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Contemporary jewelry design using inspiration from the elements of the leaky window of traditional culture in Suzhou, Jiangsu Province, China



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The examining committee has unanimously approved this Thesis, submitted by Ms. Qiong Wang, as a partial fulfillment of the requirements for the Master of Arts Fine and Applied Arts Research and Creation at Mahasarakham University

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ABSTRACT

This study is dedicated to the in-depth analysis of the forms, patterns and Cultural connotations of the traditional funnel window elements of Suzhou, JiangsuProvince, China, in modern jewelry design, as well as exploring their keyposition in architecture and culture. By studying the ways of applying Suzhou funnel window elements in modern jewelry design, we use modern design techniques and tools, such as computer-aided design (CAD) software and three-dimensional printing technology, to transform the unique patterns, forms, and themesof funnel windows into innovative elements in jewelry design, so as to create jewelry works with unique styles.

This kind of innovation, which combines traditional and modern elements, retains the unique charm of traditional culture while giving jewelry design distinctive contemporary characteristics and personalized style, reflecting the rich diversity and far-reaching cultural connotations of the interweaving of traditional elements and modern design concepts. This kind of practice not only promotes the innovation and development of the jewelry design industry, but also provides new ways of thinking and sources of inspiration for the inheritance and innovation of traditional culture.

After an exhaustive exploration of the leaky windows in Suzhou, this paper analyzes its unique artistic charm and cultural essence. This is of great value to the innovation of jewelry design and the promotion of cultural development, and also plays a key role in maintaining and promoting traditional culture. We call on more academics and researchers to pay attention to the study of window art, and work together to promote its inheritance and innovation.

This research not only stimulates innovative thinking in the field of design, deepens our understanding and re-creation of traditional cultural values, brings a wealth of innovative impetus and sources of inspiration to design practice, but also explores the infinite possibilities and commercial opportunities of integrating traditional culture into modern design.

Keyword : Contemporary, jewelry, inspiration, elements



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Qiong Wang

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CHAPTER I

Introduction

1.1 Research background (with references)

Suzhou, as the bright cultural pearl of Jiangsu Province, is highly regarded for its profound traditional architectural heritage and rich cultural heritage. Among them, the leaky window is one of the important elements in Suzhou's traditional architecture, with strong local characteristics and cultural connotations. After more than 3,000 years of development of Chinese classical gardens has formed a unique oriental garden system, window as the finishing touch in Chinese classical gardens, plays an indispensable artistic role. Leakage window, as one of the outstanding representatives of Chinese classical garden window art, its exquisite pattern modeling and extensive use makes it a unique creation in the art of gardening. It not only demonstrates the high skill of Chinese gardening art, but also conveys the thought essence and historical and cultural connotation of classical garden art. Through the leaky window, we can deeply feel the unique charm and spiritual connotation of Chinese classical garden art. Suzhou Garden is the representative of China's southern classical gardens, Suzhou Garden in the leaky window because of the rich form, diverse content, delicate and beautiful, by the gardens around the imitation, become the blueprint of the leaky window, people usually through the leaky window, to appreciate the beauty of the architecture of the Suzhou Garden. Funnel window with its unique form and exquisite patterns, in the building to play ventilation, lighting and decorative functions. Through delicate carvings and unique patterns, these funnel windows show the unique charm of Suzhou architectural art. (Fu Changli, 2011)

The historical accumulation of Suzhou gardens has given the funnel windows a unique richness of elements. The design of funnel windows integrates multiple dimensions such as patterns, motifs, space and connotations, which not only shows the diversity of forms but also carries deep cultural connotations, providing a valuable source of inspiration for domestic and foreign designers in terms of picture composition and product structure innovation. Under the background of constant changes in market demand and continuous innovation of design means, the element of window leakage, as a kind of trendy cultural symbol, shows great potential for exploration and space for play. As the core component of garden architecture, windows are richly categorized, including long windows, half-windows, empty windows, support windows, leaky windows, blind windows, wattled windows, and harmonious windows, etc. Among them, leaky windows are excellent in decorative design. Among them, the leaky window has become a bright pearl of traditional Chinese garden art with its excellent decorative, artistic and spatial sense. Leakage window, also known as leakage window, is a kind of partially translucent wall window, commonly found in the garden gallery wall or partition wall. Leakage window in the garden not only has the basic function of lighting and ventilation, but also through the leakage pattern inside the window, which skillfully enhances the visual and spatial sense of hierarchy in the garden. Designers through the careful layout of the leaky windows, skillfully borrowed the scenery of the garden, so that the wall of the pavilions, flowers, plants and trees, rockeries and bamboo forests in the virtual reality between the charming scenery. Gradually developed into a set of leaky

window function and aesthetics in one of the window styles, become one of the important means of garden landscaping. This window form is especially common in the Jiangnan garden, showing the unique artistic charm of the Jiangnan garden.(Zhang Jian; Lu Shaoyang; Shi Jinrong, 2005)

Leaky windows, as a unique and fascinating architectural element in Chinese classical gardens, have always received extensive attention from scholars at home and abroad. As an important part of garden architecture, the study of window culture occupies a pivotal position in the field of Chinese traditional art. Among the many studies on Chinese window culture, the funnel window has attracted much attention because of its unique artistic style and profound cultural connotation. The purpose of this paper is to focus on domestic and international research on Chinese window culture, especially the in-depth research on the leaky window, through systematic literature research, in order to comprehensively reveal its unique artistic charm and cultural connotation.

Domestic scholars focus on two aspects of the study of the leaky window. On the one hand, it is to explore the decorative nature of leaky windows and analyze in detail the artistic characteristics of leaky windows in various historical stages. These studies are mostly found in the literature related to garden architecture, such as the "Collection of Decorative Patterns of Classical Chinese Architecture" and other works. These works have systematically sorted out and categorized the windows in classical Chinese architecture, in which the study of the leaky windows is particularly detailed, providing us with valuable historical information and theoretical basis. On the other hand, there are also studies on traditional decorative arts and motifs, which mainly start from the perspective of two-dimensional planes, and probe deeply into the patterns and styles of patterns and motifs of leaky windows, revealing their unique aesthetic value and cultural significance.

Although the domestic research on funnel windows has achieved certain results, it still needs to be further deepened. In contrast, foreign research on digital art has always taken traditional culture as an important research object. For example, some researchers have conducted in-depth studies on the mathematical relationship in the art of African and American minorities, while a large number of books and papers have explored the geometric art in Islamic art. These studies not only provide us with new perspectives and ways of thinking, but also offer new insights and references for the study of Chinese window culture.

After in-depth research by many scholars, it is found that the underlying structure of Chinese window design contains rich mathematical logic and aesthetic principles, which gives the window decoration patterns a high artistic value and interest.Daniel Sheets Dye's book A Grammar of Chinese Lattice in 1949 is regarded as an important and well-known book for the study of Chinese window culture abroad. The book, A Grammar of Chinese Lattice, written by Daniel Sheets Dye in 1949, is regarded as an important and well-known foreign book on Chinese window culture, which comprehensively organizes and classifies the window designs from ancient to modern China, providing us with valuable materials and references. In addition, modern technological means have also been applied to the study of window pattern generation, such as Lee SY (2013) and other researchers, who added new elements to the original window patterns through algorithms, further enriching the diversity and innovation of window patterns.

Although certain achievements have been made at home and abroad in the research of Chinese window culture, there are still many deficiencies and problems to be solved. Among them, the research on the typical window pattern of leakage window is relatively weak, and its unique artistic characteristics and cultural connotation have not been fully revealed. Therefore, this paper aims to comprehensively demonstrate the artistic charm and cultural connotation of leaky windows through systematic and in-depth basic research, so as to contribute to the inheritance and development of Chinese window culture. At the same time, we expect more scholars and researchers to pay attention to the study of window culture and jointly promote its inheritance and development.

In modern society, traditional cultural elements gradually fade out of people's vision, and the field of jewelry design is no exception. However, with the evolution of aesthetic concepts and the diversification of design styles, more and more designers are trying to combine traditional cultural elements with modern jewelry design. In this context, the application of traditional Suzhou funnel window elements to modern jewelry design not only preserves the unique charm of traditional culture, but also creates works with a modern flavor and individuality.

This study aims to deeply explore the structure and style of the traditional funnel windows in Suzhou and the profound cultural value they contain. The article provides a detailed analysis of the key roles that funnel windows play in architecture and culture, and examines how these elements can be incorporated into modern jewelry design. Using advanced design tools such as CAD and 3D printing, designers are able to extract innovative elements from the unique forms and patterns of funnel windows and apply them to jewelry design to create unique pieces. This research is of great significance to the innovation and cultural inheritance in the field of jewelry design. Exploring the potential of Suzhou's traditional funnel window elements in jewelry design will help to create unique jewelry with rich cultural connotations, thus contributing to the inheritance of Suzhou's cultural heritage and the sustainable development of jewelry design. At the same time, this research also provides reference and inspiration for the use of traditional elements in other regions and cultures in modern jewelry design.

1.2 Purpose/Objectives of the Study

1.2.1 To study in depth the historical status, evolution process, aesthetic value, cultural connotation, religious beliefs and practical application scenarios of the funnel window in Suzhou traditional culture. Through systematic literature review, thematic research and in-depth discussions with relevant professionals, detailed information is collected and organized for analysis.

1.2.2 Analyze the classic style and pattern elements of funnel windows, and combine them with modern creative thinking and jewelry production technology to design jewelry works that meet contemporary market trends and consumer preferences, in order to promote the continuous development and innovation of the jewelry design industry;

1.2.3 Designing jewelry with the theme of traditional Suzhou funnel windows to assess the satisfaction of target consumers and marketing feasibility.

1.3 Research Problems

1.3.1 In the traditional culture of Suzhou, what is the historical evolution, artistic value and cultural connotation of the funnel window element? What role did the funnel window play in the long history and what beliefs and functions did it carry? How to reveal the central position of the funnel window in Suzhou's cultural system through comprehensive documentation and in-depth interviews with relevant professionals?

1.3.2 How can the styles and patterns of funnel windows be innovatively applied in modern jewelry design? In the current social context, which jewelry materials and techniques can be effectively combined with the funnel window elements to meet the expectations of the market and consumers?

1.3.3 How can jewelry designs based on traditional Suzhou funnel elements realize their uniqueness and market value? What is the acceptance of this type of design by the target consumer groups? From a marketing perspective, what are the market potentials and promotion strategies for modern jewelry designs inspired by leaky windows?

1.4 Scope of research

1.4.1 Research area:

To provide a comprehensive and in-depth analysis of the history and culture of Suzhou City, focusing on its garden art and the subtleties of funnel window design. The core of this research lies in exploring how to integrate the unique elements of funnel window design with jewelry design and production, and elaborating the related craft techniques and innovative means. At the same time, we will also deeply analyze the aesthetic value of the funnel window and study how to reflect these values in jewelry design, so as to give the jewelry works a deeper cultural heritage and unique artistic charm.

1.4.2 Time

This study aims to explore the integration and development of Suzhou's traditional funnel window elements in contemporary jewelry design, and to this end, the key historical stages have been carefully delineated. In view of the lack of early detailed documentation and fieldwork records on the application of funnel window design in jewelry, this study sets its starting point in the 1970s, the period after the founding of the People's Republic of China. In order to reveal the evolution of the funnel window element in jewelry design, the timeline of the study is divided into the following stages:

Since the 1970s, with the founding of the new China, Suzhou's economy and culture gradually recovered. During this period, the application of the funnel window element in jewelry design was relatively small, and the main body of the design mostly followed traditional styles and features. At this time, the funnel window pattern on jewelry had not yet been influenced by a wide range of cultural trends and maintained its original form and style.

From the 1980s to the end of the 20th century, with the deepening of reform and opening up, the economy and society of Suzhou underwent great changes, which had a profound impact on jewelry design. This study delves into how the element of the funnel window was reinterpreted and integrated into jewelry design in different social contexts (1970s to 1980s and 1980s to 1990s) during this period, and analyzes in detail the changes in artistic style and cultural connotations that took place during this process.

Entering the 21st century to the present, this study further subdivided this phase into two parts. On the one hand, it delves into the impact of Suzhou's sustained economic development on the application of funnel window design in jewelry, and analyzes how economic prosperity has driven the continuous innovation and development of funnel window elements in jewelry design. On the other hand, this study also focuses on the innovation and change of the funnel element in jewelry design over time, and takes the adjustment of the administrative division of Suzhou as a time point to explore how the funnel element can achieve innovative and sustainable development and inheritance in modern jewelry design.

Through this study, we are able to gain a more comprehensive understanding of the application and evolution process of Suzhou's traditional funnel window elements in contemporary jewelry design, as well as the cultural, artistic and social factors involved in this process. This is of great significance in promoting the innovation and development of jewelry design, as well as protecting and passing on traditional cultural elements.

1.4.3 In addition

Based on the perspective of skill integration, this paper provides an in-depth analysis of the funnel window production technology and jewelry craftsmanship between the similarity, and discusses how to integrate these two crafts with each other in order to realize the mingling of tradition and modern innovation. Through market segmentation and audience research, this paper analyzes in detail the recognition of the funnel window element in the jewelry market and its future market potential. In terms of exploring the cultural value, this paper, with the help of the theoretical frameworks of anthropology and culture With the theoretical framework of anthropology and cultural studies, this paper discusses the importance and uniqueness of the funnel window in Suzhou's local culture, and studies how to convey this cultural feature to more people through jewelry design. The paper also examines how this cultural feature can be conveyed to a wider audience through jewelry design. At the design and application level, we plan to organize a In addition, at the level of design and application, it is planned to organize an exhibition to showcase jewelry designs that incorporate the funnel window element and to collect feedback from industry experts and the public to guide subsequent design practice. The feedback from industry experts and the public will be collected to guide the subsequent design practice. A series of research and practice aims to inject new creative inspiration into the field of jewelry design, and at the same time to contribute to the traditional Suzhou jewelry design.

A series of research and practice aims to inject new creative inspirations into the field of jewelry design, and at the same time provide new ideas and methods for the inheritance and development of traditional Suzhou funnel window culture.

1.5 Research Methodology

This study utilizes a combination of qualitative and quantitative research methods to explore in depth the historical development of the leaky windows in Suzhou Garden and its connection with social change. Through precise data collection and analysis, it provides strong evidence and solid support for the scientific use of leaky window elements in modern jewelry design.

1.5.1 Population and Sample

1. Population:

(1) Jewelry designers: professionals who focus on jewelry design, especially those who incorporate Chinese or Suzhou characteristics in their designs.

(2) Jewelry manufacturers and artisans: Jewelry manufacturers and artisans were selected as the study sample. These manufacturers and artisans should have professional knowledge and skills related to jewelry making and knowledge of the elements of gewürztraminer.

(3) Jewelers and sales channel practitioners: a number of jewelers and sales channel practitioners are selected as samples in the study. These practitioners may be retailers, wholesalers, or salespeople on e-commerce platforms.

(4) Consumers: especially those who buy or are interested in local culturally specific jewelry.

(5) Cultural and art experts: especially those who are familiar with Suzhou culture and history.

2. Samples:

(1) Design samples: collect actual jewelry samples or design sketches that combine Suzhou window elements with jewelry design.

(2) Questionnaires: design questionnaires for consumers and jewelry designers.

(3) Literature: Including books, articles, and research papers on Suzhou windows and latticework.

(4) Interview records: records of in-depth interviews with jewelry designers, consumers and experts in culture and art.

1.5.2 Instrumentation

A variety of methods, including field surveys, in-depth interviews, detailed observations and systematic questionnaire surveys, were used to gain a comprehensive understanding of the current status and needs of the instrumentation. 1.5.3 Data Collection

Information was mainly collected through literature research. Literature data were mainly obtained from research publications, professional journals, and the archives of local governments and local museums. In October 2023, we conducted a field survey in Suzhou City to document the design characteristics, material choices, and architectural integration of traditional Suzhou leaky windows in a comprehensive and detailed manner. Interviews with local architects, artists, and jewelry designers in Suzhou were conducted to obtain reliable information on the design and cultural perspectives of funnel window elements. We also visited famous gardens, ancient buildings and museums in Suzhou to investigate the use of the funnel window element in contemporary jewelry design and its evolution.

In February 2024, through a questionnaire survey, we studied young consumers' preferences for jewelry products that incorporate traditional cultural elements and conducted an evaluation survey of jewelry pieces based on the funnel window element. These data collection efforts provide a comprehensive and in-depth perspective for us to understand the application of traditional Suzhou funnel window elements in contemporary jewelry design.

1.5.4 Data Analysis

(1) Image analysis: use computer-aided design (CAD) software or imageprocessing tools to analyze the collected images of pane windows, including their forms, patterns, and details, for geometric measurements and analysis.

(2) Data organization and in-depth analysis: comprehensively organize the collected literature and archives, use content analysis to systematically summarize and analyze the relevant information to ensure the accuracy and completeness of the research.

(3) Survey and interview data analysis: use statistical software to organize and analyze the collected questionnaire survey and interview data.

(4) Analysis of Jewelry Design Works: analyze the collected jewelry design works featuring the elements of latticework, including aesthetic analysis, form and function analysis, as well as material and process analysis.

(5) Analysis of market research and sales data: analysis of collected market research and sales data, including market trend analysis, consumer behavior analysis, and market share analysis.

Through the comprehensive use of these data analysis methods and techniques, in-depth analyses of the relationship between traditional latticework and contemporary jewelry design in Suzhou, Jiangsu Province can be conducted. These analyses can reveal the potential value, innovation direction, and market application of latticework elements in jewelry design. In addition, the data analyses provide reliable evidence and conclusions to support further exploration of the theory and practice of jewelry design featuring latticework elements.

1.5.5 Research presentation

(1) Thesis and jewelry design: descriptive and statistical analysis of the full text, accompanied by a series of jewelry design works.

(2) Research outputs: aimed at submitting research papers to international academic journals included in the Scopus database.

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1.6 Concept, Theory and Conceptual framework

Leaky Window and Contemporary Jewelry Design Innovation and Cultural Inheritance



Figure 1 Research framework (Self-drawn)

1.7 Literature Review

The process of globalization has promoted the fusion of traditional and modern elements in the field of design, which is particularly significant in jewelry design. This fusion is not only reflected in the pursuit of aesthetics, but also a profound reflection of cultural heritage and innovation. The unique element of Chinese ancient architecture, the funnel window, is now emerging in modern jewelry design. As a part of ancient architectural art, the funnel window not only carries rich historical and cultural connotations, but also presents unique aesthetic value. Although the research on the funnel window element in the field of architecture has achieved certain results, its application in the field of jewelry design is still relatively small, and there is a huge space for development.

Introducing the funnel window element into modern jewelry design not only gives the work a unique cultural flavor, but also is a powerful inheritance and innovation of traditional culture. This kind of cross-border fusion design is expected to bring new creativity and inspiration to the jewelry industry, and promote the development and progress of the design field. Contemporary jewelry design is increasingly incorporating traditional elements, aiming to tap into cultural connotations and design features, reflecting the market's strong demand for originality and cultural significance. At the same time, as consumers' demand for cultural and personalized products continues to rise, the clever integration of traditional elements into jewelry design has gradually become an important trend in the market. This not only satisfies consumers' pursuit of unique and personalized products, but also helps to inherit and promote traditional culture, and realize the perfect combination of jewelry design and culture and art. Although there are challenges between respecting tradition and innovation, research on how this innovation affects the market and cultural heritage still needs to be deepened. It also provides a useful exploration of the modern inheritance of traditional culture. This research not only promotes design innovation, but also strengthens our understanding and dissemination of traditional cultural values.

Based on the aforementioned background, this study comprehensively reviews and analyzes the relevant literature, and thoroughly explores the application of the funnel window element and its value in modern jewelry design, aiming to provide innovative inspiration for the field of jewelry design, and at the same time, promote the in-depth understanding and wide dissemination of traditional Chinese culture. In recent years, the international design field has shown great interest in the application of traditional cultural elements in modern product design, especially in the field of jewelry design, and this trend is increasingly obvious. Take the funnel window element as an example, it originated from a unique decorative art of ancient architecture in China, which is rich in cultural connotation and embodies numerous aesthetic values. Since the beginning of the 21st century, the concept of integrating the funnel window element into jewelry design has been highly concerned by designers and scholars, and has gradually become a major hot spot in the field of jewelry design research, and has achieved a series of meaningful research results.

Nowadays, the integration of traditional culture into jewelry design has gradually become a significant trend. With its unique aesthetic value and deep cultural heritage, Chinese flower window art has attracted the attention of many designers. As Wang Siqi (2020) explains in her article "The Application of Chinese Flower Window Art in Jewelry Design", the use of the funnel window element in modern jewelry design shows us a way to perfectly integrate traditional culture with modern design style. She emphasizes the importance of combining traditional culture and modern design, and advocates that only through the integration of the funnel element into jewelry design can we create works with both deep cultural heritage and modern aesthetic qualities. This viewpoint brings a new perspective to modern jewelry design, and gives new life to traditional art in the modern context. However, the multiple interpretations and applications of the funnel window element in different cultural contexts have not been fully explored in her article.

As an outstanding representative of traditional Chinese architectural art, the funnel window element contains rich cultural connotations and unique aesthetic qualities. Applying it to jewelry design requires designers to deeply understand its traditional heritage and organically integrate it with modern aesthetics to present design masterpieces that maintain traditional charm and have a modern flavor. This application not only reflects the designers' respect and inheritance of traditional culture, but also highlights their innovative spirit in the design process. By skillfully combining tradition and fashion, jewelry design shows a unique charm, which not only inherits the cultural essence, but also meets the modern aesthetic trend. This article has set up a model of organic integration of traditional culture and modern design for us. In modern jewelry design, we should continue to explore and skillfully integrate more traditional Chinese elements into the design to enhance the artistic value and cultural connotation of jewelry. At the same time, we also need to make it clear that the integration of traditional culture is not a simple imitation, but an

innovation based on a deep understanding of tradition, so that traditional culture can be revitalized in modern design.

In her study "The Use of Metaphor in Jewelry Design from a Cultural Perspective", Eddie Xie (2018) comprehensively analyzes the key position of cultural factors in jewelry design, with special emphasis on the role of metaphorical techniques. She advocates that metaphor is not only a means of artistic expression, but also a link between tradition and modernity, culture and fashion. Through this technique, designers retain traditional elements while giving jewelry a modern aesthetic and unique charm. She also emphasized that culture is the source of inspiration for metaphors, while metaphors are the physical presentation of culture in jewelry design. This viewpoint further highlights the central position of cultural factors in jewelry design, and she calls on designers to dig deep into cultural connotations and skillfully integrate them into their designs. Through metaphorical means, designers not only enhance the artistic value of jewelry, but also strengthen consumers' sense of cultural identity.

Eddie Xie also discussed the application of traditional culture in jewelry design, and said that combining traditional culture with modern design is an important way to enhance the artistic value and aesthetic taste of jewelry. At the same time, she also pointed out the current lack of empirical research in this field, and called for more scholars to pay attention to this field to provide more theoretical support and practical guidance for jewelry design.

In response to this situation, Eddie Xie proposes a new research perspective, that is, to dig deeper into the cultural elements in jewelry design, in order to give new vitality and meaning to traditional culture. Although there are limitations in the empirical study, its theoretical viewpoints are still enlightening and of reference value. Future research can expand on this basis and strengthen specific case studies of design practice to provide more reference for the innovative development of jewelry design.

In her 2016 study, Traditional Architectural Style Jewelry Design Based on Product Symbol Research, Liu Yitong delves into the use of cross-border elements in jewelry design, focusing on the fusion of technology and art in the field of architecture, which provides innovative insights into jewelry design. She provides an in-depth analysis of symbolic features in jewelry design, such as identification, narrative and symbolism. The study focuses on the application of traditional Chinese architectural elements in jewelry design, especially the element of the leaky window, and explores its potential and use in design. By combining traditional architectural elements with modern jewelry design, a unique design approach is demonstrated. The study of the funnel window element not only highlights the aesthetic value of traditional culture, but also provides a new source of inspiration for modern jewelry design.

This study highlights the key role of traditional elements in modern design, delves into how these elements can be applied to jewelry design in innovative and symbolic ways, and brings new design concepts to the industry. Liu Yitong provides an in-depth interpretation of the historical and cultural values of traditional elements and discusses their use in modern design. This study is not only limited to theoretical discussion, but also verifies the feasibility of the theory through design practice. However, while focusing on specific traditional elements such as the leaky window, the extensive exploration of other traditional elements is relatively insufficient. Despite studying the application of symbolic elements, more case studies and market feedback may be needed for further improvement in terms of empirical research.

Ding Youqiao's (2022) study, "The Application of Traditional Chinese Funnel Window Elements in Modern Product Design," comprehensively describes the practical application of traditional Chinese funnel window elements in modern design and their far-reaching significance. The study analyzes the specific performance and value of the funnel window elements in modern product design from four dimensions: decorative patterns, personalized functions, diversified shapes and cultural context. The study not only provides an in-depth interpretation of the traditional funnel window elements, but also puts forward an innovative design concept, which provides a new perspective for modern product design.

The integration of the funnel window element not only provides rich creative inspiration for modern design, but also deepens the cultural heritage of the product. This integration not only demonstrates the harmony and integration between tradition and modernity, but also highlights the unique value of traditional culture in modern design. In terms of in-depth study of cultural connotation, this article deeply analyzes the cultural value and artistic charm of the leaky window element. In terms of exploring innovative applications, the article puts forward the innovative path of combining traditional elements with modern design. These research results are important revelations for guiding actual product design and enhancing its cultural connotation and aesthetic value. Of course, there are also shortcomings in exploring the market acceptance and commercial application potential, and there is a lack of empirical research data on the effect of the actual application of leaky window elements in modern design. Future research can further explore the market potential and practical application effect of the leaky window element on the basis of the existing foundation, in order to promote its wider application and in-depth development in modern product design.

The integration of the leaky window element provides rich creative inspiration for modern design, while enhancing the cultural heritage of the product. This integration not only reveals the harmonious coexistence and intermingling between tradition and modernity, but also emphasizes the unique value of traditional culture in modern design. In terms of digging deeper into the cultural connotation, this article analyzes the cultural value and artistic charm of the leaky window element. In terms of exploring innovative applications, the article puts forward the innovative path of combining traditional elements with modern design. These research results are of great significance in guiding actual product design and enhancing its cultural connotation and aesthetic value. However, there are certain deficiencies in exploring the market acceptance and commercial application potential, and there is a lack of empirical research data on the effect of the actual application of leaky window elements in modern design. Future research can further explore the market potential and practical application effect of the leaky window element on the basis of the existing foundation, in order to promote its wide application and in-depth development in modern product design.

In terms of research methodology, case analysis, historical inquiry and design experiment are mainly utilized. Through in-depth exploration of the historical origin, artistic characteristics and evolution of traditional window elements in different periods, in order to more accurately grasp the core meaning of window design. The experimental design projects focus on how to innovatively integrate these elements into modern product design while maintaining their cultural values and aesthetic qualities.

This study illustrates the core position of the funnel element in jewelry design, which injects a new visual experience and aesthetic perception into the art of jewelry, and at the same time plays an active role in cultural inheritance and innovation. Through the use of the funnel window element, it gives jewelry design a unique cultural heritage and depth, making it not only a decorative object but also a cultural expression. The organic combination of traditional elements and modern design concepts expands new creative space and market opportunities for jewelry design. The study emphasizes that how to maintain the original flavor of traditional elements, innovatively integrate them into modern design contexts, and how to balance artistic value and commercial value are still topics that designers and researchers need to explore in depth.

These studies have made us realize that the use of funnel elements in modern jewelry design is not only a design trend, but also a way of cultural dialogue. It brings new observation perspectives and challenges to the field of jewelry design, and at the same time points out the direction for future research and practice.

In the current field of jewelry design, the use of the funnel element has attracted extensive attention from jewelry designers around the world, and has become a key research topic. Research shows that this application not only gives rich cultural connotation to jewelry design, but also demonstrates modern aesthetic qualities, which meets the urgent needs of the community for the integration of traditional culture and modern design. However, the existing research is still insufficient in exploring the diverse interpretations and applications of the funnel window element in different cultural contexts. On the one hand, designers' understanding of traditional culture needs to be further deepened to prevent the application of window funnel elements from being too superficial; on the other hand, the consideration of modern aesthetic diversity is not comprehensive enough, which limits the innovation of design.

This phenomenon shows that although the application of funnel elements in jewelry design has received widespread attention, we still need to pay attention to the in-depth study of the diverse interpretations of funnel elements in different cultural contexts and the development of empirical research. In addition, we should focus on empirical analysis to verify the relevant theories through specific design cases. At the same time, we also need to expand the application of the funnel window element in other product design fields other than jewelry design. This will help launch more masterpieces that integrate traditional cultural elements with modern design, enhance the artistic value of the products, and deepen the public's knowledge of and respect for traditional culture.

Future research should pay more attention to the innovative application of leaky window elements in cross-cultural contexts, as well as combining theoretical research with market feedback to enhance the practicality and market relevance of design. Thus, while maintaining cultural depth and artistic value, jewelry design can find wider application and recognition in the modern market. Traditional cultural elements such as the funnel window have been skillfully integrated into modern jewelry design and have shown impressive results. Against the background of changing modern aesthetic concepts and globalized cultural exchanges, we still need to continue to deepen our research and innovative practices. Through continuous research and experimentation, the use of traditional cultural elements in modern design will become more exquisite and extensive.

1.8 Benefit of Research

1.8.1 The core objective of this study is to explore how traditional cultural elements such as historical beliefs, structures and colors can be combined with modern jewelry design to achieve organic integration. The study will explore the cultural connotations of these elements and their modern transformations in depth, and then apply these traditional cultural elements to the field of jewelry design and provide a way to pass them on.

1.8.2 This research emphasizes the historical importance and commercial opportunities of traditional Chinese cultural elements. The study focuses on how to skillfully integrate the decorative elements of traditional art and jewelry design into the modern context, in order to realize the protection of traditional culture and at the same time to explore its new value in the modern market, and thus to promote the adaptive development of traditional culture.

1.8.3 Selecting the traditional culture of Suzhou as a case study, this research integrates traditional elements with modern design concepts, showing a wonderful symbiosis of tradition and modernity. Through this innovative method, it expands a new path for the inheritance and development of traditional culture, and at the same time lays a solid foundation for the construction of a national brand culture rich in regional characteristics.

1.9 Definition of Terms

Suzhou, Jiangsu Province: Located in the eastern part of China's Jiangsu Province, Suzhou is a renowned historical and cultural city. It is highly regarded for its unique classical gardens, exquisite traditional architecture and rich cultural heritage.

Cultural Heritage: This concept covers tangible and intangible assets of profound historical, artistic or scientific value, which have been handed down from past societies and cultures, and which not only reflect our historical heritage, but also serve as a revelation and responsibility for the future.

Modern Jewelry Design: This term refers to the practice of jewelry design that utilizes modern design concepts, materials and technologies, and combines or reflects the aesthetics, social culture and technological advances of the current era.

Leakage Window Element: Leakage window, also known as translucent carved window, is a common decorative element in China's traditional architecture. It mainly adopts wooden carvings, and through fine carving into various patterns of window panes, it not only plays the function of ventilation and light transmission, but also has a high artistic ornamental value.

Traditional Culture: It means the cultural elements accumulated and passed down in the historical evolution, such as art, handicraft, architecture, language and custom, etc., which together constitute the cultural foundation and spiritual characteristics of a certain region or nation.

Inspiration: In the practice of art and design, inspiration is often interpreted as innovative thinking and creative drive drawn from daily life, nature, history or various cultural phenomena.



CHATER II

Literature Review and Related Information

In the context of globalization, cross-cultural exchanges and modern interpretations of traditional art together constitute the core driving force of innovative thinking. The funnel windows of Suzhou gardens, as a remarkable example of architectural art, continue to provide a rich source of inspiration for contemporary design innovation. This study provides an in-depth exploration of the aesthetic qualities and historical changes of window funnels, as well as their application and innovative practice in modern jewelry design. Through combing the historical evolution of the funnel window element and interpreting its cultural connotations, the study highlights its important position in the history of Chinese art, and further explores its value reinvention in modern design. The study pays special attention to the integration strategy of the funnel window element in modern jewelry design, emphasizing its far-reaching impact on cultural change and innovation. By exploring the historical evolution of the funnel window element, the study reveals the interplay between traditional culture and modern design, providing useful inspiration and motivation for the inheritance and innovation of cultural heritage.

2.1 Historical and cultural background of the leaky window element

Leakage window, as a bright pearl of traditional Chinese architectural art, has a long history, and its development and evolution can be traced back to ancient times. Early leaky window form design is mainly practical, in order to meet the needs of the building ventilation and lighting at the same time, cleverly protect the privacy of the occupants of the space. Although its stone and wood carving patterns are simple, but has fully demonstrated the unique charm of China's ancient architectural aesthetics.

In the Song Dynasty, the design of the window lattice became more and more exquisite, known as the "leaky window". It not only optimized the indoor lighting and ventilation environment, but also enhanced the overall aesthetic flavor of the building. The design of the leaky windows in this period profoundly embodied the beauty of simplicity and naturalness, harmony and balance pursued by China's ancient architecture, and demonstrated the exquisite skills and outstanding achievements of the Song Dynasty architectural art.

In the prosperous period of the Ming and Qing Dynasties, the high degree of socio-economic development and cultural richness and colorful for the leaky window technology and design concepts provide a strong support to promote its continuous progress, and ultimately achieve artistic splendor. During this period, the design pattern of the funnel window is complex and varied, deeply rooted in auspicious symbols, such as auspicious clouds, bats and other patterns, full of deep cultural flavor. Despite the impact of Western culture, the funnel window, with its unique cultural symbols and architectural value, still firmly occupy an important position. In places such as Suzhou, leaky windows continue to attract the attention of modern designers and artists with their profound cultural connotations, becoming a model of the perfect fusion of tradition and modernity. (As shown in table 1)



Dynasty	Stylistic Features	Artisanal Techniques	Cultural Symbolism
Han Dynasty	Minimalist lines with stone carvings	Fundamental hand- carving techniques	Pursuit of natural harmony, ancestor worship
Sui-Tang Era	More complex Buddhist elements and patterns emerged	Advanced techniques, greater use of wood	Blending of religion, demonstrating its ties to everyday life
Song-Yuan Period	Emphasis on poetic and symbolic, delicate natural landscape modeling	Detailed carving focus, emergence of varied artistic styles	Reflecting the spirit of scholars, influence of Confucian, Daoist, and Buddhist cultures
Ming-Qing Era	Popular auspicious motifs like dragons, phoenixes, and bats, with more elaborate styles	Advanced carving techniques, innovative patterns and designs	Display of status and wealth, rich in symbolism
Contemporary Period	Combining modern aesthetics with traditional patterns, diversified forms	Modern manufacturing technologies such as laser cutting, diversified materials	Fusion of tradition and modernity, cultural diversity and innovative expression

Table 1 Evolutionary History of Lattice Window Elements

Against the backdrop of the global emphasis on traditional craftsmanship, the funnel window element has taken on a whole new vitality and value in the field of modern design. Designers are actively exploring the possibilities of combining funnel elements with modern design concepts, while respecting traditional craftsmanship. In jewelry design, modern architecture, digital art and other fields, the fine patterns and unique shapes of the funnel window have been innovatively presented, which not only meets the modern aesthetic demand, but also inherits the deep cultural connotation. This design concept of integrating tradition and modernity has given the funnel window element a new positioning and development space in modern design.

Modern design draws inspiration from the colorful classifications and shapes of leaky windows. From bracket type to auspicious cloud type, these various types of window funnels not only show unique aesthetic value, but also deeply embedded in the spirit of traditional Chinese culture. With their unique forms and styles, they provide a wealth of reference and inspiration for modern design.

Leaky windows, as an outstanding representative of classical Chinese architecture, not only plays an important role in the architectural structure, but also carries a profound traditional culture and unique aesthetic concepts. Its historical development highlights the continuous inheritance and evolution of Chinese culture, and under the trend of globalization, the application of leaky windows emphasizes the urgency of the protection and inheritance of traditional cultural heritage. Looking to the future, the exploration and application of leaky windows in the field of modern design will continue to make a unique contribution to and inspire the exchange between tradition and modernity, and between Eastern and Western cultures.

2.2 Application of cultural elements in modern jewelry design

In the field of modern jewelry design, cultural fusion has gradually become a significant trend. This fusion not only enriches the design connotation, but also makes the jewelry works in the cultural depth and aesthetic value has been significantly improved. According to the latest market data, the global jewelry market demand for jewelry rich in cultural elements continues to rise, further confirming the importance of traditional culture in contemporary design and market potential. According to statistics, the global jewelry market will be valued at approximately US\$269.19 billion in 2022 and is expected to climb to US\$518.9 billion by 2030, growing at a CAGR of 8.5%. This growth reflects consumers' love for jewelry pieces that blend traditional culture with modern design concepts, opening up new opportunities and market space for the application of traditional culture in the field of jewelry design.

The rapid changes in technology and the diversification of consumer demand go hand in hand, and the jewelry industry is also facing the challenge of integrating traditional and modern design concepts. Against this backdrop, consumers are interested in jewelry that combines traditional flavors with modern innovations. This trend not only highlights the key role of traditional cultural elements in enhancing the value and competitiveness of jewelry brands, but also highlights the in-depth exploration and flexible application of artistic elements by jewelry designers in a multicultural context. Designers have skillfully integrated traditional cultural essences such as Indian mandala design and Celtic jewelry into modern jewelry design, which not only enriches the cultural connotation of jewelry works, but also makes it an important medium for connecting different cultures. (As shown in Figure 2)



Figure 2 Series of jewelry featuring Chinese lattice window designs, mandala brooches, and Celtic jewelry (Source: Online)

The Metropolitan Museum of Art has curated an exhibition of contemporary jewelry, centered on the rare collection of Donna Schneier, that exemplifies this trend. The exhibition brings together the work of 88 outstanding designers from 19 countries around the world, who combine artistic elements with jewelry design in a breathtaking display of innovation. Curator Jane Adlin presents a comprehensive view of the creative evolution of interior art jewelry since the 1960s through a selection of more than 130 pieces. Among them, Myra Mimlitsch-Gray's knuckle rings and other works are a perfect fusion of jewelry art and personalized design concepts, becoming an outstanding representative of culture and modern craftsmanship and technology, fully demonstrating the unique charm and infinite possibilities of jewelry art. Jewelry designers' in-depth excavation and clever use of traditional cultural elements not only meets consumers' expectations for personalized and customized jewelry, but also enriches the cultural heritage of jewelry works, further enhancing the value and competitiveness of jewelry brands. (As shown in Figure 3)



Figure 3 Series of jewelry with Chinese lattice window designs, mandala brooches, and Celtic ornaments (Source: Internet)

The "Wish Fulfilling" emerald and diamond ring, a masterpiece of the Yewn brand, is a perfect blend of traditional elements and modern design ((As shown in Figure 4). The ring skillfully presents traditional motifs in three-dimensional and diversified forms, and with the help of advanced technologies such as 3D printing and laser cutting, the traditional elements are brought to life in modern times. The ring not only breaks the boundaries of time and space, but also connects the wearer's inner world with the external environment, bringing a profound cultural experience to the wearer. This combination of traditional and modern design concepts has injected new vitality into the jewelry market and gained wide recognition.

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Figure 4 Top left and right: "Ruyi" ring worn by First Lady Michelle Obama (Image source: Online, photo provided by Yewn) Bottom right: Lattice window in Suzhou's Humble Administrator's Garden (Source: Internet, photo by Cao Wenrong)

Therefore, the clever integration of the funnel window element into modern jewelry design not only helps to protect and innovate the traditional cultural heritage, but also is a perfect fusion of modern design concepts and advanced craftsmanship. This combination across generations enriches the artistic expression of jewelry design and injects new vitality into the inheritance and development of global culture. At the same time, it will also continue to lead the innovative trend of jewelry design that intermingles traditional culture and modern design, and promote the continuous prosperity and development of the market.

2.3 Exploring the Integration and Value of the Leaky Window Element in

Contemporary Design

Delving deeper into the innovative application of the leaky window element in the field of modern design, we find that it has gradually become a link between classical aesthetics and conte mporary innovation. Although originating from the traditional aesthetics of ancient architecture in China, the element of leaky window has found new forms of expression and resonance in the works of designers around the world, realizing a cross-century fusion. This fusion not only highlights the rich cultural connotation, but also inherits and promotes traditional Chinese culture, and demonstrates designers' excellent skills and balanced grasp of traditional and modern aesthetics. Nervous System, an innovative brand created by Jessica Rosenkrantz and Jesse Louis-Rosenberg, showcases the fascination of interdisciplinary fusion. They skillfully seek inspiration from biology, computer science and mathematics, abstracting patterns and processes from the natural world and translating them into the concrete practice of jewelry design through 3D printing. Although Nervous System's ideas do not stem directly from the funnel window, their design concept echoes the modern interpretation of natural elements and the use of new technologies with the modern interpretation of the funnel window in jewelry design. This design concept embodies the universal principle of drawing inspiration from traditional aesthetics and realizing creative expression through modern technology. (As shown in Figure 5)



Figure 5 Jewelry designs by Nervous_System (Source: Internet)

The transformation of the funnel window is not only limited to the reshaping of the visual surface, but also deeply embodies the in-depth understanding and innovative reconstruction of the rich cultural connotation and unique aesthetic pursuit behind it. The designers used advanced technologies such as laser cutting and 3D printing to give new forms of expression to the funnel window, while skillfully integrating modern colors, materials and forms into the design, realizing the modern interpretation and inheritance of the traditional spirit of the funnel window.

This fusion of culture and technology promotes the global audience's deep understanding of and respect for traditional Chinese culture, and contributes to the maintenance and development of the world's cultural diversity. Modern design innovation has made the element of leaky windows not only limited to traditional Chinese architecture, but also become a link between different cultural backgrounds and promote cultural exchanges and shared language. Therefore, modern designers' use of window funnels is not only an innovative transformation and inheritance of traditional Chinese cultural heritage, but also an in-depth exploration of modern design concepts and technical practices. This perfect combination of tradition and modernity, science and technology and art not only gives contemporary jewelry design a constant source of creative inspiration, but also makes a significant contribution to the inheritance, innovation, cross-cultural understanding and respect of cultural heritage.

CHAPTER III

Study and Analysis of Lattice Window Elements

This chapter analyzes in detail the core position of the leaky window in China's traditional garden architecture and its profound significance. As a model of garden art, the funnel window is highly regarded for its unique decorative and artistic qualities. This chapter comprehensively organizes the various forms, sizes and functions of the funnel window, elaborates its development through historical clues, and reveals the evolutionary trajectory of the lattice window in terms of aesthetics and practical functions. It further explores the application of the funnel window in the field of modern design, especially in modern jewelry design, and examines the ways in which traditional and modern elements are fused, emphasizing the important value and significance of traditional elements in contemporary culture.

3.1 Morphological analysis of the leaky window element

3.1.1 Overview of leaky windows

Windows, as the core constituent elements of China's traditional garden architecture, can be divided into various types such as long windows, half windows, empty windows, crosswind windows, support windows, leaky windows, lattice windows, scenic windows and so on, according to the differences in their forms, sizes and functions (As shown in Table 2). Among these window types, the leaky window stands out with its unique decorative, artistic flavor and spatial expressiveness, and has become an exemplary work showing traditional Chinese garden art.

Table 2 Types and Characteristics of Windows in Traditional Chinese Garden Architecture

Type of window	Characteristics	Function/Application	Style
Long windows, characterized by their extended length	Classified by length, these windows are longer	Enhance indoor lighting and extend visual space	
Half windows, shorter in height	Windows with shorter height	Suitable for areas with limited space	
Open windows without solid sashes	Open-style windows without solid panels	Offer ventilation or light while preserving visual openness	
Cross-ventilation windows, for air circulation	Windows that open horizontally to facilitate ventilation	Promote air circulation, improve indoor climate	

Brace windows, removable or movable	Windows that can be dismantled or moved	Suitable for varying needs for ventilation or illumination	
Leaky windows	Windows that feature distinctive decorativeness and a sense of art	Enhance the aesthetics and appreciation of space	
Yow windows, small windows typical in ancient buildings	Small-sized windows often seen in historical architecture	Provide supplementary ventilation or lighting	
Scenic windows, designed for viewing landscapes	Specially designed for landscape viewing	Enhance the environment and improve the quality of space	

Leakage windows, also known as leakage windows, are wall windows with a specific airy design. These windows are finely arranged in spaces with limited views, such as the walls of garden corridors or partition walls. As an important element of classical garden architecture, the main function of the leaky window is light and ventilation. There are designers cleverly use the window leakage pattern, not only to enhance the visual and spatial hierarchy of the garden, but also through careful planning, so that the wall scenery, such as pavilions, flowers and trees, rockery and bamboo, etc., hidden and hidden, virtual and real. With the passage of time, the leakage window gradually developed into both practical and aesthetic window. It not only has the basic function of the window, but also into the deep aesthetic interest and connotation expression. Therefore, the leaky window has become one of the important strategies for garden landscape creation, especially in the Jiangnan gardens have been widely used, and become a unique artistic architectural form in the region. 3.1.2 Historical evolution of leaky windows

The historical development and evolution of the funnel window, originating from the far-reaching development of China's classical gardens, its long history can be traced back to three thousand years ago. According to historical records, the initial form of the leaky window first appeared in the Han Dynasty pottery on the narrow high window design, when the design style is still simple and rustic. With the continuous improvement of architectural craftsmanship in the Jin and Yuan Dynasties, the design forms of leaky windows were gradually enriched, such as fanshaped windows and latticework with geometric patterns carved in the window holes, which demonstrated the unique aesthetics of ancient people's motifs and craftsmanship. These designs not only reflect the concepts of nature, feng shui and harmony between heaven and earth, but also present the unique style and characteristics of the patterns and structures of the window cores of the funnel windows in various eras in the process of cultural fusion, craft innovation and religious penetration. The specific content is shown in Table 3

Dynasty	Central Window Patterns	Pattern Regularity	Style
Sui Dynasty	Flowers, animals, and figures	Strong symmetry	
Tang Dynasty	Natural elements, animals, plants	Symmetrically balanced	
Song Dynasty	Delicate natural beauty, detailed patterns	Central or axial symmetry	
Yuan Dynasty	Meaningful characters and symbols	Central symmetry	
Ming Dynasty	Intricate and diverse relief or openwork patterns	Balanced symmetry	
Qing Dynasty	Continued Ming style, with increasingly complex designs	Balanced symmetry	and the second s

 Table 3 Historical Evolution and Development of Lattice Window Styles

3.1.3 Aesthetic properties of the leaky window

Leakage window, as a brilliant treasure of China's classical garden art, condenses the wisdom and craftsmanship of the ancients. With its unique form, subtle structure, hierarchical layout and harmonious order, it gives a rich artistic connotation to the garden space. Leaky window is not only a unique architectural element in classical gardens, but also an embodiment of the ancient people's supreme pursuit of the harmonious coexistence of nature and artifice.

In terms of formal aesthetics, the leaky window presents the charm of harmonious integration of morphological elements. Its ingenious design, including the location of the point, the smoothness of the line, the distribution of the surface, the composition of the block, as well as the matching of colors, have been carefully planned and reasonably arranged to give the funnel window a unique and rhythmic appearance. Funnel window form elements in the design process to follow strict aesthetic guidelines, so that each funnel window has a distinctive personality, showing a unique form of beauty.

In terms of the sense of rhythm, the leaky window design shows a high degree of craftsmanship, which skillfully integrates the dynamic rhythm into the static aesthetics of the garden space. Through the multi-dimensional visual effect of the solid wall and the change of perspective, the leaky window makes the garden space
produce a visual sense of flow, creating a diversified visual enjoyment for visitors. At the same time, the sparse and dense distribution of the leaky windows on the wall creates a sense of rhythm of ups and downs, which makes the garden space seem to be full of note-like rhythms.

In terms of hierarchical beauty, the leaky window with its unique combination of real and virtual technology, skillfully breaks the monotonous white wall entity, giving the garden space a rich sense of hierarchy and deep visual experience. This technique makes the scenes in the Jiangnan garden echo each other, intermingle with each other, and show a clear and exquisite picture within the limited window frame.

In terms of the beauty of order, the leaky window can be called a model of the ancient pursuit of harmony and unity of aesthetics. Its visual aesthetics and connotation of expression, are shown with the natural environment and the harmonization of the surrounding environment. This concept is deeply rooted in Confucianism, especially Confucius emphasized the "unity" aesthetics, highlighting the visual beauty and the unity of virtue and good deeds, as well as the form and content of the unity of coordination.

In short, the leaky window has a crucial position in the classical garden, thanks to its unique aesthetic qualities, including the beauty of form, rhythm, hierarchy and order. Each of these qualities has its own flavor, and through the mutual support and internal logic between the elements, to get a comprehensive and in-depth display. Therefore, an in-depth study of the leaky windows helps us understand the essence and unique value of classical garden art. A comprehensive interpretation of the aesthetic characteristics of window funnels will help us better appreciate and pass on this precious cultural heritage.(As shown in Figure 6)



Figure 6 Suzhou Garden Lattice Windows (Image source: Internet) **3.1.4 Richness of morphological characteristics**

As a treasure of ancient garden architecture in China, the funnel window is regarded as an outstanding example of traditional architectural art with its unique design concept and excellent production technology. Its form is rich and diverse, fully demonstrating the ancient craftsmen's superb skills and rich cultural connotations. After years of precipitation, the funnel window design is still full of vitality, changing forms, exuding a long-lasting charm. Geometric patterns are regarded as one of the key elements in funnel window design. Researchers and designers have always been passionate about the logic and patterns inherent in such patterns. Geometric patterns create patterns with both charm and form by abstracting and generalizing many concrete things in nature, or form new patterns with both aesthetic value and application effect through regular repetition of basic geometric shapes.

Through the use of compositional principles such as repetition, superposition, decomposition, etc., the geometric pattern of the leaky window builds a rich visual language and unique aesthetic experience, which further enhances the artistic charm of the leaky window. This geometric modeling is mainly reflected in the design of the window frame and core. According to the "garden rule" records, the leaky window frame shape of the Ming Dynasty is rich and varied, including basic geometric shapes and regular shapes after topological changes, such as rectangles, squares, circles, hexagons, octagons, fan shapes and so on. The funnel window patterns also include some irregular natural shapes, such as begonia pattern, shell leaf pattern, vase shape and so on (As shown in Figure 7). These designs not only show the ingenuity of the designers, but also reflect the deep heritage of China's traditional culture. (Ji Cheng, 1988)



(A) Lattice Window Frame Design(B) Lattice Window Core DesignFigure 7 Lattice Window Design Elements (Self-drawn)

This paper is devoted to an in-depth discussion of the core element in jewelry design, i.e. the window core, the main part of the leaky window. According to historical data, the window core patterns in Suzhou gardens are unique and rich in variety, exceeding one hundred kinds. These patterns can be divided into two categories: geometric and natural, including geometric patterns such as Wanzhi pattern and rectangular pattern, and natural patterns such as bamboo joints, tortoiseback pattern, fish scales, plum blossoms, and so on. These patterns through the "even, balanced, interspersed, proportionate, repeated, four-way continuity" of the arrangement of combinations, the formation of auspicious patterns, together shaping the leakage of the window core modeling. This symmetrical and continuous pattern design, both stable and simple, and has a strong visual impact, giving a sense of rhythm and extension of the space. The diverse core patterns of the funnel window make it an important source library of geometric shapes. From the perspective of graphics, scholars dig deeper into the aesthetic laws embedded in the geometric patterns of the window cores, and further explore the pattern aesthetics conveyed by the leaky window modeling.

The morphological features of the funnel window not only demonstrate the ancient craftsmen's deep understanding of the beauty of nature, but also highlight their unique way of skillfully integrating natural elements into their designs. They were adept at drawing inspiration from nature, integrating the beauty of nature, such as landscape, flowers and birds, into the form of the funnel window, making it not only functional, but also full of artistic aesthetics (As shown in Figure 8). This design concept of "learning from nature" makes the form of the window appear vivid and natural, full of vitality. At the same time, it also reflects the ancient craftsmen's design concept of pursuing harmony and symbiosis, and regarded the harmony and unity between man and nature, architecture and environment as the highest state of design, demonstrating their unique understanding and pursuit of harmonious aesthetics.



Figure 8 Evolution of Lattice Window Patterns from Simple Natural Elements to Landscape and Flora/Fauna Stages

The morphology of the funnel window is an important part of the ancient garden architecture, which contains rich cultural connotations and far-reaching symbolic meanings behind it. The different forms of these funnel windows not only demonstrate the exquisite skills and profound knowledge of ancient craftsmen, but also convey the core values and aesthetic orientation of traditional culture. As a precious resource of traditional architectural art, the funnel windows provide us with a unique perspective for in-depth exploration and appreciation of traditional architectural art.

After comprehensive analysis, we find that as a key element of ancient garden architecture, the diversity and uniqueness of its morphological features fully demonstrate the outstanding talent and profound artistic cultivation of ancient craftsmen. At the same time, these leaky windows also reflect the ancient craftsmen's design concept of pursuing harmonious coexistence with the natural environment and ultimate beauty. This design concept has far-reaching historical value, which has a positive revelation effect on modern architectural design.

Therefore, an in-depth, systematic and comprehensive study of the morphological characteristics of leaky windows will help us understand and appreciate the charm of traditional architectural art more deeply. At the same time, it will also provide valuable reference and inspiration for modern architectural design and promote innovation and development in the field of architectural design.

3.1.5 Material and technology innovation

The material evolution of the leaky window, from the initial natural stone, wood, and gradually developed into brick and tile and other materials, this historical change not only witnessed the spirit of the times and the innovation of craft technology, but also reflects the progress of material science and technology. This process not only reflects the enhancement of human's pursuit of aesthetics, but also shows the thoughtful consideration of environmental adaptability. In the early days, the design of leaky windows mainly relied on natural materials, giving them a primitive beauty and cozy texture. With the development of technology, the application of new materials such as bricks and tiles makes the production process of the leaky window more diversified and the pattern design more regular and complex, further enhancing its artistic value.

In recent years, the application of advanced technologies such as laser cutting, computer numerical control (CNC) engraving, three-dimensional (3D) printing, has greatly promoted the innovation and development of the design and production process of leaky windows. Laser cutting technology with its high precision and high efficiency, to achieve the complex pattern of accurate cutting, so that the edge of the window is more delicate, more delicate pattern.CNC engraving technology has the advantage of fine engraving on all kinds of materials, can accurately present the designer's creativity and conception.3D printing technology is the application of the three-dimensional modeling, for the leakage of the window innovative design provides unprecedented possibilities. Provides unprecedented possibilities for the innovative design of leaky windows. The application of these advanced technologies not only improves the efficiency and precision of the design and production of the funnel window, but also enriches its artistic expression and cultural connotation.

These technological innovations not only improve the accuracy and aesthetic value of the funnel window design, but also lay the foundation for the modern inheritance and globalization of the funnel window culture. With the help of advanced technology, the traditional elements of the funnel window are renewed in modern jewelry design, realizing the perfect fusion of traditional art and modern technology, and creating jewelry masterpieces with traditional flavor and full of modern atmosphere.

In the deep historical and cultural heritage, the funnel element plays an important role. This study intends to integrate the traditional elements with modern jewelry design to explore its unique artistic charm. With the help of modern technology, the traditional funnel elements are interpreted in contemporary times and revitalized. This combination is not only the inheritance of ancient skills, but also the embodiment of the contemporary value of traditional culture in the context of globalization, which further highlights the far-reaching influence and lasting charm of the funnel window culture.

3.2 Symbolism and cultural connotation of window elements

As a core component of classical Chinese garden architecture, the leaky window contains rich and far-reaching cultural connotations. It not only embodies the excellent architectural skills, but also the integration of ancient Chinese civilization, philosophy, aesthetics and other ideas. The window has become a window to explore the ancient people's understanding and pursuit of nature, universe and life. For example, the design of funnel windows often incorporates natural elements such as plum blossoms, bamboo and gourds, which highlights the high praise and eagerness of the ancients for the beauty of nature. At the same time, the funnel window also carries the philosophical thinking of the ancients, such as "unity of heaven and man" and "forgetfulness of things", which reveals the important qualities of Chinese culture and has far-reaching cultural value.

In the article "Modern Jewelry Design Inspired by the Leaky Window Element in the Traditional Culture of Suzhou, Jiangsu Province, China", a systematic analysis is made on how the leaky window element can be transformed beyond its original architectural use into a cultural symbol and an aesthetic element. With the innovative approach of modern jewelry design, these elements are reinterpreted and skillfully used, aiming to not only pass on and promote traditional Chinese culture, but also to let these traditional elements show new charms and meanings in contemporary society. (As shown in Table 4)

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Lattice Window Design Pattern	Pattern Name	Extraction	Transformation	Application	Effect Image
	Crabapple Pattern				

 Table 4 Application and Refinement of Lattice Window Elements in Traditional

 Culture

Modern jewelry designers are adept at drawing on the symbolic connotation of the funnel element and combining it with contemporary aesthetics to create a rich and unique jewelry art. For example, the cloud necklace symbolizes life's colorfulness and unlimited potential, while the lotus ring symbolizes the purity and steadfastness of love. This kind of jewelry not only shows the material beauty, but also carries the cultural heritage and individual emotional expression. Through an in-depth analysis of several modern jewelry design cases, we are able to appreciate the ingenious use of the funnel element in modern design.

Further research reveals that the symbolic meaning and cultural depth of the funnel element has provided a constant source of creative inspiration for modern jewelry design. Comprehensive understanding and exquisite integration of these traditional elements can not only create jewelry masterpieces full of traditional Chinese aesthetic charm, but also enable them to play the role of a cultural bridge across time and space, bridging the East and the West. Such designs not only enrich the expression of jewelry art, but also enhance the global understanding and appreciation of traditional Chinese culture, making a positive contribution to the inheritance and development of this unique cultural heritage.

3.3 Analyze the application of leaky window elements in modern jewelry design

In the scope of contemporary jewelry design, the clever integration of the funnel element not only reflects the depth of exploration of China's traditional culture, but also highlights the designers' innovative ideas. The application of this element makes the jewelry design maintain the deep historical heritage at the same time, releasing a different light of innovation, and bringing new vitality to the field of modern jewelry design.

3.3.1 Integration of innovation and tradition

In the field of contemporary jewelry design, many designers have taken the geometric forms, flora and fauna, and symbols of traditional funnel elements and combined them with modern design concepts to develop innovative interpretations and presentations of these elements. They have skillfully incorporated cloud patterns, lotus flowers, dragons and phoenixes into a variety of jewelry designs, including earrings, necklaces, bracelets and rings. This design approach not only preserves the aesthetic qualities of traditional patterns, but also gives the jewelry a modern aesthetic appeal, showing the pursuit of aesthetics that transcends time.

For example, the cloud pattern element is presented in jewelry design with smooth lines, symbolizing freedom and change, bringing the wearer a light and dreamy visual enjoyment. Lotus pattern jewelry often adopts an open design, symbolizing purity and new life, exuding an elegant and noble temperament. Jewelry with dragon and phoenix motifs are displayed through fine carving and inlay, symbolizing auspiciousness and dignity and highlighting the profound connotation of oriental culture. In modern jewelry design, designers are committed to exploring the connotations of traditional motifs such as plum blossoms, orchids, bamboo and chrysanthemums. Plum blossom represents the strong and unvielding spirit, orchid symbolizes elegance and purity, bamboo symbolizes perseverance, and chrysanthemum symbolizes autumn harvest and indifferent to fame and fortune. These motifs not only enrich the visual effect of the jewelry, but also convey a beautiful vision and meaning for the wearer.

When designing jewelry using the plum, orchid, bamboo and chrysanthemum motifs, designers need to skillfully combine traditional elements with modern aesthetics. Through exquisite carving skills, these motifs are presented on the jewelry in a subtle way, so that it retains the traditional flavor, but also has a modern sense. Such jewelry pieces not only show the charm of traditional culture, but also become a unique expression of the wearer's taste and personality. They not only have deep cultural connotation and unique artistic value, but also are a perfect combination of traditional culture and modern craftsmanship. (As shown in Figure 9)



(A)Pendant with Cloud Motif (B)Ring with Lotus Design (C)Necklace Featuring Plum, Orchid,Bamboo,and Chrysanthemum Motifs

Figure 9 Jewelry Designs Using Lattice Window Elements(Image source: Online, with the Plum, Orchid, Bamboo, and Chrysanthemum image sourced from a winning entry in the Little Red Book Jewelry Design Competition) The innovative approach of fusing traditional elements with modern design not only injects new vitality into the art of jewelry, but also satisfies modern consumers' reverence for traditional aesthetics and pursuit of fashion trends. This design concept combines traces of history, cultural depth and aesthetic height, and continues to provide an inexhaustible source of innovation in the field of contemporary jewelry design. At the same time, the use of advanced technological processes, such as precise laser engraving technology and 3D printing technology, opens up new creative possibilities for jewelry production. The application of these technologies allows jewelry works to retain their traditional exquisite charm while displaying a distinctive modern style. The extensive use of technology not only breaks the boundaries of traditional craftsmanship, but also provides designers with a broader space for innovation, which strongly promotes the sustainable development of the art of jewelry design.

3.3.2 Application of material innovation in modern jewelry design

In modern jewelry design, the material use of funnel window elements presents a new innovative trend. Designers no longer rely only on traditional metal materials, such as gold, silver, copper, etc., but boldly try and introduce a series of advanced materials, such as titanium, ceramics, polymers and bio-based materials. The introduction of these new materials not only enriches the visual effect of jewelry, but also significantly improves its wearing comfort and durability. Designers have skillfully combined traditional funnel elements with modern materials to create unique jewelry pieces that meet modern aesthetic concepts. The innovative use of this material not only broadens the application of the funnel element in jewelry design, but also enables modern jewelry design to better meet the aesthetic and practical needs of modern people.

Titanium has shown its unique advantages in the field of jewelry design with its light texture, excellent strength and excellent corrosion resistance. As a result, jewelry pieces inspired by the funnel element combine long-lasting durability with a lightweight wearable experience. The addition of ceramics gives the jewelry a unique texture and color, giving the funnel motif a more delicate and warm visual effect. The transparent or semi-transparent nature of the resin brings a dreamy expression to the jewelry, making the funnel pattern more vivid and bringing a unique artistic enjoyment to the wearer.

The rapid development of science and technology promotes the wide application of high-tech materials in daily life. Carbon nanotubes, as one of the best, has become a shining star in the field of jewelry design with its excellent physical and chemical properties. Its strength far exceeds that of steel, while its weight is only onesixth of steel, a unique property that greatly enhances the stability of jewelry structures. In addition, the conductivity of carbon nanotubes opens up a whole new realm of innovation in jewelry design, such as shaping unique visual aesthetics or realizing luminescent effects, thus enriching the artistic expression of jewelry.

Optical fiber, as a superior light-conducting material, is able to conduct light precisely. In jewelry design, the application of optical fibers has injected new vitality into the expression of works. Designers cleverly embedded it in jewelry, through precise control of light propagation, creating a unique light and shadow effect, thus enhancing the artistic connotation and aesthetic value of the work. Meanwhile, optical fiber is also innovatively applied to temperature-sensitive jewelry. When the wearer's body temperature rises, the jewelry will emit a fascinating light, and this interactive design not only adds interest, but also highlights the charm of art.

Driven by the concept of environmental protection, biodegradable materials are also attracting attention. This material has the characteristic of being naturally decomposable, which can reduce the burden on the environment and at the same time satisfy consumers' demand for environmental protection. By adopting biodegradable materials, the jewelry industry has realized a new mode of sustainable development, providing new possibilities for promoting the green transformation of the industry. (As shown in Table 5)

Material	Characteristics and Advantages	Advantages in Jewelry Design	Styles
Titanium	Lightweight, exceptional strength, excellent corrosion resistance	Enhances structural stability, provides a lightweight wearing eperience	
Ceramics	Unique texture and color	Gives lattice window patterns a delicate and warm visual effect	
Resin	Transparent or semi-transparent properties	Creates a fantastical visual effect, making lattice window patterns come alive	
Carbon Nanotubes	Very high strength, lightweight, conductivity	Improves structural stability, may achieve glowing effects, enhances artistic expression	
Optical Fibers	High light transmissibility, flexibility, durability, lightweight, safety	Creates dynamic lighting effects, enhances visual appeal, offers diverse design possibilities and environmental attributes	
Biodegradable Materials	Naturally decomposable, reduces environmental burden	Meets environmental demands, supports sustainable development in the jewelry industry	

Table 5 Types of Jewelry Design Materials

In the above chart materials, we can observe that with the development of technology, the demand for materials in the field of jewelry design is also evolving. Jewelry designers have adopted these high-tech and new materials and integrated them into jewelry design works, thus significantly enhancing the visual performance and wearing comfort of jewelry, while broadening the field of design innovation. These measures not only meet the modern people's aesthetic pursuit of jewelry, but also meet the practical needs, demonstrating the forward-looking and contemporary

characteristics of jewelry design. Therefore, the use of high-tech materials for jewelry design has brought about a revolutionary change, which not only improves the stability of the structure and visual aesthetics, but also provides designers with a wealth of creative inspiration and possibilities. It also predicts that future jewelry design will show a more diversified, environmentally friendly and innovative development trend.

3.3.3 Inheritance of cultural connotation

In-depth analysis of the morphological characteristics and material technology of the leaky window element in jewelry design aims to discover the cultural connotation of these elements and their innovative use in modern design. Incorporating the funnel element into jewelry design not only highlights the unique charm of traditional Chinese culture, but also promotes this valuable cultural heritage to the world. Consumers wearing this kind of jewelry incorporating the funnel element not only highlights the unique personal taste, but also inadvertently expresses the respect and love for traditional Chinese culture, showing the cultural confidence and deep cultural heritage.

In the field of jewelry design, designers have begun to skillfully incorporate the funnel element, successfully building a cultural bridge through time and space, connecting the essence of the arts of the East and the West. This innovation not only deepens the wearer's emotional connection with the rich traditional culture of the Chinese nation, but also allows people around the globe to feel the far-reaching influence and timeless charm of Chinese culture. This has injected new vitality into the promotion of cultural diversity and the protection of world cultural heritage. It is worth noting that Russian jewelry designer Ilgiz Fazulzyanov has become an outstanding representative of this fusion and innovation. His works are deeply nourished by traditional Russian culture, while actively absorbing international cutting-edge design concepts and technologies. He skillfully integrates the element of funnel window into jewelry design, and through hollowing, inlaying and other techniques, he shows a strong Russian flavor and Chinese elements. These jewelry works are not only of high artistic value, but also an embodiment of the designer's indepth thinking about cultural inheritance and innovation. ((As shown in Figure 10)



Figure 10The 'King of Enamel' - Jewelry design work by Ilgiz Fazulzyanov, a Russian jewelry designer (Image Source: Internet)

Under the perspective of innovative design, the fusion of the long-established funnel window element with modern jewelry craftsmanship not only highlights the harmonious symbiosis between tradition and modernity, but also pushes the essence of Chinese culture to the world stage. This thousand-year-old architectural element, with its unique perspective aesthetics and deep philosophical connotation, gives jewelry design its soul. When these jewels are worn on people, they become a walking cultural messenger, telling the story of the ancient East and conveying the long-lasting cultural values. The spread of the design concept strengthens the emotional bond between the wearer and the Chinese culture, and stimulates interest and curiosity in Chinese culture worldwide. It has also gradually prompted people to pay more attention to those cultural heritages that still shine through time, and to explore the stories and wisdom hidden behind the ancient buildings. This not only promotes the development of cultural diversity, but also injects new vitality into the preservation of the world's cultural heritage.

In the field of design, many designers are committed to researching the possibility of combining traditional elements with modern design to create masterpieces rich in cultural heritage and artistic value. These works not only expand people's aesthetic horizons, but also inject new vitality into the inheritance and innovation of traditional culture. Under the trend of globalization, it is even more necessary for us to make use of this way to promote the exchange and integration of different cultures, and jointly advance the progress and development of human civilization.

As a decorative detail in the traditional Chinese architectural system, the element of leaky window carries rich cultural connotation and aesthetic pursuit. Its application and exploration in modern design not only expresses the interaction and dialogue between traditional and modern, oriental and western aesthetics, but also highlights the designer's in-depth understanding of cultural heritage and innovation. By skillfully using the element of leaky windows, designers perfectly combine traditional architectural aesthetics with modern design concepts to create a series of creative and artistically infectious works, injecting new vitality into the field of modern design.



CHAPTER IV

Data Analysis in Modeling

This chapter provides an in-depth analysis of the integration of the funnel window element and its application strategy in modern jewelry design. The funnel window element, as a brilliant treasure of China's traditional architectural art, carries a rich historical and cultural heritage and is highly praised in the field of architecture for its unique aesthetic value. Based on modern design concepts and technical means, this study aims to perfectly combine the traditional charm of the funnel window element with the innovative concepts of jewelry design, and create artistic masterpieces that not only inherit the classical beauty, but also lead the fashion trend.

4.1 Experiment on the application of leaky window elements in contemporary

4.1.1 Experimental design and analysis

The fundamental goal of this experiment is to deepen the understanding of the practical application of the funnel window element in modern jewelry design, as well as to analyze its impact on consumer perception and preference. In view of the deep cultural heritage and aesthetic value of the funnel window element in traditional architecture, we focused on exploring how to skillfully integrate this element into modern jewelry design in order to conform to the aesthetic trend of modern consumers.

In order to ensure the accuracy of the experimental data and the convenience of operation, we comprehensively used a variety of research methods such as questionnaire survey, eye tracking and visual presentation. The questionnaire comprehensively covered several key elements of jewelry design, such as style, material, color and price, etc., while paying special attention to consumers' views and preferences on the application of leaky window elements in jewelry design.

The experiment was conducted in two stages:

Phase 1: 101 target consumers were randomly selected for questionnaire survey. The purpose of this phase was to find out their preference for funnel window elements, their purchase intention, and their evaluation of different design indicators (e.g., shape, size, material, etc.) in jewelry design. The questionnaire was designed to focus on assessing consumers' aesthetic evaluation of the funnel window motif and its acceptance in jewelry.

Phase 2: Based on Phase 1, a comprehensive and in-depth statistical analysis of the collected data was conducted. The goal of this phase was to deeply analyze consumers' specific views on the funnel window element, assess its actual effect in jewelry design, and the impact of this design style on purchasing decisions. Through careful analysis of the data, we were able to identify which designs were most likely to inspire consumers to buy, and the trade-off between aesthetics and practicality. At the end of the experiment, we analyzed the data collected to ensure the accuracy and reliability of the findings.

Through a series of rigorous experimental design and execution, we aim to provide detailed and specific references for subsequent jewelry design, so as to rationally use the leaky window element, and at the same time, grasp the market dynamics and consumer demand, so as to further promote the innovation and application of traditional elements in modern design. The results of the experiment will also provide data support for jewelry marketing strategies, optimize product promotion and positioning, and ultimately achieve the modern transformation of cultural value and maximize commercial value.

4.1.2 Survey results and conclusions

In the exhaustive survey and analysis of 101 target consumers (As shown in Figure 11), we have come to a clear conclusion: the middle-aged consumer group aged 36-45 years old has shown great enthusiasm for the funnel window element jewelry design. Consumers in this age group usually have strong economic strength and mature aesthetic concepts, and they tend to choose jewelry products that can show their personal taste and are rich in cultural connotations. This result is not only in line with our expectations, but also further confirms our precise positioning of the target market.

In-depth data analysis reveals that natural elements such as flowers and animals are popular in jewelry design, reflecting consumers' general love of natural beauty. Meanwhile, artistic styles and architectural features, especially the funnel window element, are also favored by consumers. This indicates that consumers have a high degree of acceptance and identification with jewelry designs that incorporate traditional cultural and artistic elements. This preference implies that jewelry designers who incorporate these elements in the creative process will help attract and satisfy the target market.

On an economic level, most respondents indicated that they are willing to pay extra for jewelry that incorporates traditional cultural elements, and this premium usually ranges between 10% and 25%. This phenomenon reveals the high value consumers place on the cultural and historical values that jewelry carries. The results of this study not only meet our expectations, but also provide a strong basis for market positioning and pricing strategies for jewelry products, especially in the high-end jewelry market segment.

The questionnaire survey showed that the majority of consumers highly valued the use of funnel elements in jewelry design. They believe that these traditional elements not only enhance the overall aesthetics of jewelry, but also give it a deeper cultural connotation. The unique texture and design style of the funnel elements injected a new visual impact into the jewelry pieces, allowing traditional and modern elements to coexist harmoniously in the design. This finding further emphasizes the innovative potential and market appeal of traditional elements in modern design. Of course, there is also feedback from some consumers pointing out that modern designs with leaky window elements can inspire their desire to buy, especially when these designs can highlight personalized and differentiated features. Therefore, jewelry designers need to constantly explore how to combine the funnel elements with modern aesthetics in the process of innovative design to create jewelry products that retain the traditional flavor and meet the expectations of modern consumers. This discovery provides us with new research directions and market opportunities. In modern jewelry design, the funnel window element shows great market potential and wide consumer recognition. In order to further expand market share and enhance brand influence, jewelry brands and designers need to explore the specific needs and preferences of target consumers. On this basis, they should continue to innovate and improve the application of funnel elements in jewelry design to meet the diversified

needs of the market. These results not only confirm the effectiveness of the experimental design, but also provide new ideas and perspectives for future product development.

4.1.3 Strategy Recommendations and Market Application

On the basis of fully investigating the market questionnaire and experimental data, we put forward the following specific ideas and suggestions for marketing strategy and product development direction:

In terms of target consumer positioning, the experimental results emphasize the I

mportance of the 36-45 years old consumer group, which generally has higher consumption ability and mature aesthetic concepts. Therefore, in our marketing activities, we should focus on this age group and convey the unique value and cultural connotation of the leaky window element jewelry through social media, professional magazines and direct mail marketing.

In terms of product line development, given the widespread popularity of funnel elements, natural elements and artistic styles, we propose to launch a series of jewelry products that incorporate these elements. These designs could combine modern trends such as simple lines and intricate natural motifs (e.g. flowers, foliage and animal figures) with the traditional textures and shapes of the funnel element to appeal to consumers who are interested in both traditional and modern styles.

At the higher end of the product line, we propose a high-end product line, given that most consumers are willing to pay a 10-25% premium for jewelry that incorporates traditional cultural elements. Such products should emphasize superior craftsmanship skills and deep historical and cultural heritage, such as hand-carved funnel window motifs, as well as the use of new materials and high-value gold and gemstones. At the same time, a tiered pricing strategy should be implemented to meet the needs of consumers with different financial strengths and provide a wide range of product choices. It also allows for the setting of basic and deluxe models, with the basic models using economical materials and simplified designs, while the deluxe models use high-end materials and add intricate hand finishing touches.

In the promotion of culture and education, marketing activities should incorporate educational elements, and through in-depth analysis of the history and cultural connotations of the elements of the leaky window, strengthen the emotional connection and identification of consumers with the product. Workshops, exhibitions and interactive lectures can be held to allow consumers to experience the process of jewelry production, and then deeply understand its cultural heritage and artistic value.

In terms of customer relationship management, it is crucial to establish and maintain a long-term and stable relationship with target consumers. Using customer relationship management (CRM) systems to record customers' purchasing history and preferences, personalized marketing materials and exclusive offers are regularly sent to enhance customer loyalty and repurchase rates.

By implementing these strategies, jewelry brands will not only be able to meet market demands more effectively, but also enhance their brand image and market competitiveness, ultimately achieving the dual goals of cultural heritage and commercial success.

4.1.4 Experimental limitations and future perspectives

To address the experimental limitations and future trends of this study, we propose the following strategies. For the consumer group of 36-45 years old, the market strategy should be focused on, because they show a high concern for jewelry designs that incorporate elements of leaky windows. Consumers in this age group not only possess stable purchasing power, but also have more consistent characteristics in terms of cultural literacy and aesthetic tendencies. It is recommended to enrich the diversity of product lines, especially innovative jewelry designs that combine natural elements with funnel elements. Market research shows that nature and window elements are popular in the jewelry industry, so developing such products will help attract a broader consumer base. For consumers who are willing to pay a higher price for jewelry with deep traditional cultural heritage, we can develop a high-end customized product line to meet their demand for unique designs and superior quality.

To enhance consumer awareness and appreciation, we should deepen our cultural and educational activities, such as organizing cultural seminars, workshops and exhibitions, so that consumers can fully understand the historical background and artistic appeal of these elements. In this way, consumers' recognition and emotional connection to the product will be significantly enhanced. To maintain a long-term relationship with target consumers, an advanced customer relationship management (CRM) system is recommended. By collecting and analyzing data on customers' purchase history and preferences, personalized marketing messages and exclusive offers will be provided to increase customer satisfaction, loyalty and repurchase rate. This will help to better meet market demand, enhance brand image and market competitiveness, and realize cultural heritage and market development.

4.2 Introduction to design modeling methods

In the practice of modern jewelry design, the appropriate use of modeling software and techniques is essential to achieve precise craftsmanship requirements and aesthetic results. This section will provide an in-depth analysis of modeling tools and software commonly used in jewelry design, and examine their practicality and impact when implementing the concept of funnel design.

4.2.1 Modeling Software and Tools

Computer-aided design (CAD) software and 3D printing technology are pivotal in the field of jewelry design and manufacturing. These tools not only dramatically increase design accuracy and productivity, but also provide designers with ample platforms for design exploration before physical manufacturing. CAD software developed specifically for jewelry design is highly regarded for its ease of learning and efficiency. Equipped with professional JCAD/CAM functions, the software supports 3D printing and CNC machining, and can interface directly with factories to achieve a seamless transition from design to production. CAD software plays a key role in the design process of leaky window elements. It assists designers in accurately reproducing the complex patterns and fine lines of the funnel window, ensuring that the design details are perfectly presented. Designers can use CAD software to easily adjust the proportion and details of the window pattern and optimize the design to meet the aesthetic and technical requirements. These advanced modeling software and tools provide a broad innovation platform for jewelry designers. They enhance designers' work efficiency, expand design possibilities, and enable designers to explore and experiment in practice to create outstanding design works. Take MatrixGold 3D printing technology as an example, which continues to innovate in the field of jewelry design. The technology creates complex physical objects directly from digital models, greatly expanding the boundaries of design innovation and realization possibilities. For complex jewelry designs that contain leaky window elements, MatrixGold3D printing technology can accurately render the smallest parts of the design, especially at a level of detail that is difficult to achieve with traditional manual techniques. The designer first completes the design in CAD software and then exports it directly to a MatrixGold3D printer or Jewelry Rhino (As shown in Figure 12) for efficient realization of the design. In addition, designers can also use 3D printing technology to experiment with different materials and colors, such as special metal powders or resins, to create unique window leakage effects.





Figure 11 MatrixGold 3D and Jewelry Rhino software interfaces (Image source: Internet)

4.2.2 Modeling process

The jewelry design modeling process is a difficult task that requires patience and solid fundamentals on the part of the designer. The process covers a number of key aspects from the initial concept to the final product. Designers need to conduct indepth market research to understand current trends, consumer preferences and competitors' product features. This information provides designers with valuable inspiration and helps them to establish design themes and styles. For jewelry design involving the funnel element, designers need to study the history and cultural connotations of the funnel element, explore its aesthetic characteristics, and try to combine it with modern design concepts.

In the initial design conception stage, designers use professional handdrawing tools or digital software such as CAD to draw sketches. The goal of the sketches is to capture the basic form and structure of the elements of the funnel window and to ensure their coherence with the overall jewelry design. Often, the designer will propose multiple designs, each containing unique patterns, sizes and configurations, for subsequent evaluation and selection.

During the sketching stage, the designer maintains close communication with the client to ensure that the design is in line with market trends and meets the client's individual needs. Client feedback plays a key role in the design process and may prompt the designer to make adjustments and optimizations to the sketches several times to better meet the client's expectations and aesthetics. These modifications may include fine-tuning the pattern of the funnel, or optimizing the overall size and shape of the jewelry.

Through a series of progressive steps, the jewelry design modeling process ensures that the design is unique and innovative. At the same time, through continuous adjustments and optimization, the final product can accurately demonstrate the cultural charm and artistic value of the funnel window element, thus attracting the attention of modern consumers and satisfying their aesthetic and practical needs. (As shown in Figure 13)



Figure 12 Jewelry Design Modeling Process Diagram 4.2.3 Advantages and Limitations of Methods

In the field of jewelry design, computer-aided design (CAD) software, 3D printing technology, CNC engraving technology and laser cutting technology have increasingly become powerful tools for designers. The application of these advanced technologies not only greatly improves design speed and reduces production costs, but also opens up new possibilities for responding to consumer demand for personalized and customized services. However, their use also poses certain challenges, such as requiring designers to master more complex technical operations and potentially placing some limitations on innovative design freedom. The following is a further exploration of the advantages and limitations of these technologies(As shown in Figure 14):



The above analysis provides an in-depth discussion of the strengths and limitations of the four technologies (JCad software, 3D printing technology, CNC machining and laser cutting). The advantages of these technologies are mainly in terms of improved design accuracy and productivity, while their shortcomings are mainly in terms of cost investment, technical requirements, and scope of application. JCad software, for example, is well suited to complex design tasks because of its precise operating characteristics, but its use requires a certain degree of technical expertise. 3-D printing technology can quickly build complex structures, but the cost and choice of available materials may affect product quality and economic efficiency. time make it less advantageous for rapid prototyping or small-scale production. Laser cutting is well known for its high-speed and accurate cutting capabilities, but is primarily suited to flat materials and has high running costs.

Therefore, a number of factors such as design requirements, cost estimation and production scale must be considered when choosing the right technology. The rapid development of modern modeling techniques has brought significant convenience and innovation to the field of jewelry design, as well as a series of technical and creative challenges. Jewelry designers must respect traditional handcrafted arts and give full play to their personal creativity when applying these advanced technologies. By continuing to explore and innovate, designers can ensure that technology becomes an enabler of artistic creation rather than a shackle that limits its development. This spirit of balance and innovation will propel the art of jewelry design to continue to grow and prosper in the modern world.

4.3 Analysis of Modeling with Lou Window Elements

4.3.1 Selection of window elements

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It is a technically challenging task to use the funnel window elements and optimize their design in jewelry design. These elements not only enhance the visual appeal of the design work, but also carry the deep heritage of traditional culture in Suzhou, China. Screening leaky window elements that conform to geometric rules and can be accurately simulated by computer graphics algorithms provides a solid foundation for the innovation and production of jewelry design. Through fieldwork and online research, we selected more than 200 images of leaky windows from Suzhou's famous gardens, such as the Humble Administrator's Garden, the Liouyuan Garden and the Canglang Pavilion. All images were decolorized and converted into black and white images to eliminate the potential interference of color and material on morphological identification and to achieve a pure analysis of the morphology and spatial characteristics of the leaky windows. (As shown in Figure 15)

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Figure 14 Collection of Materials for Lattice Window Elements

The application of these patterns not only demonstrates the mastery of visual aesthetics, but also highlights the deep heritage and symbolism of Suzhou traditional culture. For example, the hexagonal pattern, which appears frequently in the design of Suzhou garden window panes, symbolizes the harmonious integration of heaven, earth and human beings, while the water ripple pattern conveys the dynamic qualities and life force of water. Each pattern is analyzed by precise mathematics and geometry, which not only follows the traditional compositional principles, but also can be accurately reproduced and understood by modern computer graphic technology, which is the core of the clever integration of traditional art elements and modern design language.

After a number of experiments and market research, we have selected a set of distinctive design elements for leaky windows. These elements are widely recognized in the field of computer-aided design, and their plasticity and adaptability are impressive. The selected elements not only give a three-dimensional visual effect and rich cultural connotation to the design project, but also build a subtle bridge between tradition and modernity, revitalizing the traditional art in a new and unique way, and visually displaying it in front of people's eyes.

4.3.2 Modern interpretation of traditional patterns

In the context of modern society, it is of great significance to make innovative interpretations of traditional leaky window patterns, a process that meets the needs of modern aesthetic concepts and reflects the value of technological progress. We use advanced computer-aided design (CAD) technology to digitize and refine traditional patterns to ensure that each design retains its rich cultural connotations while meeting the high precision requirements of modern design. When simulating complex textures such as ice cracks and ten-thousand character patterns, we pay special attention to maintaining the randomness and subtle variations of natural cracks in order to enhance the natural beauty and uniqueness of jewelry designs. At the same time, we use Polygon and Hexagonal cell tools to accurately shape and adjust the basic structure of the pattern to make it more in line with the symmetry and regularity of modern design, such as the design of hexagonal leakage windows commonly found in Suzhou gardens.The LunchBox operator provides designers with advanced functions such as pattern panning, zooming, rotating and so on, which enables designers to flexibly adjust the size and rotation of the pattern according to different jewelry design needs. needs, and flexibly adjust the size and shape of the pattern to realize the diversity and personalization of the design. In addition, through the application of Graph and Evaluate operators, we are able to simulate the dynamic flow characteristics of the water ripple pattern, transforming the beauty of nature into the dynamic structure of the jewelry design, and giving visual attraction and vivid motion performance to the final product.

In this study, the Voronoi calculator is applied to simulate complex patterns such as ice cracks and vanishing patterns. By simulating the random distribution characteristics of cracks in nature and accurately reproducing the staggered arrangement with precision, the Voronoi algorithm successfully endows the jewelry designs with unique natural aesthetics. (As shown in Table 6) Table 6 Analytical Modeling of Lattice Window Elements

Lattice Window Elements	Mathematical Rules and Structured Characteristics	Digital Modeling Tools
Ruyi Pattern (Curved Intersection and Symmetry)	Curved Intersection and Symmetry	Rhino, Grasshopper
I-shaped Pattern (Geometric Parallelism and Sequential Arrangement)	Geometric Parallelism and Sequential Arrangement	AutoCAD, T-Splines
Swastika Pattern (Spiral Expansion and Progressive Repetition)	Spiral Expansion and Progressive Repetition	3ds Max, V-Ray
Returning Pattern (Cyclic Symmetry and Continuous Pattern)	Cyclical Symmetry and Continuous Pattern	Illustrator, Rhino
WindmillPattern(DynamicSymmetryandFan-shapedExpansion)	Dynamic Symmetry and Fan- shaped Expansion	Blender, Zbrush
Begonia Pattern (Natural Growth and Branching Spread)	Natural Growth and Branching Spread	Maya, Mudbox
Water Ripple Pattern (Wave Rhythm and Streamlined Shape)	Wave Rhythm and Streamlined Shape	Houdini, CINEMA 4D

With the precise use of computer-aided design technology, the traditional funnel pattern can be transformed into a unique expression of modern jewelry design, thus highlighting its unique cultural value and visual appeal. This process fully demonstrates the precision and professionalism of the design, making each piece of jewelry unique in the market. For example, during the modeling stage, fine adjustments are made to the model to ensure the quality and aesthetic standards of the design. Through a series of carefully designed technical steps, we optimized the model of the funnel window element to bring each piece to a level of excellence in both practicality and artistry. These optimization measures included precisely adjusting the size and shape of the pattern, optimizing the harmonious integration of the pattern with other design components, and employing advanced 3D rendering techniques to enhance the three-dimensionality and visual impact of the design. After layers of screening and comprehensive optimization, we successfully selected representative and aesthetically unique elements of the leakage window and modeled them with precise computer-aided design software. These elements have been carefully processed in the digital transformation and modeling process, and become the link between traditional funnel window art and modern jewelry design. Their incorporation skillfully blends the essence of traditional culture with the requirements of modern aesthetics, bringing new creative inspiration and vitality to the field of jewelry design and providing a new driving force for innovation and progress in the industry.

4.3.3 Fine Optimization of Models

During the jewelry design modeling process, fine-tuning the model is crucial to ensure design quality and aesthetics. The leaky window element model is optimized through thoughtful technical means so that each piece achieves a standard of excellence in both utility and aesthetics. Optimization measures included precise control of pattern size and form, optimizing the integration of patterns with other design elements, and using advanced 3D rendering techniques to enhance the layering and visual impact of the design. Significant technical challenges were faced when working with complex design elements. In order to replicate the complex "leaky window" pattern, a specialized algorithm was developed that allows for precise manipulation and visualization stages in CAD software prior to final production. This method not only improves the accuracy of the design, but also optimizes the production process, ensuring that every detail of the pattern is accurately represented. The process of adjusting the size and shape of the pattern emphasizes the harmony between the details and the whole. In large jewelry designs such as pendants or bracelets, the funnel pattern is modestly enlarged to highlight its visual focal point and appeal. In more delicate designs such as earrings or rings, the pattern is minimized to ensure that the design is refined and aesthetically pleasing. In addition, according to the style and functional requirements of the jewelry, the pattern form is flexibly adjusted, using rounded edges to enhance wearing comfort, or using sharp lines to show the power and dynamism of the design.

Computer simulations are used to explore and evaluate various combinations. By combining elements such as gemstone inlay and metal texture, the overall design pursues visual and aesthetic harmony. The application of these techniques not only serves as the highlight of the design, but also mirrors other elements to create a unique and artistically infectious visual effect. To further enhance the visual impact of the design, advanced 3D rendering technology is also used to simulate the impact of different light sources and materials on the jewelry. This technical treatment provides designers with a rich sense of hierarchy and texture, which helps to better grasp the final effect of the product and make necessary adjustments and refinements to ensure that each design is presented in its best state.

Through a series of comprehensive optimization measures, not only were representative and uniquely aesthetic leakage window elements screened out, but these elements were also successfully and accurately modeled through computeraided design software, and given a high degree of design flexibility and plasticity. These elements are carefully processed in the digital processing and modeling analysis, and become the link between traditional funnel window art and modern jewelry design. The use of these elements successfully integrates traditional cultural connotations with modern aesthetic standards, injecting new creativity and vitality into the field of jewelry design. (As shown in Table 7)

Leaky Windov Elemen	v Legend ts	Shape	Visual Features	Structural Principles	Digital Modeling Tools
Cloud Pattern			Flowing Texture, Sense of Lightness	Seeking Balance between Repetition and Symmetry	CAD software
Water Ripple Pattern		~	Gentle Undulations of Ripples, Dynamic Softness	Wave Effect Simulation	Dynamic Modelling Tools
Swastik Pattern	a	-	Lines Intertwined, Rigorously Organized	Analysis of Linear Paths	Tools for Parametric Design
Ice Crae Pattern	ck		Random Distribution, Naturally Created	Crack Pattern Generation	Graphic Algorithm Simulation
Geomet Frame	ric	□-○-○-○	Variable Forms, Clear Boundaries	Edge Deformation Control	Digital Carving Machine

Table 7 Selection of Lattice Window Elements

"Leak" (Perspectiv e of Caves, Profound Space)	Cave Perspective, Profound Space	Spatial Penetration Effect	3D Rendering Technology
Sense of Layering	Varied Heights, Visually Rich	Hierarchical Structure Design	Visual Effects Software

4.4 Evaluation and optimization of modeling results

4.4.1 Preliminary Evaluation

After the initial modeling of the jewelry design, we place a high priority on the rigorous processing of the evaluation phase to ensure that the utility and aesthetics of each piece are of optimal standard. Central to this phase is the integration and implementation of expert feedback from Senior Jewelry Designer Li Xiao, who is renowned for her in-depth application of traditional funnel window elements in contemporary jewelry design. Li Xiao's insights provided key guidance for the design strategy, with particular emphasis on maintaining the integrity of the cultural elements while meeting modern aesthetic needs.

When evaluating models, Li Xiao emphasizes that the success of jewelry design lies in the respect for traditional elements and the clever integration of modern technology. She highlighted the application of 3D printing and CAD modeling technology, which allowed the complex leaky window pattern to be accurately reproduced in the jewelry design, ensuring a clean and modern design while dramatically increasing production efficiency. Accordingly, Li Xiao proposed adjusting the proportions of the design to better capture the delicate balance required for complex patterns, ensuring that the final product meets modern aesthetic standards while maintaining cultural integrity.

In addition to internal expert evaluations, feedback from target consumers was collected through market research, focus group discussions and online questionnaires. This feedback covered a wide range of aspects such as product aesthetics, practicality, comfort and price acceptance, providing us with a comprehensive view of the market. Based on Li Xiao's suggestions and market feedback, we made further adjustments to the preliminary model, including optimizing the pattern size and shape, as well as reconfiguring the harmonious combination with other design elements to enhance the market appeal of each piece.

During the overall evaluation process, we not only enhanced the practicality and aesthetic value of the designs, but also ensured that each piece accurately blended traditional cultural connotations with modern aesthetic needs. The design approach advocated by Li Xiao successfully demonstrates the perfect combination of tradition and modernity, injecting new energy and innovation into the field of jewelry design. This comprehensive evaluation and optimization process ensures that our designs not only pass on classic cultural values, but also satisfy the modern consumer's dual pursuit of aesthetics and functionality.

4.4.2 Problems and challenges

In the modeling practice of jewelry design, designers often have to deal with a series of complex problems that challenge their innovative thinking and demand high technical response skills. The main challenges include technical limitations, cost overruns, and mismatches between the design concept and the actual finished product.

Technical limitations are a challenge that cannot be ignored. While advanced technologies such as 3D printing and computer-aided design offer a wide range of design innovations, some delicate and complex ideas may be difficult to replicate accurately in the actual production process. Especially when designing pieces that contain fine geometric structures and delicate decorative elements, technological limitations can lead to minor deviations in detail.

Budget overruns are another common problem. Unique designs often require high-quality materials and fine craftsmanship, which can cause the actual cost of a project to exceed the pre-determined budget. Flexibility in managing and adjusting the budget is especially critical when attempting to use novel materials or innovative techniques. In addition, the difference in effect between the design concept and the final jewelry product is also a practical issue that designers must face. When a twodimensional design concept is transformed into a three-dimensional entity, it may not be able to fully achieve the desired visual effect due to the influence of the physical characteristics of the material, such as texture, color and weight. Therefore, designers need to consider these factors in depth and make adjustments accordingly in the early stages of design.

To address these challenges, we are constantly looking for innovative strategies. This includes researching new material synthesis techniques, improving production processes, and utilizing cutting-edge software tools for more accurate previsualization. Through these efforts, we aim to identify and resolve potential problems in advance, ensuring that the final jewelry piece is as close to the original design as possible, while at the same time managing costs and improving productivity.

4.4.3 Optimization Strategies

In implementing our jewelry design optimization strategy, we use computeraided design (CAD) software technology to address the technical challenges encountered during the design process, with the aim of significantly improving the design quality and usability of the final product. This technological enhancement not only improves design accuracy, but also enables extensive innovation at the level of complex details, further enhancing the product's competitiveness in the marketplace. We employ an algorithm designed specifically for jewelry design to accurately manipulate and visualize complex "funnel" patterns in a CAD environment, ensuring that these fine patterns are accurately reproduced in the jewelry while maintaining the design intent and aesthetic appeal. In addition, we utilize 3D printing technology extensively in our design process to dramatically increase the complexity and detail of our models, while enhancing production efficiency and precision. The application of this technology allowed us to experiment with different gemstone settings during the design phase and to innovatively and harmoniously integrate traditional elements within the leaky window frame. This integration of design and technological innovation has been highly recognized and acclaimed in the market.

In terms of product utility and user experience, we continue to explore and apply new materials while optimizing the production process. This strategy allows the designs to improve durability and lightness while meeting the aesthetic and usage needs of modern consumers. All improvements are made with the goal of ensuring that the details of each piece of jewelry meet the design specifications and that the products are of high quality and aesthetically pleasing. In terms of innovative design, we are constantly reviewing and updating our design concepts to ensure that each piece has a unique visual appeal and meets the practical needs of the user. Design concepts include the precise adjustment of jewelry sizes and the introduction of adjustable design elements, such as necklaces with adjustable chain lengths and retractable bracelets, to enhance product adaptability and comfort and provide consumers with more choices.

In short, through the application of innovative technology and strategic design, we not only solved the technical and cost issues faced in the early stages of modeling, but also enhanced the overall aesthetics and practical functionality of the jewelry. This comprehensive evaluation and optimization process ensures that our designs strike a perfect balance between artistry and practicality, meeting the modern consumer's pursuit of a high quality of life and setting a new benchmark for the jewelry design industry.

The following diagram presents a flowchart of the jewelry design modeling process in this chapter, illustrating in detail the various steps from idea gathering to final production. (As shown in Figure 17)



Figure 15 Flowchart of the Jewelry Design Modeling Process

CHAPTER V

Jewelry Design and Prototype Production

This chapter provides an in-depth exploration of the comprehensive process of jewelry design and prototype construction, focusing on the unique value of jewelry at the intersection of art and historical inheritance, and demonstrating the far-reaching impact of exquisite craftsmanship and cultural inheritance. The study analyzes in depth the breeding process of creative inspiration and the expansion of diversified thinking, and explains in detail how traditional elements can be skillfully integrated into modern jewelry design. Through three concrete examples of jewelry design, the study demonstrates the application of the funnel element in jewelry design, and analyzes the core role of prototyping and production techniques in the design process. The use of advanced technologies such as computer-aided design (CAD) and three-dimensional printing in jewelry design is further discussed, as well as how to effectively transform design concepts into exquisite physical works. This seamless integration of technology and art not only highlights the cutting-edge position of jewelry design in the evolution of technology, but also reflects a modern reinterpretation of traditional aesthetics.

5.1 Design concept and creative development

Jewelry, a high degree of integration of human art and culture, demonstrates exquisite skills and carries a rich cultural heritage. When designing jewelry inspired by traditional oriental elements, we seek to match the form, and at the same time, we are committed to exploring the deep philosophical concepts and aesthetics behind these elements.

The "Geometric Light and Shadow" series of jewelry designs, shown in Figure 18, combines modern geometric aesthetics with natural light and shadow elements, exploring the interaction between light and form in visual art, and providing a vivid aesthetic experience. Inspired by the interaction between light and shadow in nature, the series captures and reproduces the flow and changes of light and shadow through delicate geometric designs, presenting a unique visual rhythm and profound artistic connotation. In the design, the sharp contrast between black and gold creates a strong visual impact. The black base deepens the background level and makes the gold geometric lines more prominent, which not only strengthens the visual focus of the work, but also symbolizes the invisible intertwining of light and shadow in natural and architectural spaces. The gold lines reflect the surrounding light, and as the viewing angle changes, the brightness and color tones change slightly, just as natural light and shadow change over time. This series is a delicate exploration of the beauty of light and form, transforming abstract geometric beauty into wearable art through the fusion of modern technology and traditional craftsmanship. During the wearing process, the light and shadow effects of the jewelry interact dynamically with the wearer, bringing each piece to life.

This design is not only a challenge to materials and craftsmanship, but also a modern interpretation of traditional jewelry aesthetics. It elevates the traditional decorative art to a new realm of expressive and dynamic beauty, and is an innovative attempt to the concept of jewelry design, demonstrating the unique value of jewelry as a product of the intersection of art and technology.



Figure 16 Geometric Light and Shadow Series Jewelry Design

As shown in Figure 19, the Appendix Night Que jewelry collection is inspired by the quietness and beauty of the night in the ancient city, which is a perfect example of the fusion of Eastern and Western arts. The designer blends traditional oriental elements, such as cloud patterns and geometric motifs, with modern design concepts to create a unique visual and cultural effect. The collection inherits the essence of traditional culture in form, and enhances the visual appeal of the pieces through symmetrical and asymmetrical geometric structures. At the same time, the materials and craftsmanship demonstrate the mastery of fine jewelry making. The smooth lines and spiral structure of the cloud pattern visually present a dynamic aesthetic and symbolize the vastness and fickleness of the sky. In addition, the use of contrasting black and white color schemes gives the design a contemporary feel, making each piece a blend of classical charm and modern style.

In terms of detailing, each piece of jewelry in the Apprentice Night Que collection has been meticulously designed, combining traditional lacquer craftsmanship with modern laser cutting technology to ensure that every detail is accurately rendered, thus enhancing the overall sense of sophistication and artistic value. For example, the fine floral motifs adorning the center of the main piece, complemented by precise border lines, reflect the reverence and reproduction of natural beauty in oriental art. The design philosophy of the Rendezvous Night Que collection respects and inherits traditional culture while showcasing the innovative application of modern design techniques, providing the wearer with a choice of

jewelry that combines both aesthetic enjoyment and cultural value. This series is a deep understanding and exploration of the intersection of tradition and modernity, art and technology in the field of jewelry design.



Figure 17 Lan Shan Ye Que Series Jewelry Design

The design of the Moonlight and Shadow series (shown in Figure 20) originates from a deep understanding and absorption of China's traditional culture and natural phenomena. Taking "moonlight" as its creative source, the series draws on the changing light and shadow in the moonlit sky to present a perfect fusion of jewelry and culture and art. The core concept is to convey the tranquility and beauty of the moonlight rather than focusing too much on technology and materials. The designers skillfully use symmetrical and asymmetrical geometric forms to capture and reproduce the movement and static under the moonlight, creating a sense of visual flow and hierarchy. While ensuring the visual coherence and aesthetic harmony of the overall design, each piece showcases delicate lines and complex ornamentation. These motifs include both traditional cloud patterns and modern abstract forms, expressing the softness and freshness of moonlight through sophisticated design. The Moonlight Shadow collection not only embodies the aesthetic spirit of traditional culture, but also demonstrates the novel concepts of modern design.

The core design of this series is to integrate traditional elements with contemporary aesthetics through modern design techniques, rather than relying on advanced technology or complex craftsmanship. Yuehua Xuan Ying series is not only a series of jewelry, but also a cultural heritage and emotional expression, allowing the <image>

wearer to appreciate the beauty of aesthetics, while feeling the deep cultural heritage and artistic sentiment.

Figure 18Yue Hua Xuan Ying Series Jewelry Design

In the three series of jewelry designs, the funnel element not only continues its decorative function, but also transforms into a core element that conveys historical and cultural heritage and philosophical feelings. In the process of selecting and applying these classic motifs, we continue to explore the harmony and unity between traditional aesthetics and modern design thinking. By interpreting the funnel window pattern from a modern perspective and combining it with innovative design techniques, the jewelry work not only has a sense of the times, but also carries farreaching historical and cultural values. As a treasure of traditional Chinese architectural art, the funnel window element shows its unique charm in jewelry design. In addition, CAD design technology and 3D printing technology are used to accurately reproduce the delicate texture and unique texture of the funnel window pattern. The combination of traditional craftsmanship and modern technology not only enhances the artistic value of the jewelry, but also allows the classic beauty of the funnel element to be inherited. The use of the funnel element in jewelry design not only adds a deep cultural heritage to the jewelry, but also becomes a link between the wearer and traditional culture.

In the design process, the pursuit goes beyond mere aesthetics, but uses the selected materials and colors as a carrier for emotional and cultural exchange. The combination of rose gold and dark grey highlights the beauty of the colors and conveys the emotional connotation of warmth and elegance. This combination allows

the warm texture of rose gold and the modernity of dark gray to reflect each other, enhancing the contrasting effect and layering of the jewelry.

The design also emphasizes innovation in the choice of craftsmanship. On the basis of maintaining the traditional skeletonization technique, modern precision processing techniques such as laser cutting and electro-etching are introduced, making the lines of the funnel window elements more fluid and the details more refined. This attitude of excellence not only shows the designer's spirit of pursuing perfection, but also highlights the unique charm brought by the fusion of tradition and modern technology.

As a form of artistic creation, jewelry design demonstrates the integration of multiple disciplines, encompassing visual arts, material science, craft technology, and even psychology and cultural studies. In this process, designers are both cultural inheritors and emotional messengers. Through color matching, material selection and technological innovation, they infuse each piece of work with a deep and rich historical heritage and a unique and distinctive emotional value. The positive feedback from the market and the enthusiastic response from consumers also highlights the strong market demand for jewelry works that incorporate traditional cultural elements and modern design techniques. This not only affirms the designers' belief in pursuing excellence, but also inspires their passion for continuous innovation. We will further explore how design concepts and ideas can be transformed into concrete products, and how designers can improve their skills in the process of evaluating and improving prototypes, in order to put design concepts into practice and create jewelry artwork that touches people's hearts.

5.2 Techniques in Prototype Design and Production

In the whole process of jewelry design, from the concept formation to the physical display, the prototype design and production technology plays an important role. This stage requires designers to show their unique artistic imagination, and at the same time, they also need to have the ability to utilize modern technology and traditional craftsmanship. The following is a detailed analysis of the key technologies and techniques used in the prototyping process for the Geometric Light and Shadow Series, the Apprentice Night Series, and the Moonlight Shadow Series.

5.2.1 Geometric Light and Shadow Series: Fusion of Nature and Technology

The Geometric Light and Shadow series demonstrates a harmonious dialogue between nature and technology, combining inspiration from nature with advanced technology to create unique and charming jewelry pieces. The collection embodies the perfect fusion of technology and natural aesthetics, highlighting the harmony between modern craftsmanship and natural beauty. Through cutting-edge stereoscopic scanning technology, the subtle details of various forms in nature are captured, especially those geometric shapes rich in mathematical beauty. These natural elements are innovatively transformed into the core elements of jewelry design. Combined with high-precision 3D printing technology and laser cutting process, it not only improves the production precision of the works, but also enhances their visual effects, making each piece of Geometric Light Series unique and glamorous, radiating irresistible luster.

(1) Perfect combination of technology and creativity

In the geometric light and shadow series, advanced technology is fully reflected, realizing the organic integration of natural elements and modern technology. This series of works is not only full of innovative spirit, but also has high artistic value. Every aspect of the design process witnesses the perfect combination of technology and creativity, fully demonstrating the harmony and unity of natural beauty and modern craftsmanship.

High-precision stereoscopic scanning technology, one of the core technologies of the collection, is able to accurately capture the subtle textures and forms of the geometric patterns. This process is based on an in-depth understanding of natural aesthetics and is designed to maximize the intricate detail and vividness of nature. These finely captured natural textures can be accurately translated into specific elements of a jewelry design with the help of stereolithography (SLA) 3D printing, a technology known for its ability to achieve high-resolution and smooth surface finishes at a microscopic level, making it ideally suited for creating intricate openwork designs. This technique is chosen not only for its high productivity, but also for its ability to accurately reproduce the designer's creativity, thus dramatically enhancing the overall texture and aesthetics of the piece.

The Geometric Light collection also makes extensive use of laser cutting technology, which provides another layer of precision in jewelry manufacturing. Laser cutting is able to fine-tune extremely fine edges and intricate contours, which are essential for exquisite openwork designs. Its precision not only increases production efficiency, but also greatly enhances the sophistication and beauty of the finished piece. Each completed piece of jewelry demonstrates an unparalleled level of craftsmanship and finish.

By integrating these advanced manufacturing techniques, the Geometric Light Collection not only showcases the technological advancements in jewelry design and manufacturing, but also embodies the new trend in modern jewelry craftsmanship in the pursuit of a balance between artistry and technicality. The creation of each piece is a modern interpretation of the tradition of jewelry craftsmanship, demonstrating the perfect combination of technology and natural aesthetics.

(2) Integration of styling design and natural beauty

In the Geometric Light and Shadow collection, the artistic content of the jewelry pieces is deepened, thanks to its unique perspective on styling, which subtly interprets the aesthetics of nature. The collection does not limit itself to the imitation of natural forms, but uses artistic abstraction to transform the harmony and symmetry of nature into modern geometric forms. The result is a perfect fusion of natural beauty and artistic design.

Through the clever use of symmetrical and asymmetrical compositions, the design not only enhances the visual appeal of the work, but also broadens the scope of modern design language. This design approach infuses the jewelry pieces with the vividness of natural elements, while subtly blending the simplicity and uniqueness of modern aesthetics, so that each piece exudes a unique charm. Thoughtfully designed forms ensure a balance between harmony and dynamic tension, and both strict symmetry and innovative asymmetry touch the viewer's soul and evoke emotional resonance.

This collection not only demonstrates the excellence of traditional jewelry craftsmanship, but also the flexible application of modern design concepts. The Geometric Shadows collection is a decorative and artistic collection of jewelry that blends technology with natural aesthetics.

Through a multi-layered design approach, the Geometric Shadows collection evokes an emotional resonance and creates a deeper sense of recognition and appreciation for the pieces. These jewelry pieces are not just a piece of exquisite decoration, but also the crystallization of the designer's love and reproduction of nature and beauty. As a result, the collection is unique in the field of jewelry design and has won wide acclaim and recognition.

(3) Cultural expression of patterns and symbols

Patterns and symbols are used in the jewelry design of the Geometric Light and Shadow series to show in its unique way how geometric forms are skillfully incorporated, giving the work a deep cultural heritage and aesthetic value. And the traditional geometric shapes are innovatively translated and abstracted to design delicate openwork patterns. This design technique not only enhances the visual hierarchy and spatial depth of the jewelry, but also greatly enriches the visual experience of the viewer. By precisely arranging the geometric forms, the traditional aesthetics are fused with modern design elements, demonstrating a unique and harmonious artistic charm.

Each pattern design is thoughtfully and precisely calculated to ensure its symmetry and proportions are perfectly rendered, demonstrating the exquisite level of jewelry design craftsmanship and respect for aesthetic principles. This design technique and concept not only strengthens the overall harmony of the pieces, but also skillfully balances the dynamic and static elements, so that each piece of jewelry displays a unique sense of dynamism and stability. The Geometric Light and Shadow series pattern design demonstrates the designer's deep understanding and modern interpretation of geometric forms.

In a cross-cultural context, geometric shapes, as symbols of order and harmony, occupy a crucial position in jewelry design. Designers use exquisite craftsmanship and innovative thinking to integrate these traditional elements into modern design language, creating unique and story-telling jewelry pieces. This fusion not only demonstrates the artistic beauty of jewelry, but also promotes communication and understanding between different cultures.

The Geometric Light and Shadow series skillfully integrates traditional geometric symbols with modern technology, and presents an amazing visual feast with the ever-changing light and shadow. This series of works not only deeply demonstrates the connotation of jewelry art, but also reveals the great potential of modern jewelry design in the field of cultural heritage and innovation. They break through the boundaries of tradition and modernity, and bring new revelations and farreaching cultural influences to the field of jewelry design. In this work, people can appreciate the organic combination of tradition and modernity, as well as the unique charm of jewelry as a carrier of culture. (As shown in Table 8)

Original Shape	Element Derivation	Alteration	Development
		+ *	
		• •	

 Table 8 The Evolutionary Process of Pattern Extraction in the Geometric Light and

 Shadow Series

(4) Choice of materials and environmental responsibility

In the Geometric Light collection, the choice of materials fully demonstrates a deep understanding of environmental responsibility and a precise grasp of modern design needs. The application of traditional metal materials ensures the classic aesthetics and durability of the jewelry, while the introduction of innovative advanced synthetic materials such as carbon fibers and special synthetic resins injects modernity into the jewelry design, optimizing the structural hierarchy and visual impact. Of particular interest is the use of anodized metal, which not only improves the corrosion and wear resistance of the metal, but also creates a strong and colorful protective layer on the surface of the metal, thus extending the life of the jewelry. As an environmentally friendly process, anodizing reduces the use and emission of hazardous substances, reflecting a concern for the environmental impact of the jewelry manufacturing process.

The choice of high-grade synthetic materials fully reflects the adherence to the principles of sustainable development. These materials often have excellent mechanical properties and a low environmental impact, ensuring quality and aesthetics while giving greater freedom of design and environmental benefits. Carbon fiber, for example, is lightweight and strong enough to be used in jewelry that requires delicate and complex designs, while reducing the reliance on traditional mineral resources for jewelry production and easing the burden on the environment.

The Geometric Light collection demonstrates not only the artistic and technical aspects of jewelry design, but also the importance of environmental responsibility through the thoughtful choice of materials. This material strategy, which balances aesthetics, functionality and environmental impact, sets an example of sustainability in jewelry design, revealing how innovative material technology can enhance the overall value and marketability of jewelry.

(5) Exquisite craftsmanship and comfort in details

In the Geometric Light collection, the pursuit of excellence and the depth of care for the wearer's experience are reflected, with exquisite detailing and comfort. Emphasizing the harmony between jewelry aesthetics and functionality, the collection is designed with millimeter precision through high-precision techniques such as CNC and laser cutting. This technology not only ensures the visual coherence of complex openworked parts, but also enhances the overall durability and sophistication. In terms of detailing, advanced technology is used to polish every part of the jewelry that comes into contact with the skin, ensuring that the edges are smooth and free of any burrs to avoid discomfort during prolonged wear. Ergonomic principles are applied to the structural design of the jewelry, such as the back hooks of earrings and necklace clasps, which are specially considered to provide extra comfort. This approach to jewelry design balances aesthetics with practicality, enhancing the wearer's experience, whether it is for everyday wear or special occasion adornment.

In the smallest of details, modern jewelry design demonstrates the utmost attention to the user experience. Designers skillfully blend high-end craftsmanship with ergonomic principles to ensure that each piece is aesthetically pleasing and meets the comfort and functional needs of the wearer. This not only enhances the overall quality of the jewelry and strengthens consumers' trust and satisfaction with the brand, but also demonstrates a precise control of details and a deep understanding of the wearer's needs.

After careful design and production, the Geometric Shadow Collection is a perfect example of the combination of modern jewelry technology and humanistic design concepts. This collection combines the essence of technology with a comfortable experience, setting a new benchmark in the jewelry industry and demonstrating the importance of control of details and understanding of the wearer's needs.

With exquisite prototyping techniques and production technology, the Geometric Shadows collection presents the following effects. (As shown in Figure 21)





Figure 19 Design Diagram of the Geometric Light and Shadow Series Jewelry 5.2.2 Appendix Night Que Series: Exploration of Historical Depth and Technical Precision

The Appendix Night Que collection is inspired by the perfect fusion of traditional oriental aesthetics and modern innovative thinking. Through the use of advanced parametric design tools, this collection delves into the inner order of geometric textures and modernizes its reconstruction and interpretation. This unique design approach not only inherits the essence of traditional art, but also gives vitality to modern design. With the help of high-precision CNC (numerical control) engraving technology, every detail is accurately rendered, making each piece a classic that showcases the serene beauty of the night.

(1) Precise application of technology

In the Appendice Night Que collection, the use of craftsmanship not only guarantees a high degree of precision and aesthetic quality, but also highlights the subtle interplay between technology and art. With the micron-level precision of CNC technology, complex geometric forms are reproduced with precision, allowing each design detail to fully express its artistic appeal. The precision of this technology and the efficient production process together create the unparalleled detail performance of jewelry, greatly enhancing the cultural connotation and visual impact of the design.
The application of laser cutting technology has also brought about a revolutionary change in the field of jewelry production. Through the precise control of high-energy laser, it realizes high-definition and high-precision cutting of jewelry materials, effectively avoiding the physical stress and material deformation that may be brought about by traditional cutting methods. This fine laser cutting treatment not only significantly improves the overall perfection and appearance texture of the jewelry, but also invisibly enhances the artistic aesthetics and market competitiveness of the products, adding a bright luster to the appendicular night que series of works.

(2) Integration of culture and innovation in modeling design

The Appendix Night Que collection is uniquely designed to blend rich cultural heritage with exceptional innovation, presenting a harmonious resonance between traditional oriental elements and modern design aesthetics. The designers use skillful techniques to create modern interpretations of classic geometric patterns, preserving the traditional cultural core while giving each piece a unique modern appeal.

During the design process, the aesthetic effect of dynamic and static intermingling is formed through the use of symmetrical and asymmetrical design techniques, thus enhancing the visual impact of the works. This treatment not only shows the designer's deep understanding of traditional culture, but also reflects a keen insight into modern aesthetics. Utilizing modern technology, these ancient symbols are given new vitality and presented to the world in a new visual form. This is not only a modern interpretation of traditional culture, but also realizes the expansion and sublimation of tradition on the cultural level. This innovative design method not only enhances the artistic value and aesthetic quality of the works, but also highlights its unique cultural identity and aesthetic interest in the globalized market.

The Apprentice Night Que series skillfully blends traditional and modern, oriental and western design elements to create works of art that satisfy modern aesthetic needs and contain deep cultural connotations. This cross-cultural design practice not only enhances the international influence of jewelry works, but also brings new perspectives and inspirations to the field of jewelry design, fully demonstrating the infinite possibilities of jewelry design as a blend of culture and art. (As shown in Table 9)



Table 9Evolution of the Midnight Tranquility Series Designs

Leakty Window Element Extraction Pattern Evolution Sculptural Shaping Prototype



(3) Deep Cultural Expression of Patterns and Symbols

The pattern and symbol design of the Appendix Night Que series vividly illustrates the depth and precision of traditional cultural connotations. Taking the indepth exploration of traditional motifs as the cornerstone and adopting modern design language for innovative interpretation, the core spirit is maintained while its contemporary aesthetic qualities are given. This exquisite fusion makes the works combine the solemnity of history and culture with the vitality of modern design, displaying a unique cross-cultural charm.

The jewels in the Appendix Night Que collection, with their exceptional craftsmanship and thoughtful design, subtly incorporate traditional motifs in a way that is uniquely appealing. This innovative approach not only enhances the ornamental and artistic value of the jewelry, but also gives each piece a modern flavor that is in line with global aesthetic trends. By refining traditional cultural elements and applying modern artistic techniques, the jewelry has a deep cultural heritage and emotional resonance. The design not only shows in-depth research and respect for traditional culture, but also reflects the courage and wisdom of artistic innovation. Each pattern and symbol is rich in cultural connotation, adding unique charm to the jewelry. Patterns and symbols not only enhance the market competitiveness of jewelry, but also provide a valuable reference for the jewelry design field to seek a balance between tradition and modernity, art and craftsmanship.

(4) Innovative choice of materials and environmental awareness

The Rendezvous Night Que jewelry collection highlights a deep appreciation of modern design concepts and an extreme focus on environmental responsibility. During the material selection process, the collection skillfully blends traditional elements with high-end synthetic materials, preserving the classic aesthetics of jewelry while meeting modern consumer expectations for environmentally friendly and sustainable products. The application and integration of this innovative material reflects jewelry design's loyal adherence to the concept of environmental protection, while also demonstrating its keen insight and leadership in modern design trends.

A comprehensive assessment of ecological impact is used as the basis for decision-making in the selection and application of materials, covering material collection, processing and eventual recycling. Enameled materials stand out for their durability and long-lasting color, with a low environmental impact during production. Advanced synthetic materials, such as carbon fiber and special synthetic resins, are adopted for their lightness and durability, and are processed in accordance with modern environmental standards, reducing the pressure on the natural environment.

The use of innovative materials not only optimizes the design of the jewelry and enhances the wearer's experience, but also highlights the jewelry's artistic value and exquisite craftsmanship, while always adhering to the concept of environmental protection. The clever use of innovative materials in the Appendix Night Que series not only gives a modern style to traditional jewelry, but also highlights the jewelry industry's firm belief in and active practice of the principle of sustainable development.

Through the comprehensive application of environmental protection concepts and technological innovation, the Appendance Night Que series has won a good reputation in the market, set up a model of environmental protection and innovation in the field of jewelry design, and led the industry on the road to sustainable development.

(5) Precision and comfort in detailing

In terms of detailing, the Apprentice Night Queue collection emphasizes both craftsmanship and comfort, and through precision casting and delicate engraving techniques, each openwork and edge treatment achieves a high level of precision and aesthetic standards. This meticulous attention to detail not only optimizes the appearance of the jewelry, but also ensures that it is smooth and non-irritating where it comes into contact with the skin, making it comfortable to wear for long periods of time. The use of anti-allergenic materials and the rounding of all edges that may come into contact with the skin ensure that the jewelry is both aesthetically pleasing and comfortable for the wearer. Ergonomics are used to meet aesthetic standards while at the same time being functional and practical.

The meticulous treatment of the Appendance Night Que collection reflects respect for the wearer's experience, as well as the concept of modern jewelry design that places equal importance on aesthetics and comfort. These detail-oriented pieces establish the brand's unique value in the marketplace and greatly enhance consumers' overall satisfaction with the product. Therefore, each piece of the Appendix Night Que series is not only a decorative piece, but also a work of art that enhances the quality of life, demonstrating the comprehensive artistry and practicality of jewelry design. As shown in Figure 22, it demonstrates the effect of the pieces of the Appendix Night Que series.



Figure 20 Fading Night Gate Series Jewelry Design Pieces

5.2.3 Yuehua Xuanying Series: Capturing the artistic beauty of moonlight

The Moonlight Shadow series uses advanced graphic algorithm simulation technology to create unique ice crack patterns. These patterns not only show the beauty of nature, but also full of random interest. When the light falls on them, it is as if the dreamy scene of the window pane under the moonlight is reproduced in front of us. High-precision 3D printing technology is an indispensable part of the collection, which not only ensures the fineness of the pattern design, but also presents the complexity of the layering perfectly through the multi-layered three-dimensional printing technology. With the help of this technology, each piece seems to be endowed with life, showing the three-dimensional and deep effect that artwork should have in the interweaving of light and shadow.

(1) Innovative application of technology

The Moonlight Shadows collection takes traditional jewelry craftsmanship to new artistic heights through the in-depth fusion of graphic algorithms and 3D printing technology. The series cleverly captures the natural flavor of the ice cracks and simulates the serene image of moonlight filling the window panes under the light, thus broadening the traditional scope of jewelry design and bringing unprecedented visual feast to the wearer. Through the simulation technology of graphic algorithms, the Moonlight Shadow Series accurately reproduces the complex texture of ice cracks, presenting dynamic and layered pattern designs. At the same time, the application of 3D printing technology allows these fine patterns to be accurately transformed into three-dimensional jewelry pieces, guaranteeing the accuracy of the design while preserving the overall aesthetic harmony.

This series of jewelry pieces is a clever interweaving of traditional essence and modern innovative design, vividly interpreting the everlasting charm of craftsmanship. Uniquely conceived and crafted, the Moon Shadow Xuanhua Collection not only sets new standards in the jewelry industry, but also opens up new horizons in the field of innovative design. Through enhanced production flexibility and efficiency, the collection is able to quickly translate complex design concepts into physical reality, ensuring precise reproduction and consistency of each piece, thus embodying unparalleled craftsmanship values.

With its unique innovation in craftsmanship technology, the Moon Shadow Xuanhua Collection not only demonstrates our country's excellence in the field of science and technology, but also highlights the modern jewelry manufacturing industry's relentless pursuit of aesthetics and craftsmanship. This innovation not only represents a remarkable leap in craftsmanship, but is also a model for the mutual integration and enhancement of science and technology and art, leading jewelry design to a period combining high-tech and artistic aesthetics in a new dimension.

(2) Depth of modeling design and emotional resonance

The Moonlight Shadow series focuses on visual and spatial layering in its styling design, maximizing the capture and reflection of light through unique patterns and complex structures, creating a strong sense of visual depth and space. This design skillfully utilizes the reflection and refraction of light on the surface of the jewelry to create a vivid light and shadow effect, just like the soft shimmering of moonlight.

In terms of emotional resonance, the Moonlight Shadow collection establishes a deep emotional bond with the wearer. Created as if inspired by moonlight, these pieces are not only visually appealing, but also provide comfort to the wearer on a spiritual level. The interplay of light and shadow, the quiet and poetic nature of a moonlit night, inspires a deep yearning and nostalgia for the beauty of nature, thus deepening the emotional connection between the wearer and the jewelry.

This series of designs is profoundly conceived, and its emotional resonance stems from the perfect combination of technical excellence and innovative thinking. The designers are not only well versed in optical principles, but also seek breakthroughs in the field of art, so that each piece of work can show its uniqueness in the fusion of technology and art. As a result, the Yuehua Xuanjiao series breaks through the boundaries of traditional jewelry, presenting a picture of visual and emotional feast, demonstrating the new realm of jewelry design in exploring the depth and expression of emotions.

(3) Cultural expression of patterns and symbols

The Yuehua Xuanying series highlights the core value of cultural transmission in the use of patterns and symbols. The designer skillfully blends traditional cloud patterns with modern geometric forms to create a unique visual expression. The design retains the aesthetic characteristics of the artwork while injecting a distinctly modern flavor.

The cloud pattern, as an iconic element of traditional Chinese art, symbolizes the spirit and change of the sky. When this traditional element is combined with modern geometric forms, it presents a unique visual and emotional effect. This innovative fusion demonstrates the designer's deep understanding of cultural adaptability, which expresses respect for traditional culture and highlights the pursuit of modern aesthetics. In the globalized jewelry market, this design concept is particularly important.

This pattern design not only enhances the visual effect of jewelry, but also resonates deeply with consumers on an emotional level. It evokes consumers' universal perception of beauty and deep emotion for cultural heritage, making each piece not only of decorative value, but also a medium of cultural exchange and emotional expression. Through the subtle design of patterns and symbols, the Yuehua Xuanying series demonstrates a high level of artistic creation and technical application, giving a modern interpretation to the cultural symbols in jewelry. The realization of such in-depth cultural presentation and emotional resonance reflects the jewelry design's deep excavation of cultural heritage and emotional richness, the goal of which has gone beyond the mere pursuit of aesthetics.

(4) Innovation in material selection and environmental awareness The Yuehua Xuan Ying jewelry collection shows the designers' insight in the choice of materials, as they carefully select silver and high-quality synthetic materials. These materials not only have excellent stability and physical durability, but also maintain their original luster and beauty over a long period of time. This thoughtful choice not only meets the dual pursuit of aesthetics and practicality in modern jewelry design, but also meets the market's expectations for high-quality jewelry that is both fashionable and durable.

In the process of choosing materials, environmental characteristics play an important role. Designers choose materials that are recyclable or less burdensome to the environment, reflecting their concern for environmental protection and in line with the global goal of sustainable development. For example, premium synthetic materials are popular for their low environmental impact during production, while silver materials reduce the environmental burden by reducing the frequency of jewelry replacement due to their excellent durability. The breakthroughs in innovative material choices and environmental awareness in the Yuehua Xuan Ying collection not only enhance the overall quality and market value of the jewelry, but also demonstrate the adaptability and innovative environmental awareness and material choices, this series not only provides consumers with beautiful and durable jewelry, but also sets a new paradigm in the field of jewelry design where aesthetics, functionality and environmental responsibility go hand in hand.

(5) Refinement of detailing and comfort concerns

With its excellent craftsmanship and the ultimate pursuit of comfort, Yuehua Xuanying series highlights the unique artistic charm and practical value. Every detail reflects rigor and excellence, demonstrating the designer's ultimate pursuit of beauty. The fine treatment of the hollowed parts and edges presents the ultimate beauty and perfection, highlighting the high attention to details.

While pursuing visual aesthetics, Yuehua Xuan Ying series also takes into account the coherence and comfort of touch. During the design process, anti-allergic materials are selected to ensure that the wearer can enjoy the beauty of the jewelry without worrying about allergic reactions caused by material discomfort. The rounded edges are a reflection of the thoughtful consideration for the wearer's comfort, making the jewelry comfortable and non-irritating even after prolonged wear. The Yuehua Xuan Ying collection also incorporates ergonomic principles, aiming to balance aesthetic standards, functionality and practicality. This comprehensive design concept makes the jewelry not only a work of art, but also an ergonomic practical object.

Through refinement and attention to comfort, the Yueh Hua Xuan Ying collection successfully realizes the perfect combination of artistic value and practicality. This series not only demonstrates the technical aesthetics in the field of jewelry design, but also reaches new heights in terms of consumer experience. This has undoubtedly consolidated the unique position and influence of the Yuehua Xuanying series in the jewelry design world, earning it widespread acclaim and recognition.

As shown in Figure 23-25, it demonstrates the effect of the Yuehua Xuanying series of works.



Figure 21 Production Process of the Moonlight Pavilion Series Pendants



Figure 22 Production Process of the Moonlight Pavilion Series Earrings

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Figure 23Jewelry Designs from the Moonlight Pavilion Series

This chapter focuses on the three series of Geometric Light and Shadow, Apprentice Night and Moonlight Shadow, and provides an in-depth analysis of the concept of jewelry design that combines traditional art and modern technology. These series not only fully demonstrate the perfect fusion of technological innovation and environmental protection concepts, but also reflect the in-depth excavation of cultural heritage and rich and diverse emotional expression. Through detailed analysis of these design practices, it is foreseeable that future jewelry design will pay more attention to sustainability and user experience. At the same time, technological breakthroughs will drive innovation in the field of jewelry design to meet the growing market demand and higher expectations of consumers. These trends indicate that jewelry design, as the intersection of art and technology, will continue to evolve towards greater refinement, personalization and sustainability.

5.3 Prototype Evaluation and Improvement

This study evaluates the jewelry prototypes of the Geometric Light and Shadow Series, the Appendix Night Queue Series, and the Yuehua Xuanying Series from multiple perspectives, including market research, online questionnaires, and expert reviews. The core evaluation indicators include design aesthetics, cultural connotation, material adaptability, wearing comfort, and overall market acceptance.

5.3.1 Market Research

During the market research phase, a series of scientific and systematic methods are used to ensure a deep understanding of the target market. Through field visits to jewelry retailers and boutiques, we observe consumers' purchasing behavior and immediate feedback on jewelry products. This direct observation allows us to gain a more comprehensive understanding of consumer needs and preferences. In addition to site visits, we also look at how people wear jewelry at social events and cultural occasions to capture changes in popular styles and analyze the cultural connotations behind them. By interacting with consumers, we are able to gain a deeper understanding of their values and lifestyles. To obtain more comprehensive market information, we conduct in-depth interviews with jewelry retailers and listen to their insights and suggestions, so as to understand a wide range of areas such as market dynamics, consumer preferences and sales trends. This information is an important guide for adjusting product design and formulating market strategies.

During the market research process, we conducted a comprehensive analysis of our competitors' product lines, evaluating areas such as design innovation, material usage, price positioning and market performance. This helps us understand industry standards and success stories, and identify market gaps and potential opportunities for innovation.

To deepen our understanding of market conditions, we used data analysis methods. By studying the trends in market retail sales and the characteristics of consumer groups in China's jewelry industry (As shown in Figure 26), we are able to more accurately grasp market demand and consumer preferences. This will help us formulate more effective marketing strategies and enhance the competitiveness of our products in the market.

Based on this series of rigorous and systematic market research work, we will be able to better meet consumer demand and increase our market share. This will lay a solid foundation for business development.



Figure 24Analysis of Trends in Sales Revenue in the Chinese Jewelry Retail Market and Characteristics of Consumer Groups



Figure 25 Annual Changes in Market Retail Sales for the Jewelry Industry

The age distribution chart of the consumer population reveals the proportion of consumers' demand for jewelry products by age group, especially the 31-40 age group has become the dominant consumer group, highlighting the main consumer level of the market (As shown in Figur 28). The focus chart of jewelry consumers on social media platforms provides an in-depth analysis of the factors that consumers attach importance to in the purchasing decision process, such as price and quality, which provides a strong basis for us to more accurately meet consumers' needs when designing products and positioning them in the market.

Jewelry category sales growth charts on social media platforms reveal the sales growth trends of various jewelry categories (e.g. gold, jade jewelry, etc.) on social media platforms, reflecting consumers' purchasing preferences and market trends. Through the comprehensive use of these research methods, this study provides a deep understanding of the current state of the jewelry market, and provides a solid data basis and empirical foundation for future innovation in jewelry design and marketing strategies. This market-oriented assessment methodology ensures the practicality and relevance of the study, and enables product design to be more closely aligned with market demand, thereby improving competitiveness.



Figure 26 Proportion of Jewelry Product Demand by Age Group

5.3.2 Consumer Feedback Collection

During the consumer feedback collection process for this study, in-depth market research was conducted to develop an online questionnaire that closely matches the current market environment and was thoroughly analyzed to obtain valuable input from the target consumer group. The questionnaires covered a number of key areas, such as evaluation of the aesthetics of jewelry, recognition of cultural values, evaluation of the wearing experience, and acceptance of product price. These questionnaires aim to gain a comprehensive understanding of consumers' needs and feelings, and provide a data basis for subsequent product optimization.

In order to gain a deeper understanding of specific consumer preferences and needs, this study also organized several focus group discussions. In these discussions, we invited consumers of different ages and backgrounds to take the questionnaire, and the researchers provided direct feedback and suggestions on the design details, material choices, and craftsmanship techniques of these jewels. Through face-to-face exchanges, we were able to understand more precisely the problems that consumers encountered during actual wear, as well as their specific needs for jewelry design aesthetics. We also found differences in jewelry design portfolio preferences by gender.

In Charts 29 & 30, we analyzed data on jewelry set, material, and process preferences by gender and occupation. In the section on gender preferences for jewelry sets, the third jewelry set was popular among both men and women, and was especially preferred among the female group. The first, second and sixth jewelry sets also possessed some degree of popularity, especially among the male group. However, the fifth set of jewelry failed to gain greater acceptance among both genders.

From the perspective of occupational categories, practitioners can be categorized into eight major groups. First and foremost are the heads of state organs, party organizations, enterprises and institutions, who constitute the first major category of occupational groups. They are closely followed by professional and technical personnel, who make up the second major category. The third major category covers clerical staff and related practitioners. The fourth major category is commercial and service workers, who occupy an important position in socioeconomic activities. The fifth major category comprises agricultural, forestry, animal husbandry, fishery and water conservancy production personnel, who are the backbone of the country's basic industries. The sixth category includes operators of production and transportation equipment and related personnel, who provide a solid guarantee for social production. The seventh major category is other practitioners who are the guardians of national security. The last category is other practitioners who are inconvenient to categorize, and they likewise contribute to the development of society.

The third set of jewelry is widely popular in most of the occupational categories, and it is especially favored in the third and fourth categories. The first occupational category, on the other hand, shows a clear preference for the fourth set of jewelry, which reflects their uniqueness in terms of aesthetics and taste. It is noteworthy that the sixth occupational group also showed a more significant preference for the sixth set of jewelry, which may imply that this occupational group has unique criteria or needs in terms of jewelry selection.

In terms of material preference, metals (e.g., gold, silver, aluminum, iron, titanium and tin), plastic/glass, silicone and resin, leather and textiles, ceramics, and composite materials (non-conventional materials) were all listed. Metals (gold, silver, aluminum, iron, titanium and tin) are particularly favored in the first category of occupations, with significant preferences for metals in the second and sixth categories. Occupations in the third and fourth categories tend to use a combination of materials-unconventional materials-suggesting that there may be a preference for specific materials in these fields. Leather and textile materials, however, are hardly popular and there is no significant preference for them across occupations.

There is some involvement in various types of crafts, including casting, carving, inlay, silk and polishing. From a preference perspective, inlay and carving skills appear to be particularly popular in the first category of occupations, suggesting that this occupational group has a high level of appreciation or demand for particular types of crafts. Occupations in the third category show a broad preference, while occupations in the fourth category have a particular fondness for crafts. The sixth occupational group favors carving and polishing techniques, possibly reflecting a desire for the particular style or quality they favor.

Considered together, the various data suggest that jewelry preferences show significant variation based on demographic characteristics such as occupation. Jewelry, materials, and craftsmanship styles that incorporate elements of traditional culture are favored among specific groups. This implies that there are differences in aesthetic tastes, functional needs or cultural influences among different groups.

Туре	1st Set	2nd Set	3rd Set	4th Se	5th Set	6th Set
Name	Geometric Light &Shadow Series	Rendezvo us Night Series	Orchid Series	Amethyst Night Light Series	Skeleton Shadow Series	Moonlight Shadow Series
Product Image						
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Figure 27 Analysis of Preferences for Jewelry Materials and Craftsmanship

Regarding the correlation matrix between the various evaluation indicators, the correlation coefficients between the ratings are as follows: a strong positive correlation is shown between design aesthetics and material quality (0.866), which suggests that jewelry collections with higher ratings for design aesthetics usually score higher on material quality as well. There is a highly significant negative correlation between wearing comfort and overall satisfaction (-0.913), which may imply that jewelry with lower wearing comfort scores also have relatively lower overall satisfaction scores. In contrast, there was a strong negative correlation between cultural value and material quality (-0.866), suggesting that jewelry collections with higher cultural value ratings may have relatively lower material quality ratings, which may reflect differences in design emphasis (As shown in Table10 for details).

	Design	Cultural	Material	Wearing	Overall
	Aesthetics	value	Quality	Comfort	Satisfaction
Design Aesthetics	1.000	-0.500	0.866	0.588	-0.866
Cultural Value	-0.500	1.000	-0.866	0.407	0.000
Material Quality	0.866	-0.866	1.000	0.104	-0.500
Wearing Comfort	0.588	0.407	0.104	1.000	-0.913
Overall Satisfaction	-0.866	0.000	-0.500	-0.913	1.000

 Table 10 Evaluation of Different Assessment Indicators

The intrinsic connection between how the multiple domains of jewelry design are intertwined is shown in detail as shown in Figure 31. While there is a positive correlation between design aesthetics and material quality, suggesting that appreciation of beauty and awareness of material texture are mutually reinforcing, there is a negative correlation between these two and overall satisfaction. This suggests that there are other, more critical factors influencing consumer satisfaction. Of particular interest is the significant negative correlation between comfort in wearing jewelry and overall satisfaction, highlighting the important role of comfort in enhancing customer satisfaction. Meanwhile, cultural values did not show a significant correlation with overall satisfaction, suggesting that cultural factors may be independent of consumers' final evaluation of the product.



Figure 28 Correlation Matrix of Jewelry Evaluation Indicators



In a survey of consumer material preferences, gold, silver and diamonds proved to be the most favored materials, due to the traditional values they carry and their unique luster. Consumer preferences for these materials are not only about appearance, but also about durability and cultural symbolism. This insight provides valuable information for jewelry manufacturers to highlight the qualities and cultural context of these materials during the product design and manufacturing process in order to appeal to consumers seeking high quality and cultural heritage.

Further, the data presented in Figure 33 provides a clear picture of the frequency of occurrence of different satisfaction levels and their corresponding rating intervals. This information is an important reference value for assessing customer satisfaction and optimizing service quality.

The analysis shows that wearing comfort has the most significant effect on overall satisfaction, and its coefficient value is low. Meanwhile, design aesthetics and cultural values also had a negative impact on overall satisfaction, with design aesthetics having a particularly pronounced effect. In contrast, the impact of material quality on overall satisfaction is relatively small and close to neutral.

The two box plots presented in Figure 34 provide us with a visual assessment of consumer satisfaction with the material quality and craftsmanship of jewelry. With respect to material quality, the mean satisfaction score is 2.01, indicating that consumers do not rate material quality highly overall. The median score of 2 shows that most of the ratings are concentrated in the lower satisfaction range. In contrast, satisfaction in the area of workmanship is slightly better, with an average satisfaction score of 2.49, but the median score is still 2, indicating that more than half of consumers gave no more than a 2, reflecting a certain level of dissatisfaction.

These data show that consumers are generally dissatisfied with jewelry in terms of substance and workmanship, especially the evaluation of material quality appears to be low. Therefore, improving material and workmanship standards is extremely critical to enhancing product market competitiveness as well as improving consumer satisfaction. By interpreting this data in depth, jewelry manufacturers can more accurately pinpoint and fix areas that fall short of consumer expectations.



Figure 30 Frequency of satisfaction levels and their corresponding rating intervals



Figure 31 Evaluation of Satisfaction with Material Quality and Craftsmanship

Through the use of diverse feedback collection methods, we ensure that our design solutions are closely aligned with market needs, providing strong support for the entire jewelry design process and driving innovation and optimization. As a result, we not only satisfy the existing needs of consumers, but also lay a solid foundation for the brand's future innovations.

5.3.3 Expert Review Session

In order to ensure the excellence of our jewelry products, we have taken into account the opinions of consumers and assembled a jury of experts in the fields of jewelry design, art appreciation and marketing. Based on their respective expertise, they conducted a comprehensive and in-depth evaluation of the jewelry's design innovation, craftsmanship and market potential. The jury's invaluable recommendations provide key guidance for optimizing design and enhancing craftsmanship. At every stage of design and improvement, we highly valued the jury's opinions and carefully incorporated their suggestions. These experts, with their rich industry experience and in-depth professional knowledge, conducted a comprehensive and rigorous evaluation of each piece of jewelry.

The jury first focused on the innovative design of the jewelry. They delved into the originality of the design concepts, the uniqueness of the design elements, and how these elements can be applied innovatively in modern design. They paid particular attention to whether the designs were able to set market trends and at the same time maintain the heritage of traditional craftsmanship. Through comparison with other similar products in the market, the experts accurately assessed the degree of design innovation and market potential of each jewelry piece.

Afterwards, the experts conducted a rigorous evaluation of the fine craftsmanship of the jewelry. They scrutinized every detail of the jewelry, including the solidity of the setting, the quality of polishing of the metal, and the precision of cutting of the gemstones. The fineness of craftsmanship is a key factor in measuring the quality of jewelry, which is directly related to the durability and aesthetics of the product. The jury made many valuable suggestions, pointing out the problems in craftsmanship and providing directions for improvement. This is of great significance to enhance the market competitiveness of jewelry products.

The jury made a comprehensive assessment of the prospects of the jewelry market from a marketing perspective. They conducted an in-depth analysis of the potential needs of the target consumer groups and explored how the designs could meet or stimulate market demand. The experts also assessed the effectiveness of pricing strategies, sales strategies, distribution channels and marketing campaigns in the jewelry market. Through a series of reviews, the experts identified market opportunities for us and suggested specific market entry strategies.

In the end, the jury's conclusion is an important reference for our decisionmaking. It not only provided us with market-oriented and professionally focused feedback, but also pointed out the direction for product improvement. Based on these professional suggestions, we are able to adjust our design, optimize our processes and refine our market strategies with greater precision, thus ensuring the outstanding success of our jewelry products in the marketplace.

5.3.4 Improvements in Design

After the initial demonstration and evaluation of the prototype, based on the data and feedback collected, we have made adjustments to the design details to ensure that the final product can more effectively meet the market demand and consumer expectations. Below are some of the specific improvements:

In the Geometric Light and Shadow series, experts and consumers generally agreed that the visual effect was excellent, but there was still room for improvement in terms of practicality and comfort. To address this, we have optimized the design and reduced some of the overly complex decorative elements. This not only reduces the overall weight of the jewelry, but also improves the comfort of wearing it. At the same time, we strengthened the structural support to ensure stable support and durability of the jewelry during daily wear, thus enhancing the user experience.

For the Appendix Night Que collection, consumer feedback mentioned limited size options. In order to meet the needs of more consumers and improve the quality of our products, we have added a variety of size options, including chain length adjustment and ring size selection. This change not only enhances the binding of the product, but also allows consumers of different body types to find the right size for themselves.

Although the Yuehua Xuanying series has gained initial market recognition, customer feedback indicates that its cultural expression still needs to be deepened. For this reason, while maintaining the essence of the original design, we have added more symbolic cultural motifs and details, such as the incorporation of traditional ornaments and symbolic totems. The aim is to make each piece not only as a decorative object, but also as a cultural transmitter.

Through a series of optimizations, we aim to make each jewelry collection aesthetically pleasing, comfortable, practical and culturally relevant to a wider range of consumers. After review and testing, we ensure that the adapted designs have excellent performance and market response before they are released to the market.

5.3.5 Results and Discussion

In this section, we will provide an in-depth analysis of the process of comprehensively evaluating and improving the merchandise through the mechanism of expert review and consumer feedback, as well as the resulting positive results and challenges. From the initial exploration of the Geometric Light and Shadow series, to the gradual optimization of the Appendix Night Queue series, to the final presentation of the Yuehua Xuanying series, each jewelry collection has achieved significant improvements in terms of design aesthetics, cultural connotations, practicality and market competitiveness. These achievements not only highlight our relentless pursuit of product quality, but also reflect our firm determination to meet consumer needs. However, we also clearly recognize that while we have made remarkable progress, we are still facing multiple challenges such as increasingly fierce market competition and changing consumer demands. Therefore, we will continue to deepen the expert review and consumer feedback mechanisms, and continuously optimize product design and improve product quality to better meet market demands and achieve sustainable development.

After several rounds of iteration and fine-tuning, each jewelry collection is more in line with the market and consumers' actual needs. For example, the Geometric Light and Shadow series incorporates more modern elements into its design, making it more in line with modern aesthetic trends; the Appendix Night Que series enhances the comfort and aesthetics of wearing it by adjusting its size and detailing. The Yuehua Xuanying series, on the other hand, digs deep into the traditional cultural elements and skillfully integrates them into the design, making the jewelry not only have a decorative function, but also become a carrier of inherited culture.

In the process of evaluation and improvement, we also encountered some challenges. How to maintain the traditional craftsmanship while meeting the aesthetic demands of modern consumers is an important issue. In addition, the choice of materials and the innovation of craftsmanship also raised higher requirements. We need to ensure that the materials selected are aesthetically pleasing, durable, and at the same time environmentally friendly and sustainable. At the same time, how to deal with consumer feedback, especially the integration and improvement of bad feedback, is also an issue that needs to be addressed. By establishing an open and transparent feedback mechanism, we are able to understand consumer needs and opinions more quickly and make timely adjustments and improvements.

This evaluation and improvement process has provided us with valuable learning opportunities. We recognize that continuous market research and close interaction with consumers are key to ensuring that our designs stay in sync with market demands. It also reinforces our focus on innovative processes and materials research. By constantly searching for new design inspirations and solutions, we are better able to respond to market changes and challenges.

Ultimately, this series of efforts not only enhanced the market competitiveness of our jewelry, but also strengthened the brand's cultural connotation and consumer recognition. Through this experience, we gained deeper industry insights and practical experience, laying a solid foundation for future jewelry design and production. At the same time, we realized that continuous improvement and innovation are the key to remain competitive. In our future endeavors, we will continue to pay attention to the changes in market dynamics and consumer demands, as well as continuously improve our design and production levels, in order to introduce more high-quality and competitive jewelry products.

CHAPTER VI

Summary, Discussion, and Recommendations in Research

This chapter comprehensively describes the core findings of this study, analyzes in depth their far-reaching impact on the fields of culture and design, and proposes a series of targeted recommendations based on the findings. In particular, this study provides a detailed analysis of the use of traditional funnel window elements from Suzhou, Jiangsu Province, in modern jewelry design, demonstrating how these elements can be flexibly adapted to and positively influence modern design trends while maintaining their unique cultural value.

6.1 Summary of findings

This study provides an in-depth analysis of the use of traditional Suzhou funnel window elements in modern jewelry design. The results of the study show that these elements not only retain their unique visual charm and deep cultural heritage, but also successfully realize the transformation and upgrading from traditional patterns to modern jewelry design through the use of advanced design technologies, such as computer-aided design (CAD) and 3D printing technology. The application of these technologies significantly enhances the innovative nature of jewelry design, while accurately inheriting the characteristics of traditional patterns and realizing the perfect fusion of technology and traditional art.

Further research reveals how to meet the market demand for uniqueness and innovation through design on the basis of respecting and inheriting traditional cultural values. The modern application of the funnel window element not only breathes new life into it, but also significantly improves its functionality and commercial value. This application makes the funnel element in the field of jewelry design show the charm of transgression of the times, providing designers with a wealth of creative inspiration and a wide range of design possibilities.

With the continuous development of design technology, the application of traditional elements in modern jewelry design is expanding, and its important position in the field of jewelry design has been established. Advances in technology not only improve the efficiency of design and manufacturing, but also enhance the market competitiveness of jewelry products by precisely achieving the design goals. The application of modern technology enables designers to reproduce complex traditional patterns more accurately while retaining the core values of cultural traditions, providing new avenues for innovation.

The results of the study show that the combination of traditional funnel window elements and modern design technology not only brings new visual and cultural depth to jewelry design, but also provides new possibilities for the revival of traditional art in the contemporary market. This combination is not only a demonstration of technology, but also a profound respect and inheritance of traditional cultural values, ensuring the continued influence and relevance of traditional aesthetics in modern society.

6.2 Discuss

This study provides design and academic references for the field of jewelry design, especially in integrating the essence of traditional culture with modern technology and aesthetic concepts. The successful use of the funnel element not only reveals the harmony between tradition and modernity, but also highlights the challenges faced in design practice. These challenges mainly stem from the technical aspects, such as the limitation of resolution and the compatibility of different materials, which have a direct impact on the aesthetics and practicality of the product. How to skillfully transform the funnel window pattern into a design element on the basis of retaining its cultural authenticity and avoiding it from being reduced to a mere visual decoration is an issue that designers need to explore in depth.

From the market point of view, the popularity of the leaky window elements and the preference for traditional patterns directly affect the market performance of the products. Consumers' acceptance of traditional elements changes with the cultural background and market trends, and it is crucial to understand and adapt to the target market's cultural preferences and consumer behavior. Designers need to conduct sufficient market research and consumer behavior analysis to ensure that the design works not only meet the aesthetic needs, but also meet the actual needs of the market. Secondly, the marketing strategy should emphasize the cultural value and innovative design of the leaky window elements in order to increase consumer awareness of the brand and the attractiveness of the product. Designers and marketing teams need to work closely together to create marketing materials that highlight the uniqueness and novelty of the leaky window element, and through storytelling and cultural education, enhance consumers' emotional recognition of the product and their willingness to buy.

Therefore, despite the great potential and attraction of the funnel element in modern jewelry design, the practical application of the element still needs to deal with a variety of challenges. This requires designers to maintain cultural authenticity while flexibly utilizing modern technology and paying close attention to market dynamics and consumer preferences. Successful design solutions should be based on respecting and maintaining traditional values, realizing the perfect combination of technology and art, and meeting the dual needs of the market and consumers.

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6.3 Suggestions

For the integration and application of traditional Suzhou funnel window elements in modern jewelry design, this paper proposes the following strategies to promote the innovative use of these traditional elements and to maintain their vitality and heritage in the context of globalization and technologization:

6.3.1 Strengthen interdisciplinary cooperation and communication: given the complexity and multidimensionality of traditional funnel window elements, build an interdisciplinary cooperation platform to bring together experts in the fields of design, culture, material science and information technology. Through in-depth exchanges and cooperation, combine the advantages of different disciplines, combine traditional elements with modern design technology, and promote the innovation of design ideas and product diversification.

6.3.2 Enhance design education and professional training: Strengthen courses related to traditional cultural elements in higher education, especially in art and design. Update course content and introduce modern design tools and techniques, such as computer-aided design (CAD) and three-dimensional (3D) printing, to train students to integrate traditional elements into modern design. At the same time, practical activities such as workshops and seminars will be organized to enhance students' practical skills and understanding of traditional elements.

6.3.3 Expand marketing and cultural promotion activities: To enhance public awareness and interest in traditional funnel window elements, organize a series of exhibitions, public lectures and interactive experience activities. Using modern media and digital technology, the historical background, cultural value and innovative application of the funnel window elements in modern design are demonstrated through storytelling and interactive displays. This can not only enhance the public's sense of cultural identity and belonging, but also stimulate the market's interest in and demand for traditional elements of jewelry.

6.3.4 Focus on innovation and ensure product quality: while pursuing innovative design, we must pay attention to product quality and craftsmanship. Establish strict quality control standards to ensure that each piece of jewelry meets high quality production requirements. Through the introduction of advanced manufacturing technologies and techniques, such as precision casting and microfabrication techniques, the precision and aesthetics of the pieces are improved, while ensuring their durability and practicality. This emphasis on quality not only enhances the market competitiveness of the products, but also reflects the respect and heritage of traditional culture.

By implementing these strategies and combining the elements of Suzhou's traditional funnel windows with modern jewelry design, not only does it preserve the essence of the culture, but also injects new vitality and market value into it. In the context of globalization, this will contribute to the continued prosperity and development of traditional art forms and promote the transmission of cultural diversity



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BIOGRAPHY

