompanied by a choice from 1-5 to indicate a score or degree. 1 being the lowest and worst and 5 being the highest and best.

questions	1	2	3	4	5
1、Do you know Dunhuang art?	4%	6%	48%	33%	9%
2、Do you know about Dunhuang Flower Tile?	37%	42%	17%	2%	2%
3、Have you ever seen Dunhuang flower tile exhibits or craft decorations in your life?	22%	35%	28%	11%	4%
4、Do you like traditional Dunhuang art such as Dunhuang flower tiles?	0%	4%	6%	48%	42%
5、Do you think Dunhuang flower tiles as traditional decoration in today's decorative system has its value?	0%	0%	0%	12%	88%
6、Do you think it is difficult to apply Dunhuang tiles to today's decorative system?	0%	9%	17%	26%	48%
7、 You think Dunhuang flower brick applied to today's decorative system should also maintain how many traditional themes?	0%	6%	44%	42%	8%
8、You think Dunhuang brick applied to today's decorative system process should also maintain how much of the traditional craft content?	6%	6%	42%	28%	18%
9、Do you like the small artifacts derived from Dunhuang flower bricks, such as ornaments and pendants?	0%	0%	4%	12%	84%
10、Would you like to add decoration in the form of dunhuang flower tiles to your residence?	0%	0%	0%	7%	93%

Notes:Percentages of statistics are displayed only up to the decimal point.

The second questionnaire was addressed to practitioners of Dunhuang flower tiles and related Dunhuang art. In designing this questionnaire for practitioners of Dunhuang flower bricks and related practitioners, the purpose and considerations of the survey were covered in the following aspects:

1）Respondents' background and experience

This includes questions 1, 2 (length of work or study) and 3 (knowledge of dunhuang bricks). These questions were set to understand the professional background and depth of experience of the respondents. Knowledge of Dunhuang flower tiles may vary among practitioners with different backgrounds and experiences, and these questions were used to differentiate the respondents' knowledge levels and to provide contextual support for the analysis of the subsequent questions.

2）Practical exposure to and experience with Dunhuang flower tiles

This included questions 4 (whether they had seen the actual objects or derivatives), 5 (whether they had painted the patterns), and 6 (whether they had made the flower bricks). These questions were designed to assess the extent of the respondents' actual contact with and experience in handling Dunhuang flower bricks. This can help the researcher to understand whether the respondents' knowledge is not only limited to theory, or they have some practical experience, so as to gauge the reference value of their opinions.

3）Value judgments on modern applications of Dunhuang flower bricks

Includes questions 7 (value in modern decoration), 8 (key points in application), 9 (theme orientation), and 10 (craft orientation). This category of questions centers on exploring the prospects and challenges of applying Dunhuang flower bricks in modern decorative systems. Through these questions, the researcher can understand practitioners' views on the modern value of flower bricks, discover the main difficulties in their application, and explore how to find a balance between tradition and modernity in terms of subject matter and craftsmanship.

4）Attitudes and Satisfaction with Derivatives

This includes questions 11 (preference for small artifacts) and 12 (satisfaction with modern applications). These questions reflect the respondents' satisfaction with the commercial potential and modern applications of the Dunhuang Flower Brick derivatives. The researcher can use this feedback to understand the current acceptance of the product in the market and to inform future commercialization or product improvement.

5）Comments on research and dissemination

Including question 13 (problems in research) and question 14 (deficiencies in cultural dissemination). These questions were designed to collect respondents' opinions and suggestions on the research and cultural dissemination of Dunhuang flower bricks, so as to provide a basis for improving the research methodology and promoting the inheritance and dissemination of flower brick culture.

6）Open-ended suggestions

Question 15 (Other Suggestions) was an open-ended question designed to allow respondents to offer insights or suggestions that they felt needed to be added. This opens up the possibility for more innovative and personalized opinions to be

gathered from the questionnaire, helping the researcher to obtain more comprehensive information.

Overall, this questionnaire was set up around the following core considerations:

Understanding respondents' professional backgrounds and their knowledge and experience with Dunhuang bricks; exploring the value, difficulties, and solution ideas of applying Dunhuang bricks in modern decorations; assessing market acceptance and satisfaction with the application of Dunhuang bricks' derivatives; and collecting practitioners' opinions about improvements to the current forms of research and cultural dissemination.

The combination of these questions can provide targeted data support for the application and inheritance of Dunhuang flower bricks in modern decoration.Below are the questions and statistics from the questionnaire. A total of 19 practitioners participated in the questionnaire. Statistical percentages do not include decimals.

Table 11 Dunhuang Flower Tile Practitioner Questionnaire Statistics

Thank you for participating in this questionnaire in your busy schedule, the results of this questionnaire will be used as an important basis for the study of Dunhuang flower bricks, your information, comments and suggestions will be fully respected, we will carefully read and your personal information strictly confidential. Thank you very much for your support! Each question has a choice from 1-5 to indicate a score or degree. 1 is the lowest and weakest, 5 is the highest and strongest.

questions	1	2	3	4	5
1. Is your current work related to or a branch of Dunhuang art?	0%	0%	0%	0%	100%
2. Have you been involved in Dunhuang art related work for more than three years?	0%	0%	0%	7%	93%
3. Do you know anything about the subject matter and craftsmanship of Dunhuang flower bricks?	0%	0%	21%	11%	68%
4. Have you ever seen any replicas, artifacts, topiaries, etc. of Dunhuang flower bricks or their derivatives?	0%	0%	0%	0%	100%
5. Have you ever painted a Dunhuang tile pattern or motif?	0%	0%	0%	0%	100%
6. Have you ever made a Dunhuang flower tile?	0%	0%	0%	22%	78%
7. Do you think Dunhuang flower tiles have their value as traditional decoration in modern decoration system?	0%	0%	0%	0%	100%
8. Do you think it is difficult to apply Dunhuang tiles to modern decorative systems?	0%	0%	33%	57%	10%
9. Do you think that Dunhuang flower tiles applied to modern decorative system themes should also maintain the orientation of traditional themes?	0%	12%	47%	26%	15%
10. Do you think Dunhuang flower bricks applied to modern decorative system in the process and materials should use modern technology and materials?	0%	0%	12%	57%	31%
11. Do you like the small artifacts derived from Dunhuang flower bricks, such as ornaments and pendants?	0%	0%	0%	0%	100%
12. Are you satisfied with the extent and manner in which Dunhuang bricks are currently used in modern decorative systems?	17%	63%	10%	10%	0%
13. Do you think the current research on Dunhuang flower tiles is problematic and misdirected?	0%	17%	31%	47%	5%
14. Do you think that the Dunhuang flower bricks are currently deficient in the form of cultural dissemination?	0%	0%	0%	27%	73%
15. Do you have any other suggestions for the study of Dunhuang flower bricks and their application in modern decorative systems?	Based on the feedback, the following three issues were summarized: 1. The current Dunhuang Flower Tile product lacks publicity and cannot keep up with the current pace of Internet publicity. 2. The current Dunhuang flower brick products in the process and material development is still insufficient. 3. Dunhuang flower brick research and development, relative to other Dunhuang art, there is a lag.				

Notes:Percentages of statistics are displayed to the decimal point.

Overall, consumers not only recognize the cultural value of Dunhuang flower bricks, but also express a high practical evaluation of their decorative effect. The decorative effect in different environments was fully affirmed. Whether it was indoor flooring, wall decoration or external architectural decoration, the target group generally believed that Dunhuang tiles were not only beautiful, but also durable and able to show their individuality and cultural aesthetics in daily life.

The results of the tripartite evaluation by experts, architects and target groups show that the application of Dunhuang bricks in modern decoration has a high degree of satisfaction. This design can inherit the core essence of Dunhuang culture, but also realize innovation through modern craftsmanship and aesthetics, which meets the needs of different fields. These evaluations provide valuable reference bases for my subsequent design and improvement, making the application of Dunhuang flower bricks in modern decoration more promising.

Table 12 Dunhuang Flower Brick Satisfaction Statistics

Dunhuang flower tile satisfaction survey statistical table

Statistics time: On May 18, 2023

Distribution situation		64 people should be sent, and 64 people should be sent						
Distributor		Hui qi zhang						
The recovery		64 copies receivable, with 64 copies actually collected						
condition	project	satisfied		More satisfied		discontent		remark
		copies	Percent-age	copies	Percent-age	copies	Percent-age	
	The current design level of Dunhuang tile	6	9%	22	34%	36	56%	
	Dunhuang tile of the current level of technology	33	51%	19	29%	12	18%	
	The current cultural dissemination degree of Dunhuang brick	4	6%	9	14%	51	79%	
	The current inheritance mode of Dunhuang tile	12	18%	17	26%	35	54%	
	Dunhuang tile current sales channels	29	45%	21	21%	14	21%	
	Dunhuang tiles of satisfaction currently in modern decoration	7	10%	16	25%	41	64%	

5.4 Dunhuang tiles In the current cultural and economic context

In the course of my research, in order to raise people's awareness of the cultural value and protection of Dunhuang Flower Brick Art, I combined traditional culture with modern design needs, and gained a lot of new knowledge through theoretical research, field research, expert interviews and experimental design creations. This new knowledge not only enriches our understanding of Dunhuang flower brick art, but also provides a new direction for the application of Dunhuang flower bricks in modern society.

5.4.1 New Knowledge of Dunhuang Flower Brick Art

(1) Reinterpretation of art form and semiotics

Through in-depth analysis of the patterns, motifs and colors of Dunhuang flower bricks, I found that in the historical context, these patterns are not only decorative, but also carry profound cultural connotations. For example, the eight-petaled lotus flower symbolizes the Buddhist concept of reincarnation, and the curly grass pattern conveys the symbol of vitality and prosperity. In modern creations, by reinterpreting these symbols, I simplify and geometrize them so as to adapt them to modern decorative needs while retaining their original cultural symbolism.

2) Balance between heritage and innovation

This study finds that there is a two-way interaction between traditional art and modern design. Dunhuang flower bricks, as a representative of traditional art, can be used in contemporary art creation to reflect cultural heritage through its classic elements and also to demonstrate contemporary aesthetic needs through design innovation. Through the use of design software and hand-drawing tools (e.g., Procreate), I have explored a variety of new design possibilities to adapt traditional Dunhuang brick patterns to modern architectural decoration and interior design styles.

3) Application of new materials and processes

In my fabrication experiments, I explored in depth the use of new materials, especially modern lightweight terra cotta and durable coating materials. These new materials are better suited to the needs of modern architecture than traditional terra cotta, and especially excel in terms of durability, lightweight and sustainability. In addition, modern process technologies, such as 3D printing and digital engraving, have provided technical support for the reproduction and transformation of Dunhuang flower tiles, allowing more complex patterns to be produced more efficiently.

4) Increased Awareness of Cultural Dissemination and Conservation

My research also found that Dunhuang flower bricks, as cultural heritage, are facing challenges in terms of transmission and preservation. Through interviews with experts and target group surveys, I learned that current forms of cultural communication still have major limitations, such as a lack of interactivity and innovation. Therefore, I propose to enhance the public's awareness and protection of Dunhuang bricks through modern design tools and innovative communication methods (e.g., cultural and creative product development, virtual reality display, etc.).

5.4.2 Proposal of Guidelines

Combining the above new knowledge and findings, I propose several guidelines for creating awareness of the cultural value and conservation of Dunhuang flower brick art in my study, which are intended to serve as a reference for modern artists, designers and cultural conservators.

1) Maintaining cultural connotations and adapting to modern needs

During the creative process, the core cultural symbols of Dunhuang flower bricks, such as the lotus flower, the curly grass pattern and other traditional symbols, should be preserved, while at the same time simplifying and modernizing them to bring them in line with contemporary design aesthetics.

2)Adopt sustainable materials and new technologies

The use of new materials with environmentally friendly properties, combined with modernized processes, improves the durability and sustainability of the products. This is particularly important in architectural decoration and large-scale commercial applications.

3) Diversified communication and interactive experience

Through innovative ways such as cultural and creative product development and digital display platforms (e.g. museum virtual tours), the audience's understanding of Dunhuang flower bricks and their sense of participation can be enhanced to promote sustainable cultural dissemination.

4) Emphasis on creation and preservation

When designing the modern application of Dunhuang bricks, we should pay attention to the inheritance of its cultural value, while strengthening the protection of traditional crafts. Through the modern creation of design works to convey the cultural essence of Dunhuang bricks, and promote the public's further cognition of its cultural value.

5.4.3 Protection and application of Dunhuang brick art in the current cultural and economic contexts

In the current cultural and economic context, Dunhuang brick art is facing new challenges and opportunities. The globalized and modernized economic environment threatens cultural diversity on the one hand, and provides new channels of communication and creative inspiration on the other. In order to effectively protect Dunhuang brick art in today's environment and to promote the dissemination of its cultural values, I propose the following strategies:

(1) Combine cultural innovation with economic development

In the process of modernization and economic development, the Dunhuang brick art should be used as part of the cultural and creative industries to promote its application in cultural and creative products, architectural decoration, public space design, to create economic value while realizing cultural heritage.

2) Government support and social participation

The government should increase its efforts to protect Dunhuang art, provide policy support and financial investment, and encourage public participation in cultural protection to enhance society's awareness of the protection of Dunhuang cultural heritage.

3) International communication

Using the international communication platform, the cultural art of Dunhuang flower bricks is promoted to the international market, so that more people can understand and participate in the protection and innovation of Dunhuang culture, and further enhance its global influence.

Summary:

1.Cultural Heritage and Modern Aesthetics

The exploration of Dunhuang patterned tiles through this chapter has underscored the significance of blending cultural heritage with modern aesthetics. The detailed analysis of the historical origins, craftsmanship, and artistic significance of Dunhuang tiles reveals their role not only as decorative elements but as vessels of cultural expression. The project demonstrates that by reinterpreting traditional designs, we can create contemporary pieces that resonate with current aesthetic values while honoring the legacy of Dunhuang art. This fusion is evident in the innovative designs that maintain the integrity of traditional elements, such as the eight-petal lotus and curling grass patterns, while adapting them to suit modern tastes. The choice to retain the natural colors and textures of Chengban clay further emphasizes a commitment to authenticity, providing a tactile connection to the past.

2.Innovation in Artistic Expression

The artistic innovations discussed throughout the chapter highlight a dual approach: respecting traditional craftsmanship while infusing modern techniques and materials. The enhancement of texture through relief and layered designs not only enriches the visual and tactile experience of the tiles but also transforms them into multidimensional works of art. This creative process reflects a broader trend in contemporary art where historical motifs are reimagined to foster a dialogue between the past and present. The exploration of dynamic forms, especially in wall decorations, revitalizes the static nature often associated with late Dunhuang art, making these designs more engaging and relevant to modern audiences. This revitalization is crucial for ensuring that traditional art forms continue to inspire and connect with future generations.

3.Diverse Applications and Cultural Symbolism

The chapter’s discussion on the applications of Dunhuang patterned tiles in various contexts—from architectural designs to handicrafts—reveals their versatility and significance in contemporary culture. The emphasis on portability and practicality in the design of souvenirs and handicrafts demonstrates an understanding of modern consumer needs while promoting the cultural richness of Dunhuang art. By creating

products that serve both aesthetic and functional purposes, these designs not only enhance everyday environments but also serve as cultural touchstones that foster appreciation for Dunhuang heritage. The incorporation of symbolic elements, such as the image of Hu people leading camels, further deepens the cultural narrative, inviting viewers to engage with the historical significance of the Silk Road and its exchanges.

4.Emotional Resonance and Cultural Identity

The culmination of these design efforts speaks to a profound emotional resonance with traditional culture. By integrating elements of Dunhuang art into modern life, the products crafted throughout this chapter aim to evoke a sense of identity and belonging. They serve as reminders of the rich tapestry of Chinese culture and history, encouraging a collective appreciation of heritage in an increasingly globalized world. This connection to cultural roots is particularly vital in contemporary society, where individuals often seek meaningful ways to engage with their identity. Through the thoughtful creation of these tiles, the project aspires to bridge cultural divides and promote a deeper understanding of the values embedded within traditional art forms.

5.Future Directions and Impact

Looking forward, the potential impact of Dunhuang patterned tiles extends beyond aesthetic enjoyment; they can play a pivotal role in cultural education and preservation. By continuing to innovate while rooted in historical context, future designs can further explore the intersection of tradition and modernity. Collaborations with artists, designers, and cultural institutions can amplify this impact, fostering an environment where traditional arts are celebrated and integrated into contemporary life. The enduring legacy of Dunhuang art, coupled with innovative design practices, has the potential to enrich cultural narratives and inspire future generations.

In conclusion, this chapter has presented a comprehensive exploration of Dunhuang patterned tiles, emphasizing their significance as cultural artifacts that can adapt to modern aesthetic and practical needs. Through innovative design and a commitment to preserving traditional elements, these tiles exemplify a harmonious blend of past and present, serving as both decorative art and cultural symbols. As we navigate the complexities of modernity, the integration of Dunhuang art into contemporary practices stands as a testament to the enduring power of cultural heritage and its capacity to resonate across time and space.

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Chapter Ⅵ

Conclusion, Discussion and Recommendations

6.1 Conclusion

This thesis centers on Dunhuang flower bricks as a cultural treasure to carry out in-depth research, combined with its historical background, artistic characteristics and modern applications for multi-dimensional exploration. By analyzing the inheritance and innovation of traditional culture, it proposes ways to give new life to the art of Dunhuang flower bricks in modern design. The following summarizes the thesis from four research purposes:

Research purpose 1: Study the historical background, artistic characteristics, traditional craft and modern craft of Dunhuang flower bricks

This thesis begins with a detailed examination of the historical origin and development of Dunhuang flower bricks. From the Wei, Jin, North and South Dynasties to the Tang Dynasty, Dunhuang flower bricks gradually formed a unique artistic style. Combined with Buddhist culture, Silk Road trade and local customs, the patterns of Dunhuang flower bricks are not only decorative, but also rich in symbolic meaning. Through the interpretation of the traditional craft, the thesis further analyzes the firing process, the choice of materials and the complex production process of Dunhuang bricks. Meanwhile, in terms of modern craftsmanship, the study introduces the use of new materials (e.g., lightweight ceramics, durable materials) and digital design tools (e.g., Procreate), and explores how to maintain the traditional style while enhancing its adaptability and artistic expression through modern craftsmanship means.

Research Objective 2: Analyze the significance and value of Dunhuang flower bricks and search for traditional cultural symbols

The patterns of Dunhuang flower bricks not only reflect artistry, but also carry rich cultural connotations. By interpreting their patterns, colors, and symbols, this study reveals the religious and cultural symbolism of patterns such as the lotus flower and the curly grass pattern, which reflect the philosophical ideas of Buddhism and Taoism as well as the multicultural intermingling of the Silk Road. The thesis further explores the transformation and reuse of these traditional symbols in modern design by simplifying and geometrizing them so that they can be integrated into contemporary design while maintaining their cultural symbolism. Dunhuang flower bricks are thus not only a decorative art, but also an important carrier of Chinese cultural inheritance, and their study contributes to a further understanding of the symbolic system of traditional Chinese culture and its continuation and evolution in modern society.

Research Objective 3: The creation of Dunhuang flower bricks patterns conforms to modern art aesthetics and needs

This thesis makes bold innovations in pattern design, combining traditional elements with modern design styles to meet the aesthetic needs of modern decoration. Through modern design software (e.g. Procreate) and hand-drawn creations, I have simplified and geometrized the traditional patterns in my designs to make them more suitable for the needs of modern architecture and interior decoration. For example, the traditional lotus pattern was redesigned into a geometric shape with clean lines and symmetrical structure to fit the modern minimalist style. At the same time, the thesis analyzed the target group's aesthetic needs for eco-design, minimalism and Chinese style, and integrated these design concepts into the innovative patterns of Dunhuang flower bricks, so as to satisfy the modern consumer's dual needs for visual aesthetics and cultural connotation.

This study created six designs of Dunhuang flower tiles. One Dunhuang paving brick, mainly used for floor decoration and anti-slip. 4 Dunhuang wall decorative bricks, changed to the form of hanging decorations, to simplify the installation process of adhesive paving bricks. 1 Dunhuang relief image bricks, scaled down to tabletop ornaments for decorative purposes. After the assessment of the expert group, these creative designs are in line with the aesthetics of Dunhuang art and the needs of modern decoration, is an excellent modern architectural decoration and interior crafts, tourist souvenirs.

Research Objective 4: Application of Dunhuang Brick Patterns in Modern Decorative Innovation

The thesis also focuses on the potential application of Dunhuang flower bricks in modern decorative innovation. By examining the two main areas of architectural decoration and interior decoration, I propose a variety of applications for Dunhuang flower bricks in contemporary architectural and decorative projects. For example, in public spaces such as museums and exhibition halls, the patterns of Dunhuang bricks are not only used as floor coverings, but can also be applied to wall decorations or ceiling designs, increasing the sense of visual hierarchy and cultural ambience by combining them with modern materials. In the interior design of residential and commercial spaces, Dunhuang bricks can be used as a local decorative element, integrated into furniture, murals and other designs, which not only reflects the cultural heritage, but also meets the aesthetic requirements of modern space design. Through target group demand surveys and expert advice, I have continuously improved and optimized the designs to ensure that these creations retain the essence of traditional culture, but are also revitalized in modern decoration.

In this study, I not only used the traditional artistic features of Dunhuang, but also simplified, flattened and geometrized them based on the characteristics and needs of modern minimalist decor. The religious and tomb culture part of Dunhuang art was weakened and the decorative aspect was strengthened. The group of experts evaluated the six creative designs and concluded that they all met the needs of modern people for architectural decoration and interior decoration.

Through a comprehensive examination of Dunhuang flower bricks combined with modern design, this study has developed new ideas about how to pass on and innovate traditional art in contemporary environments. Dunhuang flower bricks not only serve as a historical heritage, but also show their potential for new applications in modern decoration. Through the dialog between history and modernity, I have explored various ways to integrate traditional culture into contemporary design, providing valuable reference and guidance for future cultural heritage preservation and innovative design.

6.2 Discussion

In the course of discussions and exchanges with various supporters of the thesis, including Dunhuang art experts, architects, target audience groups, and Dunhuang locals in the fieldwork, the following key points were revealed in the study. These key points not only extend the depth of the study, but also further clarify the cultural value and application potential of Dunhuang flower bricks in modern decoration.

6.2.1 Views of Dunhuang art experts: cultural inheritance and innovation of traditional art

Dunhuang art experts pointed out that Dunhuang flower bricks, as the crystallization of ancient Silk Road culture, not only have high artistic value, but also carry rich historical and cultural connotations. In discussions with the experts, they stressed the importance of incorporating traditional art symbols in modern design, especially in the context of rapid globalization and modernization, it is especially crucial to preserve the essence of traditional culture. The experts also mentioned how to find a balance between preservation and innovation as a major challenge in the process of passing on the art of Dunhuang flower bricks. Through modern technological means, such as 3D printing and digital design, traditional patterns can be more accurately reproduced and innovated, while also providing more possibilities for cultural inheritance.

During the research process, experts' suggestions prompted me to pay more attention to preserving the religious, philosophical and cultural symbols in Dunhuang's flower tile patterns, such as the lotus flower and the curly grass pattern, which represent the Buddhist beliefs, the prosperity and peacefulness of life. Through these discussions, I further integrated these elements into modern decorations, which allowed the traditional culture to continue and take on a new life in the modern environment.

6.2.2 Architects' perspectives: the application of art in modern decoration

In the exchanges with architectural designers, they put forward many constructive opinions on the application of the patterns of Dunhuang flower bricks in modern architectural decoration. The designers pointed out that the pattern of Dunhuang flower bricks has strong visual appeal and cultural recognition, especially in large public buildings and cultural venues, such as museums, exhibition halls and high-end residential projects, which can add a unique sense of history and cultural atmosphere to the space. At the same time, they also emphasized the importance of

considering the practicality and functionality of modern decoration in practical applications, such as the use of lightweight materials, durability and environmental performance.

Based on the feedback from the designers, I adopted more modern materials and processes in my subsequent creations, such as lightweight terra cotta and more durable coatings, which not only improved the service life of the flower bricks, but also adapted to the environmental protection needs of materials for modern architecture. In addition, the designers' suggestions prompted me to simplify and geometrize the pattern design to make it more aesthetically pleasing to modern decorating and to integrate it with the overall style of the interior design.

6.2.3 Feedback from Target Audience Groups: Cultural Needs of Modern Consumers

Through the survey of target audience groups, I found that modern consumers are more and more inclined to choose design styles with cultural connotations in decoration, especially in Chinese style, minimalism and ecological design styles, and the pattern of Dunhuang flower tiles can satisfy their dual needs for cultural identity and aesthetic value. Audience groups generally show a strong interest in Dunhuang flower tile patterns, and they believe that this design not only conveys a long history and culture, but also creates a unique atmosphere in modern home and commercial decorations.

During the course of my research, I made several adjustments to the design based on this feedback, so that the pattern not only became more contemporary in color and form, but also met consumer demand for environmental protection and sustainability through innovations in materials and production processes. Through these discussions, I realized that the cultural value of Dunhuang flower bricks is no longer limited to their historical context, but also lies in their ability to take on the dual roles of heritage and innovation in modern décor.

6.2.4 Opinions of Dunhuang locals: local identity of cultural heritage

During the fieldwork, the perceptions and emotional connections of Dunhuang locals to Dunhuang flower bricks also provided important insights for the study. As witnesses and inheritors of Dunhuang culture, locals have a deep affection for Dunhuang flower bricks, and they see this art form not only as a representation of local culture, but also as an expression of national pride. Locals would like to see this traditional art form spread more widely through modern design means, while also continuing to be used in everyday life.

The opinions of the Dunhuang locals further strengthened my view in my research that these valuable cultural heritages can be effectively preserved and passed on through modern technology and design innovation. In the creation of the flower bricks, I have tried to combine local cultural symbols with contemporary design concepts, so that these traditional art forms can not only be displayed in museums or cultural venues, but also enter the daily lives of the general public, increasing the sense of cultural identity.

Through discussions with multiple constituencies, including Dunhuang art experts, architects, target group consumers, and Dunhuang locals, the research reveals the great potential of Dunhuang flower bricks in modern decorative applications and

expands their important role in cultural heritage and innovation. The new knowledge gained during the research process suggests that the preservation of traditional culture not only relies on respecting its historical value, but also requires innovation through modern technology and design tools to adapt it to the needs of contemporary environments. Through these discussions and feedbacks, I propose guidelines for combining the artistic and cultural values of Dunhuang bricks with modern design aesthetics, thus providing new ideas and practical paths for the application and inheritance of Dunhuang bricks in modern society.

6.3 Recommendations

Based on the content and findings of the previous research, the following recommendations are made at several levels. These suggestions not only help Dunhuang flower brick art to be better inherited and applied in modern society, but also help to improve the level of innovative design in related fields.

6.3.1 Strengthen the combination of traditional culture and modern design

It is recommended to continue to promote the integration of traditional art and modern design innovation. As a traditional art form rich in historical and cultural value, Dunhuang flower bricks can be revitalized through modern design means. More in-depth exploration can be carried out in the following aspects:

1) Multi-dimensional design innovation

Combine the traditional Dunhuang flower brick pattern with modern minimalist design, geometric elements or eco-design style to meet the needs of modern architectural decoration and interior design. At the same time, we can try more color changes to make the pattern more adaptable to modern aesthetics.

2)Cross-field application

Not only limited to architecture and interior decoration, but also can explore the application in other fields, such as clothing design, daily necessities or artwork, to expand the influence and use of Dunhuang flower bricks.

6.3.2 Promote the application of digital technology in traditional art conservation

In the study, it was found that digital technologies (e.g., 3D modeling, virtual reality, and design software) have an important role to play in the reproduction, conservation, and innovation of Dunhuang flower bricks. Recommendation:

1) Establish a digitized database

Building a digital pattern library of Dunhuang flower bricks not only helps to protect these precious cultural heritages, but also provides rich materials and inspirations for subsequent design innovations.

2) Promote the application of design software

Encourage designers to use modern design software for creation, such as Procreate and other software, which not only enhances the efficiency of design, but also allows for more flexible experimentation and modification in the creative process.

6.3.3 Explore the application of new materials and techniques

In the modern application of Dunhuang flower bricks, the choice of materials and the innovation of craftsmanship are particularly important. Suggestions:

1) Use environmentally friendly and lightweight materials

In architectural decoration and interior design, give priority to environmentally friendly, lightweight and durable materials, which not only meets the functional needs of modern decoration, but also conforms to the current concept of sustainable development.

2)Promote the application of modern craftsmanship

Explore more production processes with modern performance, such as high-temperature firing or corrosion-resistant coating, etc., so that Dunhuang flower bricks not only maintain the traditional beauty in appearance, but also meet the modern decorative needs in performance.

6.3.4 Strengthen public recognition of cultural values and education and publicity

Through the study, it was found that the public has a strong sense of cultural identity for Dunhuang brick art, especially for its application in modern decoration is full of expectations. In order to further promote the dissemination and cognition of Dunhuang flower bricks, it is recommended to:

1) Increase cultural publicity and educational activities

Promote the cultural value of Dunhuang flower bricks to the public through multiple channels such as museum exhibitions, cultural lectures and digital media. Especially among young groups, interactive publicity can be carried out through social media platforms to make traditional culture and modern life more closely integrated.

2) Promote traditional art programs in school education

In fine arts and design education, add courses related to Dunhuang flower bricks and other traditional art forms to cultivate students' interest in and knowledge of traditional culture, so as to reserve talents for subsequent design innovation.

6.3.5 Encourage industrialization cooperation and cultural creative product development

The application of Dunhuang flower bricks is not only limited to the artistic and academic fields, but can also be further expanded through the combination with cultural and creative industries. Suggestion:

1) Promote the development of cultural creative products

Cooperate with cultural creative enterprises to apply the pattern of Dunhuang flower bricks to more products, such as stationery, gifts, home decorations, etc., in order to meet market demand and promote cultural dissemination.

2) Explore the path of industrialization

Through cooperation with architectural design companies, decoration companies, etc., apply Dunhuang bricks to more practical projects and explore their potential for promotion in domestic and international markets.

6.3.6 Establish a multi-party cooperation mechanism to promote cultural heritage and innovation

The inheritance and innovation of Dunhuang bricks requires the participation and support of academics, designers, artists, businesses and the government. Suggestion:

1) Establish a cross-border cooperation platform

Build a cooperation platform between traditional art and modern design, promote exchanges and cooperation between experts and practitioners in different fields, and form a benign ecosystem that promotes the innovative development of traditional culture.

2) Introduce government support and protection policies

It is suggested that the government further increase the protection of traditional cultural heritage such as Dunhuang flower bricks, provide financial support and policy inclination, and encourage more designers and enterprises to participate in the inheritance and innovation of this culture.

The in-depth study of Dunhuang flower bricks not only expands the understanding of traditional cultural values, but also provides rich inspiration and guidance for modern design innovation. The recommendations made in this study aim to promote the application of Dunhuang Flower Brick art in modern decorations, as well as to raise public awareness of its cultural value and conservation. Through multi-party collaboration, technological innovation and material optimization, Dunhuang bricks will have the opportunity to take on new life in the modern cultural and economic context.

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APPENDIX

PERSONAL INTERVIEWS

Interviewer 1:

Interviewer : Yanda Du

Interviewee : Yongwei Du

Time: 10:30 a.m on April 6, 2023

Location: Mogaoli Artisan Village, Xindun Village Group 3, Mogao Town, Dunhuang City

Interview content: Face-to-face interview

Yanda Du: Mr. Du, thank you for accepting my interview on your busy schedule. As an expert in Dunhuang art and sculpture, you have unique insights into the study and design of Dunhuang flower bricks. In the process of designing the Dunhuang tiles, you have helped me a lot in choosing the prototypes for my designs. Can you please tell me about your criteria for choosing the patterns for the Dunhuang tiles?

Yongwei Du: Well, the selection of Dunhuang brick pattern should first be considered from the aspects of its cultural connotation, historical value and artistic expression. We are looking for in the traditional brick pattern is able to represent the Dunhuang characteristics of the pattern, such as paving tiles we chose a more simple, regular geometric patterns, so that both meet the needs of modern decoration, but also allows people to feel a glance Dunhuang style of art. Selected patterns should also meet the needs of modern applications, both visual aesthetics, but also easy to batch production and decorative applications.

Yanda Du: I understand. The Kabuki pattern in Dunhuang flower bricks is also one of the patterns we focus on. I previously provided twelve kabuki motifs, and you and other experts ultimately selected four of them. Can you share your thoughts on the kabuki patterns? Why did you choose those four?

Yongwei Du: The kabuki motifs have a very high cultural value in Dunhuang murals, as they show the multiculturalism of the Silk Road period. Each of the four kabuki motifs we chose has a specific sense of dynamic beauty and rhythm, and this sense of movement is an important feature of Dunhuang art, which is the essence of kabuki motifs. By showing dances and instruments, we want the viewer to feel the atmosphere of ancient music and dance directly. In modern décor, we need this kind of vibrant pattern to break up the dullness of a space, and at the same time give new life to traditional culture. Specifically for these four patterns, we also considered their expressive power, and every detail honors the wisdom of ancient craftsmen.

Yanda Du: Listening to you say this, my understanding of these kabuki patterns and a lot deeper. How do you choose the patterns of the relief bricks? Cameo portrait tiles have a strong sense of three-dimensionality, what is the application value in modern design?

Yongwei Du: The three-dimensional effect of the relief tiles makes it very unique in space decoration. The relief pattern we chose is deeper, and the content of the pattern is closely related to religious beliefs and folklore, with cultural symbolism. The relief itself is a relatively complex process, and modern design has relatively few applications in this area. We hope to create a more layered cultural atmosphere in the modern space by choosing relief patterns with rich details. The patterns of the relief portrait tiles are visually more impactful than the flat flower tiles, which can bring a unique decorative effect in modern architectural decorations and make traditional art more expressive.

Yanda Du: Very enlightening! Your analysis made me realize that relief patterns are indeed unique in terms of expressiveness. In addition, I also used modern design software and materials in the design process, may I ask how you think modern technical means can help us better inherit and innovate the art of Dunhuang flower bricks?

Yongwei Du: This is a very good question, modern technology does help a lot in the innovation of Dunhuang art. For example, the Procreate hand-drawing software and other digital tools that you use in your designs, these technical means bring a lot of convenience to the secondary creation of traditional patterns, and allow us to experiment and make adjustments more efficiently. The application of modern materials,

such as the environmentally friendly and durable materials you used, not only conforms to the current concept of sustainable development, but also enhances the practicality of Dunhuang Flower Tiles in modern decoration. Through digital design and modern materials, we can bring Dunhuang bricks out of the museum and into the lives of modern people.

Yanda Du: Mr. Du, you said it very well. I think your understanding of Dunhuang bricks and your innovative ideas have been very helpful to me. This interview has given me a new perspective on the application and inheritance of Dunhuang bricks, and I'm especially grateful for your guidance on my design work!

Yongwei Du: You are welcome, I am very happy to be able to help you. Dunhuang art, as an important part of Chinese culture, carries our history and spiritual connotation. We need to innovate without forgetting the essence of traditional culture. I also look forward to seeing how your designs can really make Dunhuang tiles shine in modern life.

Interviewer 2:

Interviewer : Yanda Du

Interviewee : Junrong Zhao

Time: 16:00 p.m on April 6, 2023

Location: Mogaoli Artisan Village, Xindun Village Group 3, Mogao Town, Dunhuang City

Interview content: Face-to-face interview

Yanda Du: Mr. Zhao, thank you very much for accepting my interview. As an expert on Dunhuang murals, your comments were very helpful to me in choosing the patterns for the Dunhuang flower tiles design. In our design process, you especially helped us to select the Kabuki pattern and some other patterns with cultural symbolism. First of all, could you tell us about the cultural significance of the Dunhuang kabuki motifs in the mural paintings and why you think they are still valuable in modern design?

Junrong Zhao: You're welcome, I'm very happy to be involved in this project. The kabuki motifs at Dunhuang occupy a very important place in the murals, not only as depictions of music and dance, but also as reflections of the cultural, religious and artistic climate of the time. As an important cultural crossroads on the Silk Road, Dunhuang's kabuki motifs reflect the fusion of multiple ethnic cultures. In the kabuki patterns, the musical instruments, dance movements, and the clothing of the characters all display multicultural elements. This dynamic beauty not only has artistic value, but more importantly, it conveys the ancient artist's love of life, joy and faith. This expression still resonates even in today's art and design because it conveys an aesthetic feeling that transcends time and space.

Yanda Du: Your reference to cultural intersections and dynamic aesthetics has given me a deeper understanding of the potential of these motifs in modern design. In our original design, I offered twelve kabuki patterns, four of which you and other experts ultimately chose. Can you share what your specific criteria were for selecting these four patterns?

Junrong Zhao: I considered several aspects in the selection of the kabuki patterns. The first is the artistic expression of the pattern. The patterns we chose should not only convey the essence of Dunhuang art, but also have a certain modern aesthetic adaptability. For example, the four patterns we chose have a strong sense of dynamics and rhythm, and are able to show the movement of the characters and the expressiveness of the instruments. In addition, the richness of the details of the pattern is also an important consideration, especially in modern decoration, the richer the details of the pattern, the more visual impact and sense of hierarchy.

It is also important that the patterns can be used wisely in modern design. This means that the structure of the motifs should not be so complex as to detract from their presentation on different materials. The four kabuki motifs we ultimately chose were able to meet these requirements, retaining the core qualities of Dunhuang art while being able to be integrated into modern design without being obtrusive.

Yanda Du: This gave me a more comprehensive understanding of pattern selection. We also discussed the choice of patterns for the Dunhuang paving tiles. I chose nine traditional paving tile patterns, and

eventually we all chose one of them. What do you think are the most critical factors in the selection of these patterns?

Junrong Zhao: The pattern of paving tiles, the first thing to consider is its functionality and visual expression. Paving tiles usually have a large area, the pattern needs to have a strong sense of order and simplicity, so as to bring a sense of neatness and unity in the application of large areas. The pattern we selected is a pattern with geometric characteristics, with concise lines and regular shapes, very much in line with the requirements of modern decoration for simplicity and order.

At the same time, although geometric, it is still inspired by the traditional floral patterns of Dunhuang art. This form honors history while possessing the simplicity of modern aesthetics. This pattern was chosen mainly because it is well adapted to the needs of different spaces, both in public buildings and private spaces, bringing a serene and harmonious aesthetic to floor decoration.

Yanda Du: The functionality you mentioned made me realize that not only artistic expression but also practicality should be considered in design. Regarding the choice of the relief tiles, we offered three representative patterns, one of which was chosen by you and the experts. Can you tell us why you chose this relief pattern?

Junrong Zhao: The selection of the relief tiles was really challenging because relief is a three-dimensional art in itself, and it has to incorporate a three-dimensional effect in the flat design. The relief pattern we chose has a strong narrative, the content of the relief is closely related to the religious and historical background of Dunhuang culture, and the pattern is rich in cultural elements, such as human figures, sacred animals and ornaments. These elements not only carry traditional symbolism, but also provide more imagination for modern design.

In addition, the layers of relief patterns have unique advantages in modern decoration. Compared with flat tiles, relief can enhance the three-dimensionality and artistic atmosphere of the decoration through the effect of light and shadow. The pattern we selected is rich in detail but not complicated, layered, suitable for use as a visual focus in modern architecture, and can bring a strong cultural atmosphere to the space.

Yanda Du: After listening to your analysis, I have a deeper understanding of the design of relief portrait bricks. Mr. Zhao, as an expert in the study of Dunhuang murals, can you share your views on the cultural heritage and innovative application of Dunhuang flower bricks in modern architectural decoration?

Junrong Zhao: As an important branch of Dunhuang art, Dunhuang flower bricks carry rich cultural connotations. It not only reflects the artistic wisdom of ancient craftsmen, but also records the social culture and religious beliefs of that era. In modern architectural decoration, we don't just simply carry these patterns into modern spaces, but find their combination with modern aesthetics and functions. Through innovative applications, we can give these motifs a new lease of life, and at the same time allow more people to understand and feel the profound heritage of Dunhuang culture.

In terms of innovation, I think we can use modern technology, such as digital design, 3D printing and other techniques to achieve a more complex craft performance. This will not only make traditional arts more accessible, but also give them new forms of expression. In addition, the choice of materials is also very important. The use of modern materials not only improves the durability of the decoration, but also allows for a more refined expression of the details of the pattern.

Yanda Du: Mr. Zhao, I have benefited a lot from your comments. Thank you very much for your support and guidance in the design process, your insights are invaluable to my research and creation.

Junrong Zhao: You are welcome, I am very happy to be involved in this project. Dunhuang art is an important treasure of our Chinese culture, and it is very meaningful to be able to pass it on and innovate it in modern life through your design. I also look forward to seeing your work bring culture and beauty to more people.

Interviewer 3:

Interviewer : Yanda Du

Interviewee : Kehong Kou

Time: 14:00 p.m on April 18, 2023

Location: Kehong Kou's office, Jiefang Street, Gaotai County, Zhangye City

Interview content: Face-to-face interview

Yanda Du: Mr. Kou, thank you very much for accepting my interview on your busy schedule. As an expert on Dunhuang cultural relics, you have studied in depth the historical heritage and cultural background of Dunhuang flower bricks. Can you please talk about the unique position of Dunhuang flower bricks in Dunhuang cultural relics?

Kehong Kou: Sure. Dunhuang flower bricks are an important part of Dunhuang culture and art. The history of flower bricks can be traced back to the period of Wei, Jin and North and South Dynasties, not only the ground paving bricks, but also includes relief portrait bricks and some painting bricks. They carry the aesthetic standards and craftsmanship of that era, and also have a strong religious and social cultural symbolism. As part of the decorative arts, the presence of flower bricks not only beautifies the built environment, but also exposes people to exquisite artistic expression in their daily lives.

Yanda Du: These cultural values of Dunhuang flower bricks are really profound. In the early stages of our project design, I provided you and other experts with a variety of Dunhuang paving bricks, kabuki motifs, and bas-relief portrait brick motifs to use as prototypes for the design, and you were ultimately involved in the selection process. What were your main considerations in the selection of these patterns?

Kehong Kou: I chose the patterns for the Dunhuang tiles based on their cultural symbolism and the recognizability of the patterns. The bricks are not just decorative, they represent the beliefs, artistic pursuits and cultural identity of Dunhuang society at the time. We wanted to choose patterns that were not only representative of Dunhuang's history, but that would also allow modern people to visualize their cultural value.

For example, in the selection of Dunhuang paving tiles, I preferred designs with natural plant motifs, which not only have a high degree of artistic expression, but also represent the worship of nature and the idea of living in harmony with the sky and the earth in ancient times. In

addition, flower tile patterns need to be both aesthetically pleasing and practical in modern decoration, so we also consider the visual effect of the pattern and its adaptability. The final pattern was chosen to find a balance between contemporary aesthetics while preserving the traditional essence of Dunhuang art.

Yanda Du: Your point of view has given me a clearer understanding of the cultural significance of the choice of motifs. Regarding the kabuki motifs, you and other experts chose four out of twelve. What factors made these patterns stand out among the many kabuki patterns?

Kehong Kou: Kabuki motifs are a unique and important part of Dunhuang art, and they are often used to represent scenes of heavenly music and dance, symbolizing the solemnity and joy of the Buddhist world. In choosing the kabuki motifs, we considered not only their aesthetic expression, but also their cultural significance. These four patterns not only show the dynamism of the music and dance, but also bring a touch of sanctity to modern decorations, as if people can still feel the spiritual beauty of ancient art in modern life.

When selecting the kabuki motifs, we paid particular attention to the demeanor and movement of the figures to ensure that they conveyed the unique flavor of Dunhuang art. Several of the kabuki motifs we chose are very vivid in form, with a wealth of expressions and body movements that bring a sense of movement to modern spaces. In addition, these motifs can be flexibly applied in the design, either as stand-alone decorative elements or combined to form complete scenes, and this versatility is one of the reasons why we chose them.

Yanda Du: I see, the kabuki motifs do have a dual value on an aesthetic and spiritual level. For the relief portrait bricks, we offered three representative patterns, one of which was selected by you and the experts. What is so special about this relief pattern that makes it more appropriate for a design reference?

Kehong Kou: The relief portrait tile is indeed different from ordinary flat tiles, it has a stronger sense of three-dimensionality and visual expression. The relief pattern we chose stands out mainly because

it is more complete in its composition, with a clear sense of hierarchy of characters and scenes, which expresses the delicate craftsmanship of Dunhuang relief art.

In addition, this pattern can realize better decorative effect in modern design. The relief pattern increases the sense of hierarchy through the change of light and shadow, and can produce rich visual effects under different lights. The pattern we finally chose outlines figures and scenes with concise lines, reflecting a sense of history while also being suitable for modern materials and processes. This pattern can be a visual focal point in the décor without losing the elegance of Dunhuang art.

Yanda Du: Thank you for your explanation! Your criteria for the selection of the relief motifs has really given me a deeper understanding of the design ideas. Finally, could you tell us about the significance of Dunhuang tiles in modern decoration? How do you think the use of flower tiles can better reflect Dunhuang culture, especially for contemporary audiences?

Kehong Kou: As a carrier of traditional culture, Dunhuang flower bricks have a unique cultural heritage in modern decoration. It is not only an artistic decoration, but also a symbol of Dunhuang culture and Silk Road culture. For contemporary audiences, the presence of flower bricks allows them to come into contact with history and culture in their daily space, and to understand the craftsmanship and aesthetics of the past through visual experience.

In terms of application, we can make the flower bricks closer to modern life through innovative approaches. For example, some improvements in material and craftsmanship can be made to make them more adaptable to the needs of modern architecture while preserving their ancient cultural symbols. The colors and patterns of the bricks can also be moderately adjusted to enhance their expressiveness in modern environments.

More importantly, through the use of flower bricks, we convey not only the beauty of Dunhuang culture, but also a respect for cultural diversity and historical heritage. The cultural connotation of flower bricks can transcend time and space, injecting the temperature of traditional

culture into modern design. This kind of decoration is not only a visual enjoyment, but also a spiritual touch.

Yanda Du: Mr. Kou, your insights have given me a deeper understanding of the cultural heritage of flower bricks, and I am very grateful for your valuable guidance in design. I look forward to letting Dunhuang flower bricks take on a new life in modern society through our efforts.

Kehong Kou: You're welcome, I'm very pleased to see Dunhuang culture continue in modern society. I hope that your design can make more people feel the charm and value of Dunhuang art.

Interviewer 4:

Interviewer : Yanda Du

Interviewee : Yongsheng Wang

Time: 16:00 p.m on May 7, 2023

Location: Y.S. Wang's Laboratory,Lanzhou Jiaotong University, Anning District, Lanzhou City

Interview content: Face-to-face interview

Yanda Du: Prof. Wang, thank you very much for this interview. As an expert in the application of modern technology in the dissemination of Dunhuang art, you have been committed to the combination of traditional culture and modern technology. In my design projects, you have given valuable advice on the improvement of Dunhuang flower bricks. In your opinion, what key role can modern technology play in the inheritance and innovation of Dunhuang flower bricks design?

Yongsheng Wang: I am also glad to have the opportunity to discuss this topic with you. Dunhuang flower bricks themselves have deep historical and cultural connotations, but to make them more widely accepted by contemporary people, it is not enough to rely solely on traditional design and production methods. Modern technology, especially digital design and 3D printing, provides us with new tools that allow us to more accurately recreate historical tile patterns and innovate while retaining the traditional flavor. For example, 3D modeling and

printing technologies help us to better reproduce and even amplify the three-dimensionality of traditional patterns, while making them more adaptable to the needs of modern decorative environments.

Yanda Du: This is indeed a very novel idea. In the initial stages of the project, I selected a number of prototypes of Dunhuang flower tiles, kabuki patterns and relief portrait tiles to provide to you and other experts. Could you please share with us your considerations in selecting the patterns at that time?

Yongsheng Wang: My main consideration in selecting the patterns was how to better demonstrate the essence of Dunhuang bricks with the help of technology and at the same time facilitate the realization of modern application effects. For example, in the paving tiles, we chose simple lines and symbolic patterns, which are easier to adjust the details when digitizing and can be reproduced in high quality through 3D printing technology. These tiles need to be aesthetically pleasing as well as practical, and can be used in a variety of indoor and outdoor environments, so we favored patterns that are highly adaptable and easily scalable.

Yanda Du: I see. Modern technology has really made it easier to improve and expand patterns. In terms of kabuki patterns, you and the experts have chosen four out of twelve. May I ask if these patterns have some unique expressive features that make it easy to combine them with technology?

Yongsheng Wang: Kabuki patterns do have a unique dynamic beauty, and modern technology can help us to better show this. We chose these four patterns because their movements and shapes are highly expressive, which gives them greater possibilities for 3D modeling and animation. Through digital modeling, we can dynamically display the kabuki dances and even recreate them in a virtual reality or augmented reality environment. This will not only allow viewers to better understand the dynamism of Dunhuang art, but will also provide more layers to the modern design of the tiles.

Yanda Du: In this way, the kabuki motifs are not just flat decorations, but also allow the viewer to feel the dynamic art behind them. This interactivity really adds a new experience to modern design.

For the selection of the relief portrait tiles, you and the experts have also chosen a representative motif. May I ask how you considered the combination with modern technology in this relief pattern?

Yongsheng Wang: The relief portrait tiles have a stronger sense of three-dimensionality, which is especially suitable for the application of 3D technology. In choosing this relief pattern, we hope to carry out finer restoration and local optimization through digital carving technology. Modern technology allows us to carry out localized refinement of the relief, especially for high-resolution restoration and reproduction of the details. This motif is well suited to 3D scanning and printing techniques because of its layered nature, allowing it to display a more vivid visual effect while preserving the traditional style. The application of this three-dimensional tile in modern decoration not only adds texture to the decoration, but also brings a visual enjoyment with a strong sense of history.

Yanda Du: You mentioned that these technical means do give new vitality to the traditional craft. Finally, I would like to ask you, as a Dunhuang art of modern science and technology dissemination experts, you think in the process of promoting the Dunhuang brick culture in the modern society, science and technology, what are the other potential application direction?

Yongsheng Wang: I think that in the future, when promoting Dunhuang flower brick culture, we can make more people understand and come into contact with these traditional arts through digital display and virtual technology. For example, virtual exhibitions can be created to display Dunhuang flower bricks in museums or public spaces through augmented reality technology, allowing people to view the details up close without touching the actual objects. This not only protects cultural relics, but also expands the audience. In addition, the digital platform can also be used as an educational resource, combining multimedia means to explain the history, culture and craftsmanship of Dunhuang flower bricks, so that more young people will be interested in this traditional art.

Yanda Du: Thank you very much for your insights, Prof. Wang! Your suggestions are very inspiring to my design thinking in the project. I look forward to bringing the Dunhuang Flower Brick to life in the modern world through the combination of technology and traditional art.

Yongsheng Wang: I am very happy to see the continuation and innovation of traditional culture through your design and the support of modern technology. I hope our cooperation will provide a new path for the inheritance and innovation of Dunhuang culture.

Interviewer 5:

Interviewer : Yanda Du

Interviewee : Yongsi Du

Time: 10:00 a.m on May 10, 2023

Location:Yongsi Du's Studio,Lanzhou Vocational and Technical College, Anning District, Lanzhou City

Interview content: Face-to-face interview

Yanda Du: Mr. Du, thank you very much for taking the time to accept my interview. As an architect, you have provided many practical suggestions for the modern application of Dunhuang bricks in your projects. In your opinion, what are some of the unique aspects of Dunhuang bricks that can be utilized for their cultural value in modern architectural decoration?

Yongsi Du: It's a pleasure to discuss this topic with you. Dunhuang bricks carry a rich history and culture, applied to modern building decoration can not only enhance the aesthetic of the space, but also give it a deep cultural connotation. Nowadays, architectural decoration emphasizes personalization and cultural value, and the pattern, color and texture of Dunhuang tiles are very consistent with this demand. In modern architecture, it can be used as a “visual cultural symbol”, such as in the entrance wall, corridor or outdoor courtyard paving can play a striking effect, while showing the unique flavor of Dunhuang art.

Yanda Du: I totally agree. In fact, at the beginning of the project, I provided you and several experts with many Dunhuang tile patterns for reference. We chose some of the classic patterns and motifs, what were your considerations when making the selection?

Yongsi Du: For architectural decoration, I pay special attention to the stability and visual adaptability of the patterns when I choose them.

For example, in paving tiles, the pattern we choose must have a regular symmetry and continuity, so that it will not look cluttered when laid over a large area, and at the same time make the space as a whole look more harmonious and unified. Dunhuang tiles of these classic patterns itself is through the test of history, both the power of traditional aesthetics, but also has a good extensibility, is very suitable for modern architecture in a large area of paving or decoration.

Yanda Du: This idea is very clear. In the design, I have also been trying to enhance the cultural atmosphere of the space through these traditional elements. In addition, we chose a few kabuki patterns as prototypes for the design. I remember that you also gave a lot of specific suggestions about these kabuki patterns at that time. Can you tell us why you focused on the kabuki motifs in the architectural decoration?

Yongsi Du: Kabuki motifs are highly decorative and also have a lively cultural atmosphere. I recommend these motifs because the "dynamic beauty" of the kabuki image breaks the static limitations of modern architectural decoration. Modern architectural spaces are often more formal and rigid, and the addition of kabuki elements can add interest and life to the space. In addition, these motifs have a contemplative cultural context that can evoke images of Dunhuang culture while decorating.

Yanda Du: I see, indeed, kabuki motifs can give people a sense of vitality. In terms of the relief tiles, we finally chose a pattern with a strong sense of three-dimensionality for indoor and outdoor wall decoration. What were your considerations in choosing this pattern?

Yongsi Du: Relief image tile is suitable for wall decoration, especially in the lobby, foyer and other locations, can become a visual focus. We choose a strong sense of three-dimensional pattern, on the one hand, because it can show a rich layering effect in different light conditions, on the other hand, can also highlight the Dunhuang tiles unique craftsmanship texture. The relief pattern itself carries a sense of heaviness, which can not only increase the historical flavor of the architectural space, but also enhance the grade of the space. Therefore, we pay special attention to its richness of detail and three-dimensional expressiveness in pattern selection, so that it can be better adapted to the different decorative needs of indoor and outdoor.

Yanda Du: Indeed, the three-dimensionality of the relief portrait tile can enhance the artistic effect of the architectural space. Mr. Du, from the perspective of architectural design, what other aspects do you think need to be paid attention to when using these Dunhuang elements in modern architecture?

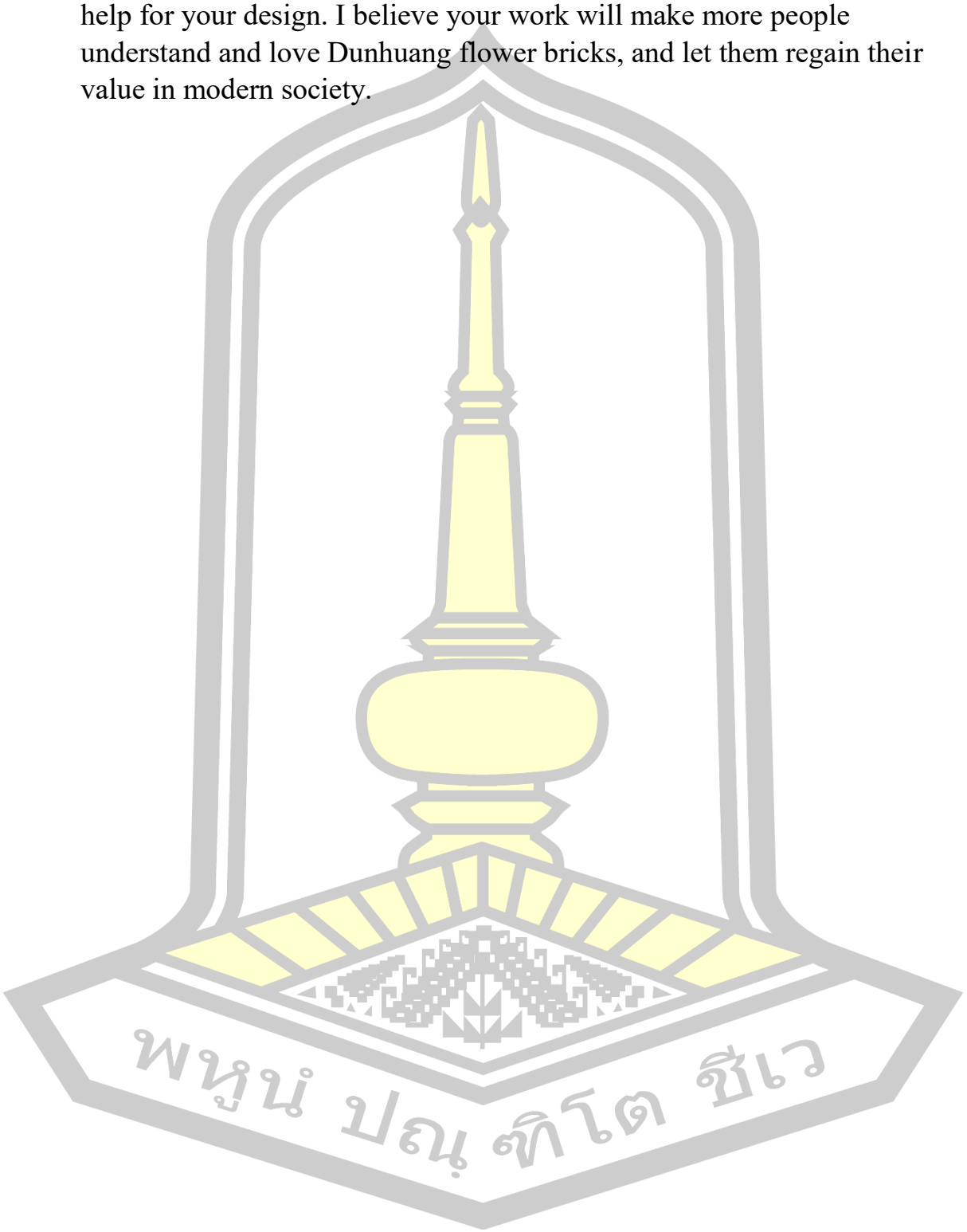
Yongsi Du: When using traditional elements in modern architecture, we need to avoid blindly copying them and causing style conflicts. The design and layout of Dunhuang tiles should be applied in a way that is compatible with the architectural style. For example, in the modern minimalist style space, you can choose the cleaner lines of the Dunhuang pattern, with a monochromatic tone to deal with, so as to retain the traditional beauty, but also with the modern style into one. In addition, also pay attention to the innovation of the material, you can consider the traditional flower brick pattern into modern materials such as ceramics, glass or metal, so there will be more possibilities, not only reflects the cultural heritage, but also in line with the technical requirements of modern architecture.

Yanda Du: This is a great suggestion! I will pay more attention to the integration of material innovation and style matching in my subsequent design. Finally, I'd like to ask you a question. What do you think is the positive effect of applying Dunhuang tiles in modern architecture to promote Dunhuang culture?

Yongsi Du: I think this design is not only purely decorative, but also has the role of dissemination and education. Modern architecture is a space that the public comes into contact with very frequently, and introducing the Dunhuang bricks into these spaces will allow more people to recognize and understand the beauty of Dunhuang culture. And through the integration of modern design language, these traditional elements can be better integrated into people's daily lives, allowing Dunhuang culture to be more widely recognized and accepted. I think what you are doing is exactly a good bridge to bring traditional art into modern life, which is both cultural heritage and cultural innovation.

Yanda Du: Thank you very much for your insights, Mr. Du! Your comments have given me a deeper understanding of the design project. I hope that through this design, we can bring the Dunhuang Flower Brick culture to life in modern architecture.

Yongsi Du: You're welcome, I'm glad to be able to provide some help for your design. I believe your work will make more people understand and love Dunhuang flower bricks, and let them regain their value in modern society.



CASUAL INFORMANTS

1. Sun Rujian, male, 90 years old, former director of the Dunhuang Conservation Institute.
2. Gao Shan, male, 60 years old, Dunhuang painter.
3. Lu Qinxue, male, 69 years old, director of Dunhuang Color Plastic Factory.
4. Du Xin, male, 37 years old, Dunhuang color sculpture craftsman.
5. Wang Xiaobo, male, 30 years old, art teacher at Dunhuang College of Northwest Normal University.
6. Li Yucheng, male, 29 years old, Dunhuang young painter.
7. Li Juan, female, 29 years old, Dunhuang young painter.
8. Su Ting, female, 33 years old, Dunhuang Mogao Caves Docent.
9. Jia Yaozhang, female, 27 years old, civil servant.
10. Li Dan, female, 28 years old, civil servant.
11. Wang Zidong, male, 35 years old, construction worker.
12. Zhao Yanzi, male, 34 years old, accountant.
13. Wang Xia, female, 50 years old, store operator.
14. Kou Yanqin, female, 41 years old, company employee.
15. Li Yanli, female, 21 years old, student.
16. Wang Yifei, male, 33 years old, university teacher.
17. Su Jinquan, male, 54 years old, farmer.
18. Wang Lihong, female, 38 years old, nurse.
19. Liu Qinglin, male, 58 years old, civil servant.
20. Yan Shixi, male, 49 years old, businessman.
21. Zhang Hui, male, 27 years old, mechanical mechanic.

There were also three respondents who only provided information but did not want to disclose their names and ages and have not been included here.

BIOGRAPHY

NAME	Mr.Du Yanda
DATE OF BIRTH	July 30, 1990
PLACE OF BIRTH	Guangyuan, Sichuan Province, China
ADDRESS	No. 87, Beibinhe West Road, Anning District, Lanzhou City, Gansu
POSITION	Student
PLACE OF WORK	Lanzhou Vocational and Technical College, Lanzhou, Gansu, China
EDUCATION	2020 Graduated from Jingdezhen Ceramic University with Master Degree, Major Ceramic Art 2024 Doctor of Philosophy (Fine and Applied Arts Research),Faculty of Fine and Applied Arts, Mahasarakham University

พหุน ปณ ฑิโต ชีเว