

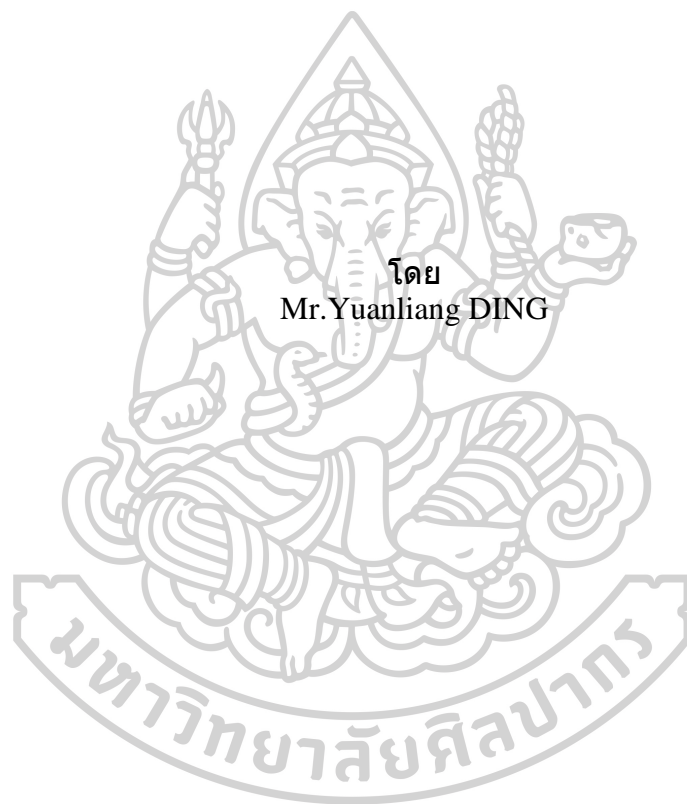


CHINESE IRON PAINTING DESIGN FUSION



A Thesis Submitted in Partial Fulfillment of the Requirements
for Doctor of Philosophy Design
Silpakorn University
Academic Year 2024
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วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปรัชญาดุษฎีบัณฑิต
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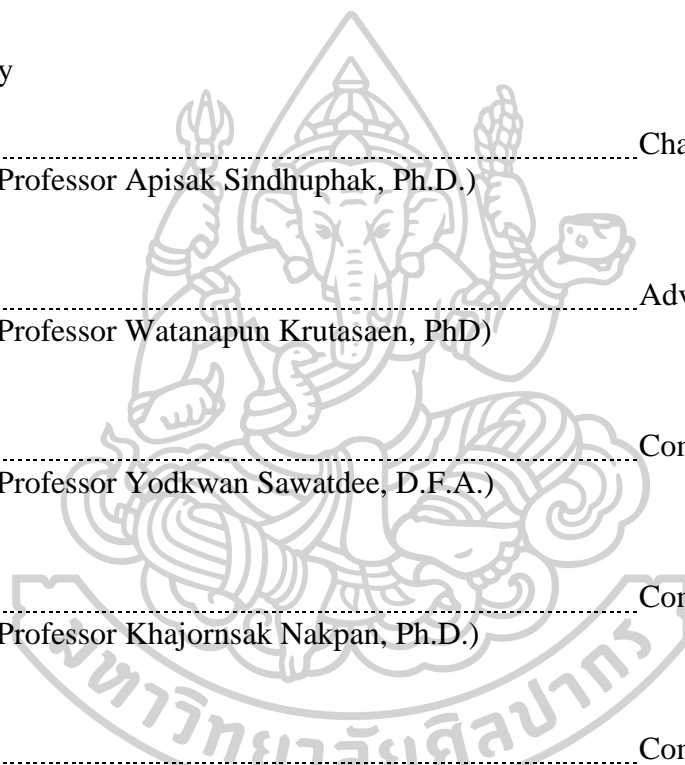
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Iron painting is a unique traditional handicraft of China and an excellent traditional national culture. In 2006, it was selected into the list of China's national intangible cultural heritage. It has unique aesthetic value and rich cultural connotation, reflecting the Chinese idea of creation. The purpose of this study is: 1) to explore the core factors that promote the development of Chinese iron painting in different historical periods. 2) to integrate Chinese iron painting with modern design and develop Chinese iron painting cultural and creative products that meet the needs of modern young consumer groups. 3) to explore the path of integration of Chinese iron painting and design to promote cultural inheritance and protection. The research method is qualitative as the main method and quantitative as the auxiliary method, combining literature research, case study, field investigation, expert interview and design experiment. Based on the research data and design practice, the researchers developed and designed a series of iron painting lamps based on the modeling language of Chinese landscape painting to meet the aesthetic and life needs of young consumer groups. Research results: 1) The integration of technology and art is the core factor in the development of Chinese iron painting. 2) The iron painting landscape lamps with integrated design have realized the development of iron painting from two-dimensional to three-dimensional space, which is practical, emotional and cultural, and meets the needs of young consumers. 3) Iron painting cultural and creative products that integrate craftsmanship and design promote the productive inheritance and protection and development of Chinese iron painting. The conclusion shows that the iron painting landscape lamps with integrated design have achieved innovation. By studying the integration of Chinese iron painting design, the transformation of iron painting from artistry to design products is realized, which meets the aesthetic and life needs of modern people, enhances market competitiveness, promotes the inheritance and protection of Chinese iron painting culture, and provides theoretical support for the sustainable inheritance and development of Chinese traditional crafts.

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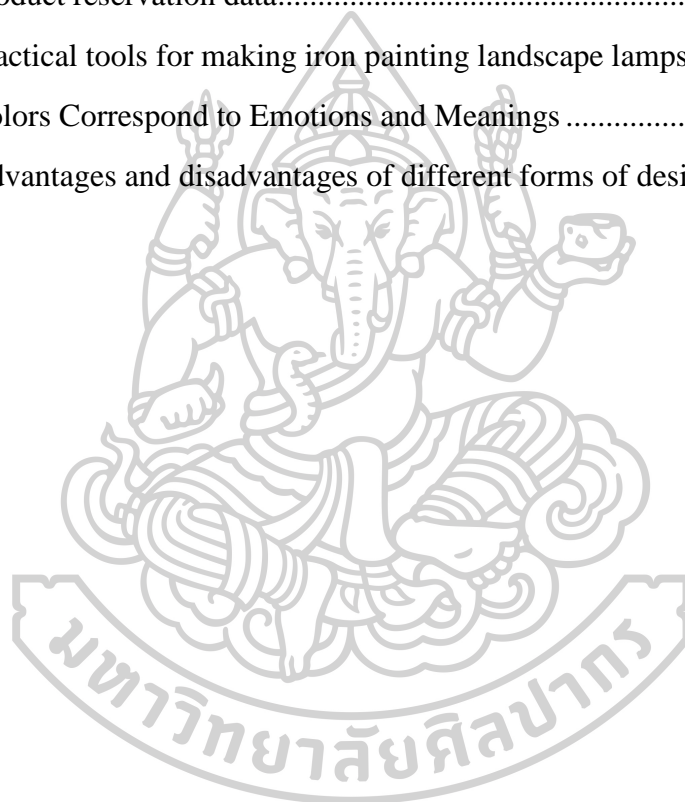
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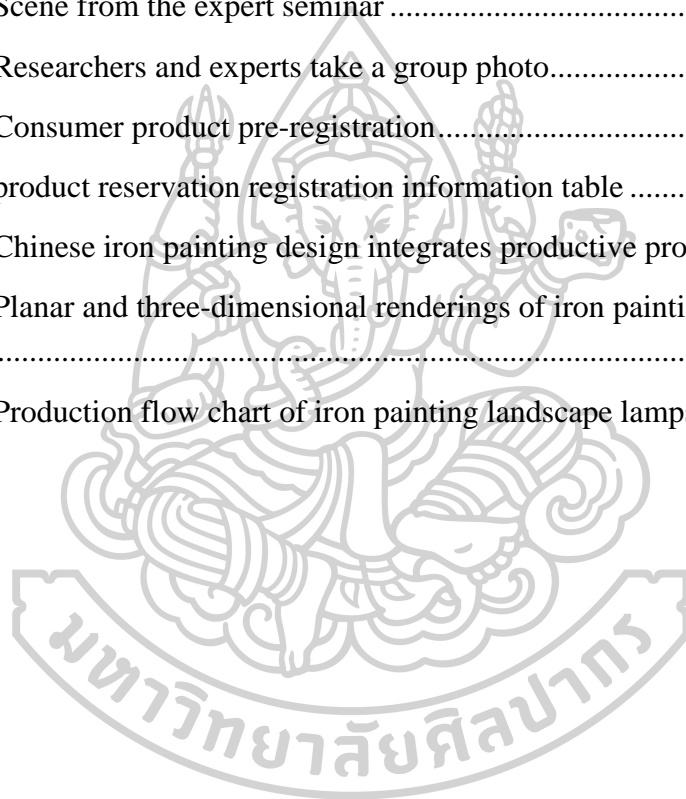
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CHAPTER 1 INTRODUCTION

This chapter will lay the foundation and clarify the specific objectives of this study. First, the background of the study on the fusion of Chinese iron painting design will be introduced, and then the research questions will be clarified, and the purpose, significance, results and scope of the study will be further elaborated. Finally, this chapter will give a schematic diagram of the research framework and outline the relevant keywords and term definitions.

1.1 Research Background

1) Political background: the need for the protection and inheritance of China's intangible cultural heritage.

Since the 21st century, China has introduced a number of policies to promote the protection and development of intangible cultural heritage. In 2006, the Measures for the Protection and Inheritance of Intangible Cultural Heritage were issued, and the first list of national intangible cultural heritage was announced. In 2015, the Chinese government, together with universities in different regions, launched a training program for inheritors of intangible cultural heritage, aiming to cultivate inheritors and practitioners of traditional handicrafts, improve cultural literacy and expand horizons. In 2017, the Chinese government issued the "Plan for the Revitalization of Chinese Traditional Handicrafts", encouraging the inheritance and revitalization of traditional handicrafts as an important means to increase local employment, promote income, and achieve targeted poverty alleviation (QIAN et al., 2020). In 2019, "Integrated Development of Culture and Tourism" promoted the development of tourism through culture, encouraged bold innovation and exploration, and found effective ways to integrate the development of culture and tourism through practice. In 2022, ten national departments jointly issued the "Opinions on Promoting the High-Quality Inheritance and Development of Traditional Crafts" to further promote and implement the revitalization of Chinese traditional crafts, involving four aspects, namely strengthening the protection of traditional handicraft projects, cultivating high-quality inheritance talents, promoting the development and revitalization of traditional handicrafts, and increasing the promotion and publicity of traditional handicrafts. In 2023, the Ministry of Industry and Information Technology and the Ministry of Culture and Tourism jointly issued the "Guiding Opinions on Promoting the Inheritance and Development of Arts and Crafts". These specific policies and measures support the development of China's traditional craft culture and also illustrate the importance of protecting the intangible cultural heritage of traditional crafts.

As an important part of intangible cultural heritage, traditional crafts are widely distributed in villages and towns in China. They are the crystallization of people's wisdom in the agricultural era and meet the needs of daily life and production. Due to the lack of motivation for subject innovation and the old carrier expression method, traditional technologies cannot keep pace with the times, and some are even on the verge of being lost. To achieve cultural confidence, cultural awareness and cultural self-reliance, it is necessary to promote and revitalize traditional crafts. The exploration and practical research on the revitalization of traditional crafts is a

practical example and concrete action to enrich the theory of protection and inheritance of China's intangible heritage, which can stimulate the endogenous driving force of innovation and development of traditional crafts. As a carrier of characteristic industries and characteristic cultures, it can promote practitioners to increase employment income, promote the prosperity of the industry, and better protect and inherit excellent traditional culture.



Figure 1 The national intangible cultural heritage plaque awarded by the State Council of the People's Republic of China
Note. Photographed by researcher2023

2) Cultural background: Carrying forward China's excellent traditional culture requires.

Iron painting is a representative traditional craft in China. It is famous as a unique metal craft. It has unique artistic value, cultural connotation and national spirit. It embodies the indomitable iron will of the Chinese people and is the best combination of traditional ironmaking technology and painting art. Chinese iron painting originated in the early Qing Dynasty and has a history of 350 years. In 2006, Chinese iron painting was included in the national intangible cultural heritage list. In 2018, Chinese iron painting was included in the first batch of traditional craft revitalization catalogues in China (Tan, 2021). Chinese iron painting originated in Wuhu City, Anhui Province. It is an art form made of iron materials using forging, welding, engraving, cutting, grinding, coloring and assembly techniques. It incorporates the artistic characteristics of traditional Chinese painting, calligraphy, sculpture, paper-cutting, etc., has important cultural and artistic value, and reflects the traditional Chinese aesthetics and craft culture. As an important part of Chinese traditional culture and a representative of Huizhou culture, Chinese iron painting plays an important role in promoting cultural diversity and carrying forward excellent national culture.

At present, Chinese iron painting faces challenges in development, cultural inheritance and product innovation are hindered, practitioners are aging, products do not meet market demand, etc. One of the reasons for studying Chinese iron painting is to inherit and revitalize the development of Chinese iron painting, enhance the cultural confidence of practitioners, expand its cultural influence and the market space of products, and contribute to the prosperity of local economy and culture. Design fusion may provide a link between iron painting culture and modern life, add multi-

dimensional value to iron painting products, stimulate its inherent production methods, and realize the revitalization of excellent traditional culture. At present, the role and potential of design in iron painting have received little attention, and still focus on its artistry as a decorative painting.



Figure 2 Honors and awards that the CCP Iron Painting has received
Note: Photographed by researchers 2023

3) Market background: consumers' urgent demand for innovative Chinese iron painting products.

As a traditional craft and folk art, Chinese iron painting has a wide range of application fields and market potential. Locals still produce Chinese iron painting products, and researchers found that local iron painting products are inconsistent with market demand and do not provide a stable economic income for iron painting craftsmen. Consumers believe that Chinese iron painting products are outdated, impractical, poor in quality, and do not meet customer needs. Iron painting craftsmen are often forced to leave to do other jobs when they cannot earn enough money to live. As a result, the younger generation has lost interest in participating in the production and inheritance of Chinese iron painting. This raises a question: "What can design do to help the revival of iron painting and increase the economic income of craftsmen? Attract the younger generation to join the iron painting industry and promote the sustainable inheritance of culture.

Study the fusion of Chinese iron painting design and develop cultural and creative products, daily necessities, etc. to meet people's growing consumption needs. In the context of modern design, with the rise of cultural and creative industries, more and more emphasis is placed on integrating traditional crafts with modern design to create products with cultural connotations and innovation. Traditional Chinese iron painting uses Chinese painting as a reference, emphasizes the composition and artistry of the picture, lacks practicality, and lacks the participation of designers and painters in the industry. Most of the current products repeat traditional themes and forms, with solidified content and lack of innovation in form. In the new era, it is necessary to reintroduce Chinese iron painting into daily life, highlight its application in all aspects of life, diversify product development, strengthen original design, and reflect the spirit of the times (Ding & Kai, 2016). The market demand for products with both traditional cultural values and modern design is growing. As a product with cultural characteristics, spiritual connotations and special aesthetics, Chinese iron painting

cannot meet consumers' demand for innovative products. Combining Chinese iron painting with modern design can not only protect and innovate traditional craftsmanship, but also meet the needs of today's market and satisfy people's spiritual and material needs.

4) Cultural inheritance: Chinese iron painting faces the dilemma of inheritance and innovative development.

With the rapid development of modern society and changes in the environment, people's material wealth has increased significantly, and aesthetic concepts are constantly evolving and updating. In recent years, the inheritance and development of Chinese iron painting has faced huge challenges and has been fighting an increasingly desperate struggle to maintain its relevance to the modern world. On the one hand, the number of inheritors of Chinese iron painting has decreased, and the inheritors of skills are generally older, with low cultural education levels and insufficient innovation capabilities, which has affected the artistic level and market competitiveness of Chinese iron painting. On the other hand, the lack of innovation in Chinese iron painting itself has led to a decline in market demand and sales, making it difficult to adapt to market changes and meet consumers' aesthetic and functional needs.

Existing research mainly focuses on the historical culture, traditional skills, artistic value and application research of Chinese iron painting. However, there is still little research on the application of modern design in iron painting in the existing literature. The significance and understanding of modern design on iron painting innovation have not been explored from the perspective of design fusion, and the relationship between cultural and creative products and the sustainable inheritance and development of iron painting has not been analyzed and studied, lacking systematic theoretical and practical guidance. In general, research on Chinese iron painting is still in its infancy, with sparse and superficial literature, mainly focusing on its history, artistic value and aesthetic characteristics (Shi, 2010). The application of Chinese iron painting in modern design and market needs to be further explored. Whether the combination of Chinese iron painting and modern design can be achieved by developing products that meet modern needs and have market competitiveness is an urgent problem to be solved.

1.2 Research Questions

This study aims to explore the following issues:

- 1) The core factors that promote the innovative development of Chinese iron painting in different historical periods.
- 2) What kind of innovative Chinese iron painting products meet consumer needs.
- 3) How can Chinese iron painting with design fusion promote cultural inheritance.

1.3 Research Hypothesis

According to the cultural level theory and emotional level theory, through the application of modern design and productive protection concepts, the design fusion of Chinese iron painting should be achieved. This fusion can not only preserve the artistic value and cultural essence of Chinese iron painting, but also enhance its

practicality and market appeal, meet the needs of modern consumers, and promote the sustainable inheritance and development of Chinese iron painting.

1) Skill and art fusion is the core factor in the innovative development of Chinese iron painting.

2) Iron painting cultural and creative products with artistic, emotional, cultural and practical functions meet the needs of young consumer groups.

3) Chinese iron painting design fusion promotes its productive inheritance and protection development.

1.4 Research Objectives

The main objective of this study is to achieve the inheritance and innovative development of Chinese iron painting through design fusion. In order to achieve this goal, the following three specific objectives are formulated:

1) Explore the core factors that promoted the development of Chinese iron painting in different historical periods.

2) Fusion Chinese iron painting with modern design and develop Chinese iron painting cultural and creative products that meet the needs of modern young consumer groups.

3) Explore the path of Chinese iron painting design fusion, and promote the inheritance, protection and development of cultural productivity.

1.5 Research Results

1) The Fusion of skill and art is the core factor in the development of Chinese iron painting.

2) Through design fusion, develop Chinese iron painting cultural and creative products with market potential to meet the needs of contemporary consumers and enhance the market competitiveness of Chinese iron painting products.

3) Based on the cultural level theory and emotional level theory, construct a Chinese iron painting design fusion model to achieve the creative transformation and innovative development of Chinese iron painting, and provide theoretical support for the productive inheritance and protection development of traditional handicrafts.

1.6 Research Scope

1) Target group: young and middle-aged people with a certain level of aesthetics and culture, who like traditional culture and pursue taste and personality.

2) Chinese iron painting: the historical development and current situation, production techniques and tools, themes and categories, artistic aesthetics and value of Chinese iron painting.

3) Design fusion: Analyze and study the cases of the fusion of Chinese iron painting and modern design, design principles and methods, product forms and characteristics, etc. Explore the needs of Chinese iron painting design fusion, and design innovative Chinese iron painting products that meet the needs of life, cultural heritage and emotional needs.

4) Cultural and creative products: Analyze the characteristics, design concepts and role of cultural and creative products in cultural inheritance. Design and produce a series of Chinese iron painting cultural and creative products.

5) Satisfaction of Chinese iron painting design fusion products: Exhibit and display Chinese iron painting design fusion products, invite experts and consumer groups to conduct satisfaction evaluation, and understand market competitiveness through on-site product reservations.

1.7 Research Framework

The research framework follows the basic logic of identifying problems, analyzing problems, and solving problems to complete the study on the fusion of Chinese iron painting and design.

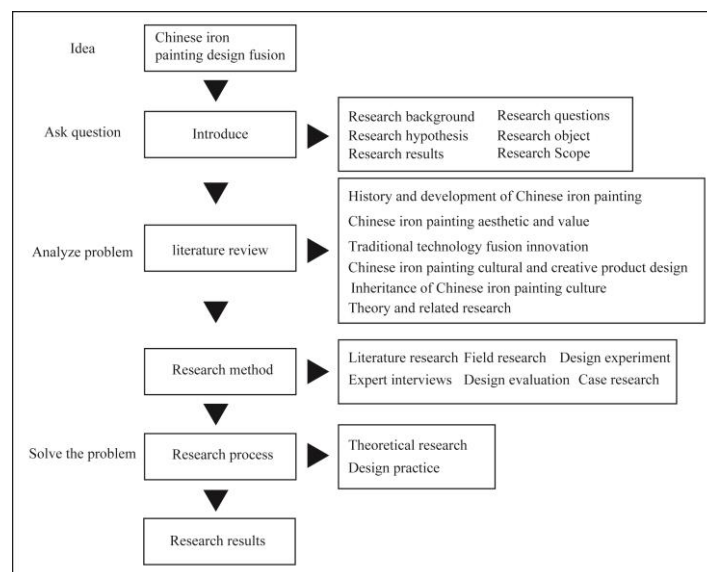


Figure 3 Research framework
Note. Researcher draws 2023

1.8 Research Methods

This study is based on the cultural level theory and the emotional level theory, with modern design concepts, to achieve the goal of user-centered through the fusion of craftsmanship and design. Explore how to enhance the aesthetics, emotions and practicality of Chinese iron paintings to make them more competitive in market and cultural value. If the design fusion of Chinese iron paintings can promote the development of the industry, it is not only the inheritance and promotion of Chinese traditional culture, but also an important step in economic growth, with groundbreaking theoretical significance and practical value. The study will adopt a mixed research method, including literature research, case study, field survey, expert interview and questionnaire evaluation.

1) Literature research: Review the relevant literature on Chinese iron paintings and modern design to understand the current research status and development trends.

2) Case study: Analyze the successful cases of the fusion of Chinese iron paintings and modern design, and extract experience and methods.

3) Field research: Through market surveys and interviews, understand the development status, market demand and main elements of Chinese iron paintings to guide design practice.

4) Expert interviews: Interview experts in different fields of Chinese iron paintings to understand the opinions and suggestions on the design fusion of Chinese iron paintings.

5) Questionnaire evaluation: According to the research objectives and requirements, questionnaire evaluation questions are set through Likert scale, and audience satisfaction evaluation is conducted at the product exhibition site.

1.9 Definition Of Terms

1) Chinese iron painting.

Historical development, craft characteristics and cultural symbolic significance. It is a traditional handicraft unique to Wuhu, China, with a development history of more than 350 years. It uses iron as the material and is a purely handmade artwork or craftwork based on the Chinese painting pattern. The color contrast is clear in black and white, and it has the charm of Chinese painting and the three-dimensional sense of sculpture.

2) Design fusion.

Combine the knowledge, skills and thinking methods of different disciplines to produce new design concepts and solutions. It is a multi-dimensional design method that not only focuses on the combination of technology and aesthetics, but also pays more attention to how to integrate culture and emotion into design to create works with profound meaning and multi-dimensional value. In traditional crafts, it is based on respecting and protecting traditional culture, introducing modern design concepts and methods, realizing the organic combination of craftsmanship and design, and making the product creative, practical, emotional and cultural.

3) Cultural and creative products.

The full name is cultural and creative products. It is a concept that combines culture with creativity. It relies on the wisdom, skills, and design methods of creative people to create and enhance cultural resources, and has cultural and commercial value. The essence of cultural and creative products is based on profound culture, focusing on meeting diverse needs and arousing emotional responses from the audience.

4) Cultural inheritance.

Refers to the process of consciously passing on culture, knowledge, skills, values, and traditional customs to the next generation. It involves language, art, music, literature, architecture, traditional crafts, customs, and other aspects. The purpose of cultural inheritance is to protect unique cultural heritage, maintain cultural diversity, and enable it to continue and be recognized and understood by future generations. In traditional crafts, cultural inheritance helps to protect unique cultural heritage, share common historical and cultural identities, enhance social cohesion and identity, and prevent it from disappearing due to the passage of time.

5) Cultural hierarchy theory.

The cultural hierarchy theory was proposed by Leong and Clark, that is, the external layer of tangible materials, the middle layer of behavioral systems, and the internal layer of ideology and thinking. Through the cultural hierarchy theory, the

cultural connotation of the fusion of Chinese iron painting design is excavated to achieve cultural identity.

6) Emotional level theory.

The emotional three-level theory was proposed by foreign scholar Norman, which mainly divides the design goals into three levels, namely instinctive level design, behavioral level design and reflective level design. Through the emotional level theory, we can explore the emotional factors of Chinese design fusion and achieve emotional identification.



CHAPTER 2 LITERATURE REVIEW

The purpose of the literature review is to summarize the existing research on Chinese iron painting, analyze the application practice of the theory of design fusion in Chinese iron painting, explore the role of Chinese iron painting design fusion in cultural and creative product design and cultural inheritance, as well as related research theories and methods. Condensing and improving key information and features can significantly enhance the research value of the project.

Iron painting is a traditional handicraft art in ancient China, and its main function is decoration and aesthetics. In China, people like Chinese landscape paintings to decorate rooms, cultivate sentiments, and highlight their unique aesthetics and life pursuits. Chinese iron painting is based on Chinese painting and is made of iron materials by hand forging. It has a 350-year development history. It is a unique traditional craft in China and has been selected into the first batch of China's national intangible cultural heritage catalog. It occupies an important position in Chinese traditional culture. The research on the design fusion of Chinese iron painting not only focuses on the fusion with modern design, but also focuses on the historical background, aesthetics, value, characteristics, and traditional Chinese creation ideas and spiritual connotations of iron painting.

The literature review of this chapter mainly includes the following eight parts:

- 2.1 History and development of Chinese iron painting
- 2.2 Aesthetics and value of Chinese iron painting
- 2.3 Fusion and innovation of traditional craftsmanship and design
- 2.4 Design of cultural and creative products of Chinese iron painting
- 2.5 Cultural inheritance of Chinese iron painting
- 2.6 Research gaps and potential opportunities
- 2.7 Theory and related research
- 2.8 Summary

2.1 Historical development of Chinese iron painting

2.1.1 Origin of Chinese iron painting

China is the country that created iron smelting technology and used ironware the earliest in the world (Yang & Zhang, 1989). With the continuous development of iron smelting technology and the increase of iron materials, after forging weapons, farm tools and daily necessities, iron smelting technology began to shift from practical objects to daily decorations. During the reign of Emperor Kangxi of the Qing Dynasty, Chinese iron painting was formed in Wuhu, making the ironmaking technology that served people's farming and daily use become iron painting that meets people's decorative and aesthetic needs. It has a history of 350 years to date, which has a profound impact on the development of Chinese traditional crafts and has become a witness to China's superb iron smelting technology.



Figure 4 Ancient iron smelting technology diagram
 Note. Tiangong Kaiwu (1637)

Chinese iron painting was born in Wuhu City, Anhui Province, China in the late Ming and early Qing dynasties. It is a beautiful cultural name card of Wuhu City. Wuhu is an ancient city with a history of more than 2,000 years. It is located in the southeast of Anhui Province and the lower reaches of the Yangtze River. The Yangtze River flows slowly from the west to the east of the city. Since ancient times, it has been a major town in the south of the Yangtze River with smooth water and land transportation and a prosperous economy. It is the second largest city in Anhui Province and is known as the "Famous Town in Jiangdong" and the "Famous District of Wu and Chu". The permanent population is 3.654 million. Wuhu's metal smelting technology occupies an important position in history. The rich mineral resources and long history of metal mining and smelting make Wuhu one of the earliest regions to appear iron tools. From the Western Zhou Dynasty to the Tang and Song Dynasties, bronze smelting technology reached its peak. The Sword of the King of Yue and the Sword of the King of Wu unearthed in Wuhu area have been buried underground for thousands of years, but they are still cold, sharp, and exquisitely crafted. Especially in the Ming and Qing Dynasties, there was a saying among the people that "iron becomes steel in Wuhu", and the unique Chinese iron painting art was born on this basis (S. Liu, 2013). Figure 3 shows the location of Anhui Province on the map of China, and the location of Wuhu City in Anhui Province. It belongs to the Jiangnan region of China, with convenient transportation, prosperous economy, and many cultural celebrities.



Figure 6 Wuhu Copper Mine Site (Western Zhou Dynasty to Song Dynasty)
Note. Wuhu Archive 2023.



Figure 7 Wuhu Shenshan Sword Casting Site
Note. Photographed by researchers 2023



Figure 8 "King Wu Guang Sword" unearthed in Wuhu (Spring and Autumn Period)
Note. Wuhu Nanling County Museum 2023.



Figure 9 *Gan Jiang and Mo Ye sculptures in Wuhu City Square*
Note. Photographed by researcher 2023

Chinese iron painting is the product of the combination of iron and painting, which originated from folk ironmaking skills. Chinese iron painting is a creative combination of Chinese ironmaking technology and Chinese painting art, and is also a treasure of Chinese folk art (Peng, 2020). Wuhu has been rich in iron ore in history. When the great Tang Dynasty poet Li Bai wandered in Wuhu, he wrote the poem "The furnace fire illuminates the world, and the red stars are in chaos with purple smoke. Hao Lang sings on a bright moon night, and the song moves the cold river." This shows that 1,200 years ago in the Tang Dynasty, the iron ore mining and smelting in this area had a certain scale. With abundant iron ore and a high level of smelting, high-quality iron can be provided, creating material conditions for the development of the blacksmith industry. The Song Dynasty "Wuhu County Chronicles" recorded the famous poet Huang Shangu's poem describing Wuhu's superb sword-making technology: the ancient sword touches the sky, and the cold light opens Tai'a (Yang & Zhang, 1989). The "Wuhu County Chronicles" during the Jiaqing period of the Qing Dynasty recorded: "There are dozens of steel companies in the city, and hundreds of people are needed to work every day." This shows that Wuhu's iron smelting industry has been very developed throughout the ages. In the early days of the founding of New China, there were 192 blacksmith shops in Wuhu. In the 1980s, there were more than 300 people in Wuhu who had superb ironmaking skills. It is precisely because of the long history of iron smelting and ironmaking, as well as the many blacksmiths engaged in ironmaking, that the Chinese iron painting production skills have been developed.

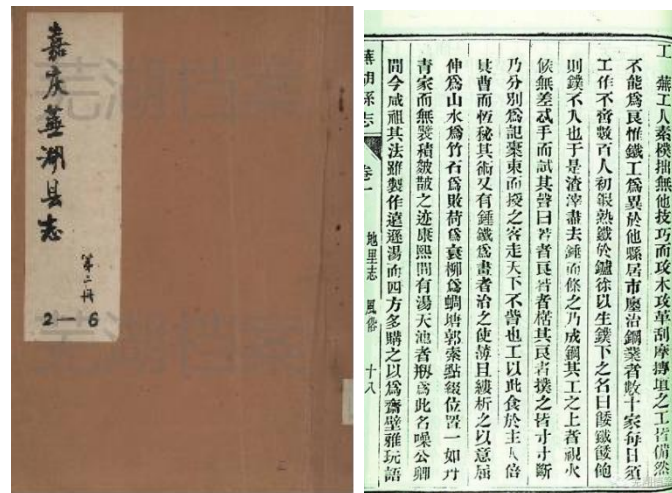


Figure 10 Records the smelting situation in Wuhu during the Jiaqing period of the Qing Dynasty
 Note. *Jiaqing Wuhu County Annals 1807.*

After having iron materials and ironmaking technology, painters are needed. The combination of the two can produce iron paintings. Chinese iron paintings mainly refer to Chinese paintings. Wuhu has been a place of cultural gathering since ancient times. Many painters have lived here, such as Xiao Yuncong, Tang Yansheng, Fang Zhaozeng, Han Tao, etc. They have successively stayed in Wuhu. In particular, the "Xin'an School of Painting" has brought profound influences on the folk customs of Wuhu, and also planted the seeds of art in the hearts of many blacksmiths. The works of the Xin'an School of Painting are mainly simple, line-based, and dot-based. The paintings are composed of different levels of points, lines, and blocks. The brushwork is simple and sparse, and the lines are thin, which is suitable for the blacksmith's hammering skills. The original Chinese iron painting craftsmen got great inspiration from it. The forged Chinese iron paintings not only have the effect of Chinese paintings, but also have strong three-dimensional and perspective, black and white complement each other, and virtual and real coexist. At the same time, Chinese paintings have a broad mass base in society. People like Chinese paintings and thus also like Chinese iron paintings with Chinese paintings as the expression content.

The creation of Chinese iron painting is inseparable from two people, one is the blacksmith Tang Tianchi, and the other is the painter Xiao Yuncong (1596-1673). They are neighbors, and the cooperation between the two made Chinese iron painting possible. Tang Tianchi has a Chinese iron painting of landscapes, "River and Mountain Smoke and Mist", which is now in the Zhenjiang Museum of Jiangsu Province, China. It has a history of more than 300 years, and the picture still has a unique charm (Peng, 2020). Xiao Yuncong was a famous painter in the late Ming and early Qing dynasties, the founder of the Gusu School of Painting, and his most influential work was the 43 "Taiping Landscapes". Tang Tianchi was a skilled blacksmith who was very interested in painting. In his spare time, he often went to see the painter Xiao Yuncong paint. Xiao Yuncong was moved by Tang Tianchi's diligence and tenacity, so he taught him to paint and personally designed the iron painting drafts, and jointly studied the Chinese iron painting production techniques. Under the long-term cooperation of the two, Chinese iron painting was formed.



Figure 11 Tang Tianchi, "Mountains and Streams in Mist", 140*76cm, Qing Dynasty
Note. Zhenjiang Museum 2023.

In summary, the origin of Chinese iron painting is closely related to the rich iron ore resources in Wuhu, the advanced metal smelting technology in ancient times, the long-standing traditional cultural accumulation, and the cooperation between blacksmiths and painters. The formation of Chinese iron painting art is closely related to the social, economic and cultural conditions at that time, especially the level of iron smelting technology, carving craftsmanship and painting (Shen, 1984).



Figure 12 Tang Tianchi and Xiao Yuncong collaborated to create a sculpture of Chinese iron painting
Note. Photographed by the researcher in 2023

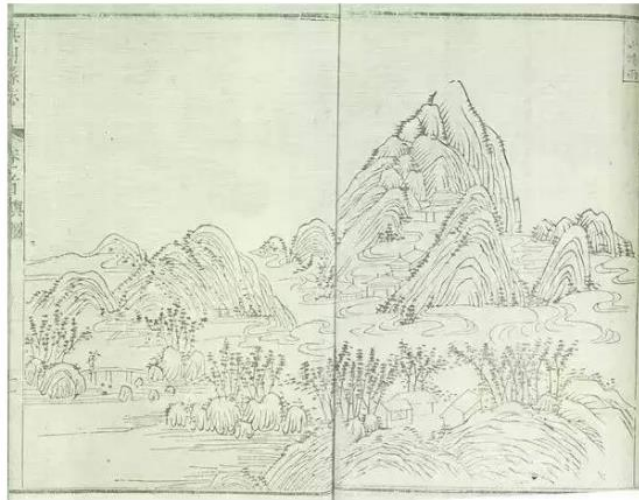


Figure 13Xiao Yuncong, "Painting of Taiping Mountains and Waters: Rain on the Divine Mountain" (1648)

Note. "Illustrated History of Chinese Printmaking", 1930



Figure 14Tang Tianchi's work "Four Seasons Flowers and Birds", Qing Dynasty
Note. Palace Museum 2023

2.1.2 Important historical stages of Chinese iron painting

1) Important historical stages of Chinese iron painting

Chinese iron painting has a history of more than 350 years. Due to various historical and contemporary reasons, it has progressed slowly in a tortuous development. Its development history includes the following four stages: formation and maturity, development trough, development prosperity, and exploration and revitalization.



Figure 15 *History of the development of Chinese iron painting (design drawing)*
 Note. Provided by Gao Wenqing 2023



Figure 16 *History of the development of Chinese iron painting (physical image)*
 Note. Photographed by researcher 2023

Figure 13 History of the Development of Chinese Iron Painting This large iron painting work is divided into 7 parts, telling the formation and development process of Chinese iron painting. They are: (1) The scene of blacksmith Tang Tianchi taking a boat to Wuhu; (2) The scene of Tang Tianchi and Xiao Yuncong making iron paintings together; (3) The scene of Liang Zaibang making the iron painting "Reed Crab Picture"; (4) Emperor Qianlong of the Qing Dynasty admiring Chinese iron paintings in the palace; (5) Monk Liaochen instructing blacksmiths to make Chinese iron paintings in the temple; (6) The scene of the Shen family father and son trading Chinese iron paintings with foreigners; (7) Wuhu Arts and Crafts Factory became the birthplace of modern Chinese iron painting.

Formation and Maturity Period (1644-1775).

Regarding the time when Chinese iron painting was formed, considering that Tang Tianchi and Xiao Yuncong lived during the Shunzhi and Kangxi periods of the Qing Dynasty (1644-1722), combined with the time when Liang Zaibang lived (1693-1775), the formation and maturity stage of Chinese iron painting was roughly between 1644 and 1775. This lesser-known craft was popular in Wuhu, Anhui Province, and was developed in the late 17th century by blacksmith Tang Penghe under the guidance of local landscape painter Xiao Yun (Messerschmidt, 2014). Once formed, Chinese iron paintings were appreciated by all walks of life. Officials and dignitaries bought and appreciated them, and literati wrote poems and essays to praise them. Among them were Zhu Wenzao, Liang Tongshu, Wei Qianheng, Wu Yan, Lu Xixiong, Huang Yue, Zhu Delin, etc., all of whom highly praised the artistic achievements of Chinese iron paintings and made outstanding contributions to the development and promotion of Chinese iron paintings. During the Qianlong period,

Chinese iron paintings were sent to the court and were deeply loved by the emperors of the Qianlong and Jiaqing dynasties. They were once presented as state gifts to foreign envoys. At that time, many people scrambled to buy them, put them in wooden frames and hung them on the wall. Like Chinese paintings, each one was very expensive and not easy to buy (Xu, 1885). Liang Tongshu pointed out that Tang Tianchi's wrought iron paintings of grass, insects, flowers, bamboo and landscapes were as exquisite as those of famous artists (Committee, 2010).



Figure 17 Blacksmith making Chinese iron painting, Republic of China, photographed by German photographer (Hedda Morrison)

Note. Provided by Shen Tao 2023



Figure 18A blacksmith paints a Chinese iron painting, during the Republic of China, photographed by German photographer Hedda Morrison

Note. Provided by Shen Tao 2023

After Tang Tianchi, Liang Zaibang inherited and developed Chinese iron painting. The "Jiande County Chronicles" during the Xuanton period of the Qing Dynasty recorded that Liang Zaibang was smart and talented, and could write poems and paint. Because he failed many exams, he amused himself by forging iron. As long as the painter could draw, he could make it with iron. After his death in his eighties, the Chinese iron painting technique was lost. Liang Zaibang focused on the expression of brushwork and texture, and the scenes in the pictures were realistic, and the lines were vivid and natural, making Chinese iron painting full of novelty. Because Liang Zaibang was good at painting, the biggest feature of making Chinese iron paintings was to forge paintings with literature. His works have profound artistic

conception, ingenious composition, unique shape, poetic feeling, and no craftsmanship (Yang & Zhang, 1989). Liang Zaibang's current Chinese iron painting works "Reed Crab Picture", "Flowers and Birds", and "Landscape" are collected in the Anhui Provincial Museum. Liang Zaibang's literati painting style iron painting has always influenced the creation of later generations. He improved the production techniques of Chinese iron painting, such as chiseling, stacking, filing, and welding. These techniques in iron painting crafts are still in use today. Tang Tianchi created Chinese iron painting, and Liang Zaibang made Chinese iron painting mature as a unique art (Yang & Zhang, 1989). Chinese iron painting during this period was mainly used as home decoration and hanging lamps.



Figure 19 Liang Zaibang, *Bamboo and Rocks*, 187.5*97.5, Qing Dynasty
Note. Anhui Provincial Museum 2023



Figure 20 Liang Zaibang, *Reed Crab*, 63.7*77, Qing Dynasty
Note. Anhui Provincial Museum, 2023

Development trough (1776-1954)

After Tang Tianchi and Liang Zaibang, Chinese iron painting entered a long period of depression, which was approximately from 1776 to 1954. Wang Fengyi said that after Tang Tianchi's death, many people imitated his iron painting, but none of them achieved the desired effect (Xu, 1885). More than ten years after Tang Tianchi's death, the method of making iron paintings had not been passed down to anyone. There were people who imitated his works, but the works they made lost the charm of the works (Committee, 2010; Zheng, 2014). Liang Tongshu pointed out that iron painting is a fusion form of Chinese painting combined with ironmaking techniques, and no one could inherit it after Tang Tianchi's death (Zheng, 2014).

During the trough period when no one inherited and developed Chinese iron painting, the monk Liaochen from Wuhu organized blacksmiths to restore the Chinese iron painting production skills, promoting the inheritance and development of Chinese iron painting. Monk Liaochen was the abbot of Wuhu Nan Temple. He was good at calligraphy and painting and loved Chinese iron paintings. He organized a group of blacksmiths to come to the temple to make Chinese iron paintings, providing furnace fire, iron materials and drawings. Monk Liaochen lived and ate with the blacksmiths and studied the production skills of Chinese iron paintings together. After repeated exploration and practice, the Chinese iron painting skills were finally restored. Among this group of blacksmiths, there was a man named Shen Guohua, who had the most exquisite Chinese iron painting skills. He established the Shen Yixing Blacksmith Shop in Wuhu and ran it with his son Shen Dejin, mainly making daily necessities and Chinese iron paintings.



Figure 21 Wuhu Museum displays the production scene of Chinese iron paintings
Note. Photographed by researchers 2023

After Wuhu became a trading port in 1876, it developed into one of China's four major rice markets. The wharf traded goods frequently. At that time, there were many iron shops in Wuhu, which was the heyday of Wuhu iron smelting. Shen Guohua's blacksmith shop mainly made Chinese iron paintings and sold them to people from other places who came to Wuhu for business. Foreign businessmen and missionaries from the Catholic Church bought them and took them back to their own countries as gifts. At this time, a batch of Chinese iron paintings spread abroad. The "Wuhu County Chronicles" in 1919 recorded: "Although iron paintings do not have the magical craftsmanship of Tang Tianchi, the skills have been passed down, and there

are many exquisite works, and people are also scrambling to buy them." After Shen Guohua died in 1924, his son Shen Dejin inherited his father's business and continued to make iron paintings until Japan launched the war of aggression against China in 1937. After the Japanese army occupied Wuhu in December of the same year, Shen Dejin stopped making Chinese iron paintings. Shen Dejin passed away in 1951, and he passed on the skills of making Chinese iron paintings to his apprentice Chu Yanqing. Chu Yanqing was born in Congyang County, Anhui Province. At the age of 12, he was introduced by a neighbor to work as an apprentice in a blacksmith shop to learn crafts. At the age of 19, he worked in a blacksmith shop in Wuhu. In 1928, when he was 26 years old, he joined Shen Yixing's blacksmith shop. Two years later, he graduated and opened the "Chu Yongchang" blacksmith shop in Wuhu, mainly engaged in iron tools and Chinese iron paintings.

During the low period of Chinese iron painting, most of the works were small pieces, and there was no certain influence and representative works. Due to the influence of war factors, the existing Chinese iron paintings from the late Qing Dynasty and the Republic of China are mainly collected in foreign museums, such as some museums in the United States, Britain and Germany.



Figure 22 Four pieces of iron painting palace lanterns (1860-1900), now in the collection of the Mannheim Museum in Germany

Note. Provided by Shen Tao 2022



Figure 23 Plum, Orchid, Bamboo and Chrysanthemum, now in the British Museum, (late Qing Dynasty)

Note. Provided by Shen Tao 2023

Development and prosperity period (1955-2002)

After the founding of the People's Republic of China, the principle of "letting a hundred flowers bloom" was adopted for culture and art. In 1955, the government began to explore the Chinese iron painting skills and found Chu Yanqing, the only person who survived and knew how to make Chinese iron paintings, which opened the prelude to the prosperity and development of Chinese iron paintings. In August

1956, Chu Yanqing produced the first iron painting work in New China, "The Legend of the White Snake: Meeting at the Broken Bridge", which laid a good foundation for the inheritance and development of Chinese iron paintings. In 1958, the "Wuhu Craft Factory" was established, mainly producing Chinese iron paintings, paper paintings, pile lacquer paintings and feather fans.

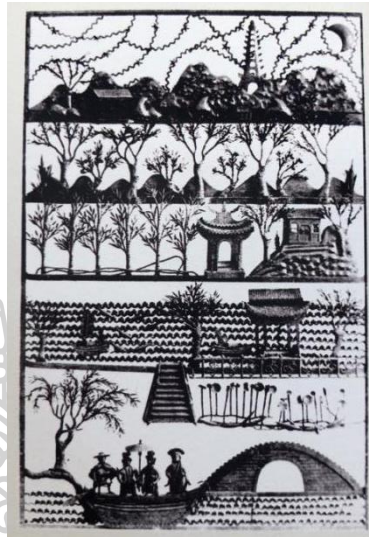


Figure 24 The first iron painting in New China, "The Legend of the White Snake: Meeting at the Broken Bridge", 1956
Note. Provided by Shen Tao 2023



Figure 25 Chairman Mao viewing Chinese iron paintings in 1958
Note. Provided by Shen Tao 2023

In order to improve the creation and production level of Chinese iron paintings, the Wuhu Municipal Government organized famous painters such as Zhang Zhenyi, Wang Shicen, and Liu Wentian to live and work with Chinese iron painting craftsmen. The painters not only created Chinese iron painting designs, but also taught Chinese iron painting masters art knowledge. During this period, the Arts and Crafts Factory admitted high school graduates with art expertise, and Chu Yanqing also recruited two batches of apprentices to learn Chinese iron painting. In 1958, to celebrate the 10th anniversary of the founding of New China, the Great Hall of the People in Beijing was about to be completed, and the provinces needed to carry out internal

decoration. Chu Yanqing took eight disciples and carefully produced a 4.5-meter-long and 2.75-meter-high iron painting "Welcoming Pine" after a year of careful production. The work was finally displayed in the National Reception Hall of the Great Hall of the People. In 1959, the large-scale iron paintings "Huangshan Lotus Peak" and "Guanshan Snow--Great Wall" were selected to participate in the exhibition in Budapest, the capital of Hungary; in the same year, "Pine Eagle", "Flower Butterfly" and "Cowherd and Weaver Girl Smile" participated in the Paris World Expo in France.

In 1965, the "spot welding machine", an electric heating machine for Chinese iron paintings, was successfully developed, replacing the traditional coal-fired furnace, reducing the heavy labor of iron painting masters, increasing work efficiency by 70%, and promoting a significant improvement in the skills, quality, output and artistic effects of Chinese iron paintings (Cente, 2018). The successful development of the spot welding machine has overcome the problems of cumbersome heating, waste of resources and environmental pollution of iron paintings. At the same time, it has also made iron painting production bid farewell to the problem of teamwork, greatly promoted the large-scale production of iron painting technology, and solved the main heating equipment problem for the prosperity and development of iron paintings. Starting in 1966, due to the influence of the Cultural Revolution in China, the production of iron paintings was discontinued, and iron painting workers moved to industrial hardware and agricultural production tools.



Figure 26 Made in 1959, displayed in the Welcoming Pine at the Great Hall of the People in Beijing

Note. Provided by Gao Wenqing 2023



Figure 27 Heating and welding machines used to make Chinese iron paintings in the 1960s and 1970s

Note. Photographed by researchers 2023



Figure 28 In the 1960s, Chu Yanqing analyzed the drawings for his apprentice

Note. Provided by Shen Tao 2023



Figure 29 In the 1950s, Chu Yanqing adjusted Chinese iron painting

Note. Provided by Shen Tao 2023

In the first ten years of the prosperity of Chinese iron painting, many talents were cultivated for the development of China's iron painting industry. With the emergence of China's iron painting heating machine spot welding machine and the support of the government, China's iron painting craft continued to prosper. In March 1970, the State Council of China held a national planning work conference and put forward the slogan of "promoting a new leap in the national economy". Premier Zhou Enlai instructed that industrial products could be organized for production and export. In 1970, the production of Chinese iron painting was resumed. In addition to Chu Yanqing, the representative figures of Chinese iron painting during this period included Yan Changgui, Wu Zhixiang, Zhang Decai, Tang Chuansong, Zhang Jiakang, Chu Jinxia and Ye He.

In May 1973, the Chinese iron painting products of Wuhu Arts and Crafts Factory were allowed to be exported to exchange foreign exchange for the country. In 1977, Mao Zedong's poem "Long March" was forged for the "Chairman Mao Memorial Hall". The work factory was 8.8 meters long and 2.32 meters high, which was highly praised by the central leaders and Beijing artists. In 1982, the first large-scale three-dimensional openwork Chinese iron paintings "Pine Crane Picture" and "Ink Bamboo Picture" were innovatively forged, integrating Chinese iron painting craftsmanship with sculpture. In 1983, the "China Wuhu Iron Painting Exhibition" was held in Washington, USA. In 1984, the Anhui Hall of the Great Hall of the People produced a large-scale Chinese iron painting "Three Friends of Winter". In 1985, Chinese iron painting continued to innovate in themes and forms, with large-scale iron paintings such as hanging screens and floor screens, as well as display ornaments and tourist souvenirs. The iron painting products "Welcoming Pine" and "Huangshan Scenery" won the National Excellent Tourism Product Award. In 1986, porcelain plate iron painting was innovated. In 1987, the large-scale iron painting "Jiangcheng into the Painting" was completed. This work integrated iron painting craftsmanship and mural craftsmanship for the first time, expanding the outer edge of iron painting.

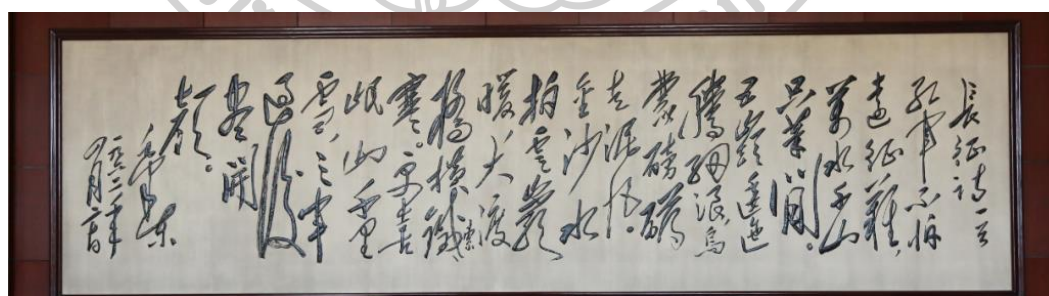


Figure 30 Chinese iron painting calligraphy: Mao Zedong's poem "Seven-Character Verse • Long March"

Note. Chairman Mao Memorial Hall 2022

In 1990, Chinese iron painting master Ye He presided over the development and production of the Chinese iron painting "Panda Panpan", the mascot of the 11th Asian Games of the People's Republic of China, which was made into 10,000 Chinese iron painting hanging plates as designated gifts for the Asian Games. In 1992, Chinese iron painting masters began to forge Chinese gold paintings. In 1994, colored Chinese iron paintings were produced. This was the first time that iron paintings with black

and white as artistic features were turned into colored iron paintings, marking a new development in iron painting technology. In 1995, decorative iron paintings for the gates, inner doors and windows of the National Committee of the Chinese People's Political Consultative Conference Office Building were customized, showing the perfect combination of design and handwork. In 1996, Wuhu Arts and Crafts Factory had the capacity to produce 200,000 iron paintings annually, and its products were exported to five continents in the world. In 1997, a huge iron painting "Xia Wei Qianqiu" was produced, which was presented to the Hong Kong Special Administrative Region by the Anhui Provincial People's Government to celebrate the return of Hong Kong. In 2002, the Chinese iron painting gate was made for the Publicity Department of the CPC Central Committee, combining design and craftsmanship again, expanding the application of iron painting from indoor decoration to outdoor decoration. In 2002, the Wuhu Arts and Crafts Factory was transferred from the government to the enterprise, and Chinese iron painting craftsmen began to change their jobs, heralding the end of the prosperous period of the development of Chinese iron painting technology.



Figure 31 Iron painting of porcelain plate, mascot of the 11th Asian Games (Panda Panpan)

Note. Anhui Archives 2023

In 2005, Wuhu Arts and Crafts Factory was sold to a private enterprise. Before the restructuring, it was mainly a government-led behavior. The Crafts Factory was the only main body of iron painting production in China. From product design, product sales, industry atmosphere and other aspects, it was the peak period of China's iron painting development. It cultivated a large number of senior engineers, arts and crafts masters, senior arts and crafts artists and other professional talents. At its peak, there were more than 500 employees and the working area exceeded 10,000 square meters. After the Arts and Crafts Factory went bankrupt, many workers changed their jobs. Most people believed that the restructuring was a failure, which brought great challenges to the development of Chinese iron painting. The prosperous development stage broadened the types of Chinese iron painting, expanding Chinese iron painting from traditional artistic decorative paintings to screen iron painting, porcelain plate iron painting, color iron painting and ornament iron painting.



Figure 32 In the 1970s, Chinese iron painting works of Peking Opera model plays
Note. Photographed by researchers 2023



Figure 33 China Iron Painting Arts and Crafts Factory in the 1990s
Note. Provided by Qian Tao 2023

Exploration and revitalization period (2003-present)

With the transformation of Wuhu Arts and Crafts Factory into a private enterprise in 2002, the development of Chinese iron painting ushered in another stage, and private enterprises and personal workshops began to dominate the inheritance and development of Chinese iron painting. Some masters who came out of the arts and crafts factory were professionally engaged in other work, some made Chinese iron paintings at home, and some set up companies and personal studios, starting the exploration stage of the revitalization and development of Chinese iron painting. To this day, the road to revitalization still faces many challenges. For example, Zhang Jiakang, Zhang Decai, Yang Yong, Ling Xiaohua and others set up personal studios to make iron paintings or. Chu Jinxia, Gao Wenqing, and Xing Houfan established the Chinese Iron Painting Company. Chu Tiewi and Nie Chuanchun went to schools to teach and make Chinese iron paintings. In 2006, the Chinese iron painting forging technique was selected into the national intangible cultural heritage list, which made the Chinese iron painting technique once again receive national attention. University scholars began to conduct theoretical and practical research on the protection, inheritance and innovative development of Chinese iron painting. In 2012, Chu Jinxia became a national representative inheritor of the Chinese iron painting forging technique. In 2016, Wuhu City passed the Regulations on the Protection and Development of Iron Paintings, and the Wuhu Iron Painting Association was

established in the same year. In 2018, Chinese iron painting craftsmanship was selected into the first batch of national traditional craft revitalization catalogs, and the revitalization of Chinese iron painting has become the focus of national attention and support.

In 2009, Zhang Jiakang led a team of iron painting craftsmen to cooperate with Zhao Jianfeng, a famous Chinese sculptor and muralist, to produce a three-dimensional openwork iron painting work "Iron Danqing", which is 2.5 meters high and 9 meters long. It also went to Beijing to participate in the Third China Mural Exhibition and won an award. This work is a successful attempt at iron painting and sculpture. In the same year, Jinxia's team cooperated with Zhang Zhihe, a famous Chinese calligrapher, to make his regular script "Ode to China" into a Chinese iron painting calligraphy work. The work is 18 meters long and 3.72 meters high and is hung in the central golden hall of the Great Hall of the People. In 2015, Zhang Jiakang completed the Chinese iron painting "Dwelling in the Fuchun Mountains" with reference to Huang Gongwang's Chinese painting "Dwelling in the Fuchun Mountains" in the Yuan Dynasty. The work is 10.9 meters long and 0.62 meters high, showing the unique artistic charm of Chinese iron painting production skills. In 2017, Chu Jinxia's team cooperated with painter Wang Xiaolin to create a huge Chinese iron painting "Huizhou Merchants Prospered in Jiuzi", combining Chinese iron painting with architecture into public art. The work was certified by the Guinness World Record for the Largest Chinese Iron Painting. The Chinese iron painting "Huizhou Merchants Prospered in Jiuzi" covers an area of 115.91 square meters, is 15.77 meters long and 7.35 meters high. This world's largest Chinese iron painting restores the characteristic scenes of Huizhou ancient villages, Wuhu Tianmen Mountain, Big and Small Mirror Lakes, Zheshan, Guangji Temple, Pagoda Root, Qingyi River Old Floating Bridge, Jiuzi Ancient Town, etc. In 2023, the Chinese iron painting work "Happy Family" produced by Yang Yong and the designer team of Anhui University of Architecture, which integrates Chinese iron painting with public art, was erected in Luogang Central Park, Hefei. This work is presented in a three-dimensional form by electric welding, giving it a new artistic style, bringing visual shock and aesthetic enjoyment to people.





The representative large works during the revitalization period of Chinese iron painting are basically participated by painters or designers. Without their drawings and design drafts, iron painting craftsmen cannot make them. In the process of Chinese iron painting production, the first step is to design and draw drawings, which shows the importance of design to the development of Chinese iron painting. In the history of the development of Chinese iron painting, skilled iron painting craftsmen and artists with rich painting skills are the basis for the prosperity of iron painting in various periods (Fang & Li, 2016). The development of Chinese iron painting has gone through several stages of development under the cooperation of artists and blacksmiths. Close cooperation leads to better development, and vice versa, slow development.



Figure 34 Chinese iron painting "Huizhou merchants started from Jiuzi" the world's largest iron painting

Note. Photographed by researchers 2023

Table 1 Representative figures and works of Chinese iron painting in different periods

Period	Time period	Representatives	Representative Works	Picture
Formation and maturity	1644-1775	Tang Tianchi, Liang Zaibang	Landscape Painting	
Development trough	1776-1954	Shen Guohua, Shen Dejin	Plum, Bamboo and Chrysanthemum	
Prosperity	1955-2002 (1966-1969, product ion stopped during the Cultural	Chu Yanqing, Yang Guanghui, Zhang Decai, Yan Changgui, Tang Chuanson	Welcoming Pine, Reservoir, Meishan Guo Moruo's inscription	 

	Revolution)	g, etc.	
Revitalization	2003 to present	Chu Jinxia, Zhang Decai, Zhang Jiakang, Ye He, Chu Tieyi, Ling Xiaohua, etc.	Funny Chicken Picture, Happy Spring, Dwelling in the Fuchun Mountains
Exploration			
Period			



Note. Researcher produced 2024

As can be seen from the table above, the representative works of iron paintings in each period all refer to traditional Chinese paintings. The form is mainly traditional wall hangings, and the content and elements are mainly natural themes of landscapes, plum, orchid, bamboo, chrysanthemum, pine trees, and animals such as horses and chickens. With the development of the times, the production of iron paintings has become more and more sophisticated, and the size has begun to change from small to large works. These works reflect the composition form, aesthetic taste and traditional Chinese creative concepts of Chinese paintings, and design thinking and form are basically less involved.

2.1.3 The production process and process of Chinese iron painting

1) Process

There are relatively few studies on the production techniques, tools and equipment used in Chinese iron painting. Chinese iron painting uses iron as raw material, which is smelted in a red furnace and then made by forging, drilling, lifting, pressing, welding, filing, chiseling and other techniques (Song, 2023). The production of traditional Chinese iron painting requires the following processes: designing drawings, selecting materials, cutting and chiseling materials, red forging, cold forging, joining, shaping, rust removal, painting, mounting and framing.

Table 2 Chinese iron painting production process flow chart

Step	Picture
------	---------

a. Draw or design drawings



b. Material selection



c. Cutting and chiseling



d. Red forging (hot forging)



e. Cold forging



f. Welding



g. Plastic surgery



h. Rust removal



i. Painting



j. Mounting in a frame



Note. Researcher produced 2024

The table above shows the complete process of Chinese iron painting production. Since Chinese iron painting is made with reference to Chinese painting, the draft of process a is usually drawn by professional painters, and the craftsmen do not have the ability to draw and design. This situation remains to this day, which seriously restricts the development of Chinese iron painting. From process b to process i, the iron painting craftsmen are independently completed, and process j is handed over to professional mounting craftsmen. Different woods are selected to make picture frames and installed according to the size specifications and price positioning of the works. In the entire process, a and j are not controlled by the iron painting craftsmen. They are respectively responsible for the painter and mounting craftsman. The lack of Chinese iron painting craftsmen in the design of the draft a and the mounting of the later stage j shows that the production content and the final presentation form are not under their control. The role of Chinese iron painting craftsmen is only the production of iron paintings.

a. Design the draft, the painter or designer designs and draws the draft according to the content and theme to be expressed.

b. Material selection, the raw materials used for iron painting are mainly low-carbon steel plates, round steel wires, etc. Material selection is to select materials close to the size and thickness of the picture according to the draft to save workload.

c. Cutting and chiseling materials. Use tools such as steel-embedded scissors and sharp steel chisels to make preliminary drawings of raw materials such as iron plates, round steel, and iron wires according to the design.

d. Red forging. Heat the iron painting sample on the stove. While it is red hot, use large and small hammers to knead and forge the iron on the anvil quickly and repeatedly. The secret of Chinese iron painting production lies in the word "forging". "Red forging is soft", which can obtain better ductility of iron materials and facilitate shaping.

e. Cold forging refers to striking with a hammer at room temperature. "Cold knocking makes it hard, and cold forging shows style" reflects the role of cold forging and the artistic effect it presents.

f. Joining fire, that is, welding. Chinese iron paintings are basically composed of multiple separately forged parts. "Joining fire" is to put the two parts to be spliced into the furnace and heat them at the same time. At the moment when the metal surface

begins to melt but the inside has not yet melted, quickly take them out and forge them to quickly join the two parts.

g. Shaping is an important process in the formation of Chinese iron paintings, that is, using special tools such as pliers, hammers, chisels, and files to shape, file, and fine-tune the basically formed iron paintings according to the drawings.

h. Rust removal: After the main body of the Chinese iron painting is completed, it is annealed, annealed, pickled, and phosphated to remove the debris and grease on the surface of the iron painting and remove the floating rust layer on the surface.

i. Painting: The baking paint is sprayed, brushed, and painted. First, a layer of anti-rust primer is applied on the surface of the Chinese iron painting, and then a layer of metallic paint is applied, and then it is dried.

j. Mounting and framing, which are divided into mounting and framing. Mounting: In the early days, Chinese iron paintings generally used wooden boards to mount rice paper or silk as the substrate. Framing, its main function is to hang and prevent dust, that is, the mounted iron painting is framed with wooden frames and glass, and hooks are prepared.



Figure 35 Chinese iron painting staff are mounting golden Chinese iron paintings
Note. Photographed by researchers 2023

2) Chinese iron painting production technology

The production skills of Chinese iron painting mainly include: forging, filing, welding, riveting, engraving and other processes.

Forging is called forging and forging. It is divided into hot forging and cold forging. Hot forging, the ancient method uses a red furnace forging. A large furnace is placed in the middle of the room, and a bellows is placed on the side of the furnace. When the bellows are pulled, wind enters the furnace, and the flames in the furnace cavity jump straight up. The iron pieces to be forged are first burned red in the furnace, and then moved to the large iron pier. Two people are divided into upper and lower hands to forge. Cold forging refers to the rapid forging of Chinese iron painting parts without heating at room temperature to make them into the desired shape. Cold forging can strengthen the metal and increase the strength of the parts.

Filing and grinding, use different file tools to grind Chinese iron painting works, remove surface defects, trim burrs, and trim the outer edges to obtain the correct shape. When filing, choose a file with suitable shape, size, and file pattern for filing.

Use a flat file for convex arc surface and a round, semicircular, or elliptical file for concave arc surface.

Welding is the most delicate process in Chinese iron painting. Chinese iron painters call it fire connection. The segmented iron painting parts are put together by forging welding. First, heat the two parts to be welded. Keep an eye on the temperature until they are about to melt. Take them out and knock them quickly. Sprinkle fine soil after welding to prevent oxidation.

Riveting, also known as riveting, is a cold connection method. In iron painting, it is often used to make multi-petal flowers, such as plum blossoms and chrysanthemums. The holes of the multiple petals and stamens are aligned, and a metal pin with the same diameter as the hole is inserted. Use a hammer to upset the tip of the metal pin into a head, press the corresponding multi-petal parts with holes, and play a fastening role.

Chiseling is a process method used for cutting Chinese iron paintings; using a chisel and a hammer to hollow out and chisel on the surface of the metal block, remove the unnecessary parts and leave a complete pattern, which is suitable for cutting fine patterns in iron calligraphy and iron painting. When operating, hold the chisel in one hand and the hammer in the other hand, and use the chisel to shape the surface of the iron block.



Figure 36 Chinese iron painting production process: hot forging, cold forging, engraving

Note. Photographed by researcher 2023

2.1.4 Tools and changes in the production of Chinese iron paintings

The tools and equipment used in the production of Chinese iron paintings mainly include furnaces or spot welders, anvils, hammers, pliers, chisels, chisel knives, scissors, and tin blocks. Since the object of production is iron material, the tools used need special steel, among which hammers and scissors require hardness of 45 or above, and chisel knives require spring steel. Among these equipment and tools, furnaces and spot welders are the main equipment for making iron paintings, which are used to heat iron materials and weld. Anvils are used as chopping boards for hammering iron materials. Hammers are mainly used for hammering iron materials. Pliers are used to clamp heated iron materials for easy forging and safety. Chisels are used to cut off the hammered iron materials. Chisel knives are used to make patterns on iron sheets. The main function of scissors is to shear iron materials. Tin blocks are used as pads when chiseling to protect chisel knives.

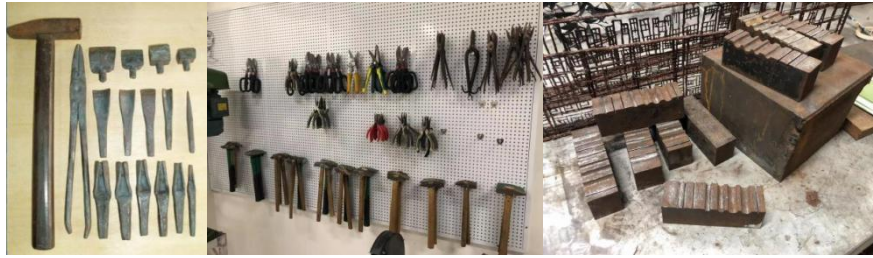


Figure 37 Some tools used to make Chinese iron paintings
 Note. Photographed by researchers 2023

For a long time, the production process of Chinese iron painting relied on coal furnaces to heat iron materials, and then forge, weld and assemble. This period lasted until 1969 after the founding of New China. Chinese iron painting is a fusion of traditional ironmaking skills and Chinese painting. The tools used in the early days were all ironmaking tools, including furnaces, bellows, hand hammers, anvils, sledgehammers, etc., and the tools were relatively rough. The iron material was heated by the traditional ironmaking furnace, which was an open furnace with poor insulation effect and slow heating. The bellows were pulled by manpower to supply air to assist combustion. The bellows are a tool for blowing air, which can make coal burn more vigorously. The production of traditional Chinese iron painting requires the cooperation of three people, one person pulls the bellows, one person uses a small hammer to mainly forge, and the other person assists with a sledgehammer. Influenced by the heating method and tools, the works are generally thick lines, simple structure, and simple and rough pictures. As shown in Figure 1, it shows the production scene of traditional Chinese iron painting.






Figure 38 Scenes of traditional Chinese iron painting production
 Note. Photographed by researchers 2023

The above picture shows the scene of Chinese iron painting production in the 1950s and 1960s, which was completed by three people. The old master used pliers to clamp the iron material to adjust and determine the hammering position, the young master used a hammer to hammer, and the apprentice was responsible for pulling the bellows. Through the cooperation of the three people, the production of Chinese iron painting was completed in an orderly manner.

After 1969, with the popularization of electricity in China, Chinese iron painting artists developed an electric heating machine-spot welding machine, which was produced by point-to-point local heating of iron materials. This technological innovation reduced the difficulty of Chinese iron painting production, turning the three-person collaboration into a single-person independent production, which not only solved the problem of coal pollution, but also greatly improved the efficiency of Chinese iron painting production and the refinement of works. At the same time, the machine is small in size, saves space, is easy to move, and is easy and safe to operate. This machine is suitable for people of different ages to operate and use, can complete the production independently, and reduces the threshold for learning Chinese iron painting. Spot welding machine heating iron is suitable for making small and medium-sized works. Combined with the update and improvement of production tools, it can express delicate and complex Chinese iron painting works. There are certain difficulties in the production of large iron paintings.

In the subsequent development, Chinese iron painting craftsmen continued to improve the spot welding machine. After 2000, the spot welding machine can adjust the power, increase the elevation angle of the machine head, and lengthen the machine arm, which is suitable for making medium and large iron paintings, but three-dimensional works are still impossible to complete and need to be welded with the help of electric welding machines. Larger Chinese iron paintings are still heated by coal stoves, and the bellows are replaced by electric blowers, which are completed by two people. The kiln has been improved to be more scientific, sealed, fast heating, and good insulation effect. The details are made with spot welding machines, which not only improves the production efficiency, but also makes up for the problem that the kiln production cannot be refined.

Table 3 *Three different heating devices for Chinese iron painting*

	Before 1969		1969-Present		2000-Present	
Heating tools	Open stove	+ bellows	Spot welding machine		Sealed furnace	+ blower
Picture						
Heating method	Coal + Human bellows		Electricity		Coal + Electric Blower	
Need people	3 people		1 people		2 people	

Works Presentation	Medium to large works, simple and rough	Small and medium-sized works, with delicate and complex works	Large works, details are made with spot welding machine
Production efficiency	Low	High	Medium
Safety	Low	High	Low

Note. Produced by researchers 2023

The above table lists the three main types of equipment used to heat and weld iron materials in China's iron paintings. Different heating methods determine the labor required, welding methods, production efficiency and safety. At present, China's iron paintings are mainly produced using electric spot welding machines, which can be operated by a single person, do not require space, are convenient and safe to use, and save energy. The use of this spot welding machine has transformed the iron painting production from multi-person production to single-person production, and is suitable for the production of fine iron painting works. Furnace production is mainly used for large-scale works or when it involves the use of iron sheet materials and when required by customers. It requires independent space. Generally, only Chinese iron painting companies have furnace equipment.

At present, in addition to the main use of spot welding machines, the use of modern equipment and processes in Chinese iron painting production techniques is also increasing, which has not affected the overall presentation effect of Chinese iron painting and has reduced the high manual costs to a certain extent (Zhou, 2024). For example, plasma is used to cut raw materials, machine tool molds are used to press accessories, etching processes are used to engrave products, electroplating processes are used to plate gold and silver on finished products, and three-dimensional works are welded with electric welders. This method of using machines to make semi-finished products, combined with manual secondary processing and assembly, has not yet been widely recognized in the Chinese iron painting industry. Most people do not approve of the use of modern machines to intervene in the production of Chinese iron paintings, believing that it reduces the handicraft characteristics of Chinese iron paintings. Therefore, the use of modern machines is limited to the production of mass products by companies. The use of these new equipment and new processes has improved the efficiency of Chinese iron painting production and promoted the innovation of product forms to a certain extent, making it possible for iron paintings to transform from artworks to handicrafts and daily necessities.

The Chinese iron painting production process now mainly uses electricity to heat iron materials with spot welding machines, and coal furnaces and blowers are combined to heat iron materials as a supplementary production method. With the development of modern technology, the tools used to make Chinese iron paintings are also changing towards a more practical and refined direction.

1) Main production tools.

The tools used to make Chinese iron paintings mainly include spot welders, hammers, anvils and chisels. With these four basic tools, Chinese iron paintings can

be made. Hammers are mainly in two forms: wide-mouthed hammers and thin-mouthed hammers, depending on their uses. Different hammers can produce different shapes, and they need to be selected according to the characteristics of the work when making them. The anvil is a pad for forging iron materials with a hammer. Generally, there are raised rectangular iron blocks and chisels on the anvil. The rectangular iron blocks are convenient for forging and shaping, and the chisels are used to cut off the forged parts. As shown in Figure 37, the basic tools for making Chinese iron paintings.

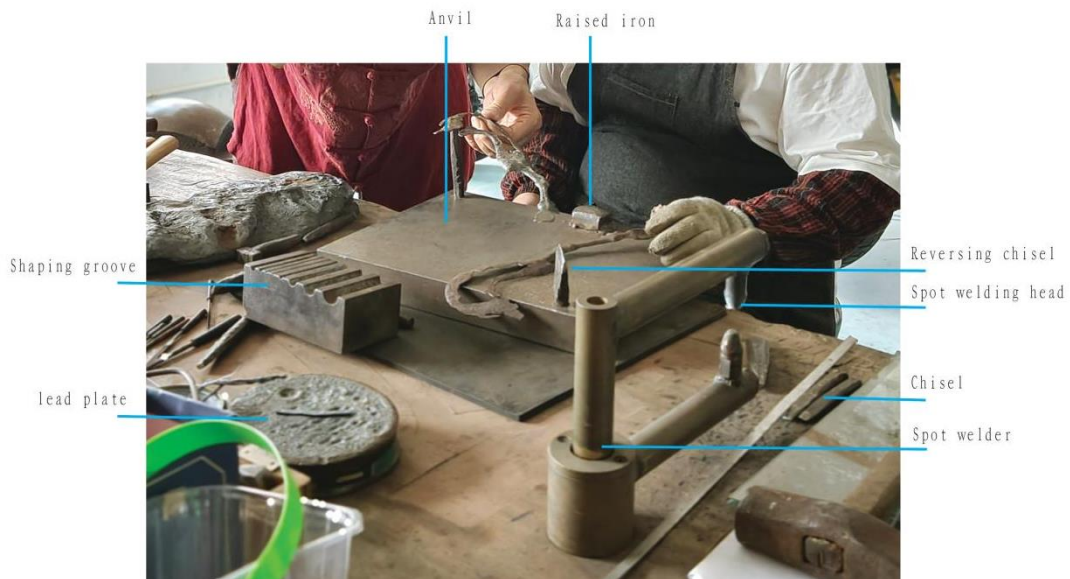






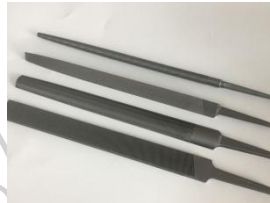



Figure 39 Basic tools for making Chinese iron paintings
Note. Photographed by researchers 2023

2) Main auxiliary production tools.

The auxiliary tools for Chinese iron painting production mainly include pliers, iron scissors, muskets, chisels, shaping grooves, sandpaper, files and tin plates. The pliers are used to clamp the iron materials directly instead of hands, which is convenient for production. The iron scissors are mainly used to cut iron materials and trim the shapes. The musket is connected with liquefied gas, which is mainly used for large-scale heating and annealing, and is mostly used for cold forging. The chisel is a tool used for cold forging, which is used for pattern engraving and relief. The shaping groove has many notches with different widths. It was originally used for forging the shape of metal jewelry. Later, it was introduced into the production of Chinese iron painting as a tool for cold forging. It is forged and trimmed according to the needs of the work. Sandpaper and files are used for fine grinding. The tin plate is a pad used when the chisel engraves the pattern, similar to the rubber plate in modern silverware production, which protects the chisel and facilitates engraving. The use of these auxiliary tools can enable the inheritors of Chinese iron painting to better produce Chinese iron painting and improve production efficiency and precision.

Table 4 Traditional Chinese iron painting auxiliary production tools and their functions

Tool Name	Iron shears	Hammer	Chisel	Pliers
Picture				
Effect	Shearing iron	Hammering Iron	Engraved pattern	Clamping iron
Tool Name	Shaping slot	Transfer copper rod	Rasp	Musket
Picture				
Effect	Iron Shaping	Parts that cannot be welded by the adapter head	Fine filing and defect treatment	Iron annealing

Note. Researcher photography and production 2023

The above figure lists the main auxiliary production tools used in the production of Chinese iron paintings and their functions. With these auxiliary tools, the production efficiency and quality of the works can be improved. Through these tools, it can be found that the production of Chinese iron paintings does not require very high auxiliary tools. Basically, iron painting craftsmen use existing tools or modify tools by themselves in production practice. The scientific and technological content and technical difficulty are not high, and the capital investment is also small, but it is an indispensable auxiliary tool in the production of Chinese iron paintings.

3) Modern auxiliary production tools.

Mainly plasma cutting machines, machine tool mold pressing, etching machine etching, grinding tools, painting equipment, mounting equipment, etc.

Plasma cutting machines are mainly used for cutting and cutting Chinese iron painting parts, especially for thicker iron materials in Chinese iron painting calligraphy and large works. As shown in Figure 40, the inheritor of Chinese iron painting uses plasma equipment to cut iron materials.

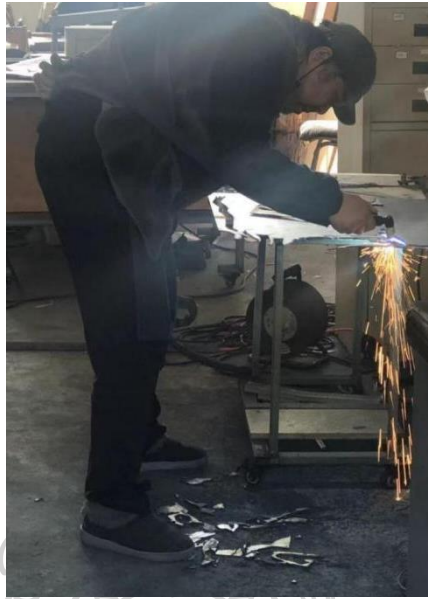


Figure 40 Ling Xiaohua, the inheritor of Chinese iron painting, uses plasma equipment to cut iron
 Note. Photographed by researchers 2024

Machine tool mold pressing is to use molds to press out the parts of Chinese iron painting. Currently, it is widely used in pine trees, bamboo leaves, plum blossoms and animals. As shown in Figure 41, the machine tool presses plum blossom petals and bamboo leaves of different sizes.

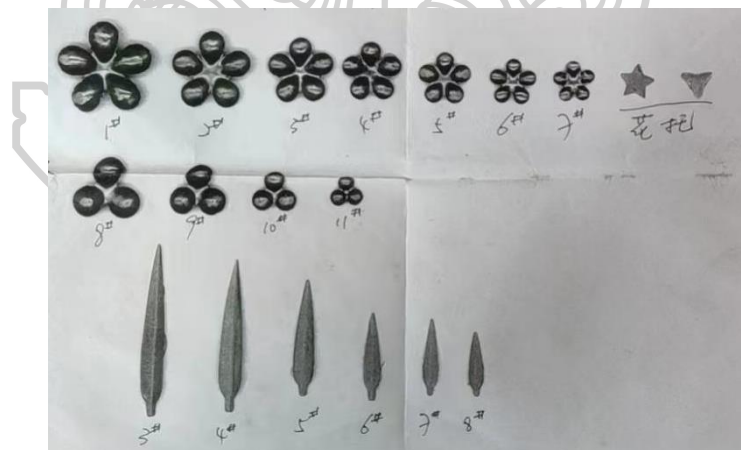


Figure 41 Plum blossoms and bamboo leaves in Chinese iron paintings pressed by machine tool molds
 Note. Photographed by researchers 2024

The etching machine removes materials through chemical solutions, which is relatively low-cost and suitable for large-area removal. It has certain requirements for the thickness of the iron material and is suitable for the production of small iron paintings. As shown in Figure 42, the semi-finished products produced by the etching machine and the finished products processed by the iron painting inheritors.



Figure 42 Semi-finished products etched by etching machines and finished Chinese iron paintings finished by hand

Note. Photographed by researchers 2024

Grinding tools, grinding with grinding wheels and hanging grinders, instead of traditional files and sandpaper grinding.

Spraying equipment is mainly for medium and large Chinese iron paintings. Liquid paint is placed in a container, and compressed air or paint pump is used to transport the paint to the spray gun to form a spray. Spray it on the surface of the product to form a layer of paint coating. After spraying, it is naturally dried to solidify the coating and meet the required performance requirements.

Mounting equipment is mainly used to make picture frames and base plates, and machine-cut materials are used to assemble them into picture frames. Since Chinese iron paintings are semi-three-dimensional and the works are heavy, more than three iron nails need to be welded to the base plate after the finished product. The base plate is made of wood and white paper is pasted. Foam strips are placed between the base plate and the glass to fix the distance between the two. At the same time, hard cardboard with a certain width and shape is cut and placed around the frame to cover the foam strips and decorate.



These modern auxiliary tools basically rely on electricity to use, and are used in the early material preparation, later spraying paint and mounting in the picture frame of Chinese iron painting, which improves the production efficiency of Chinese iron painting. In summary, with the development of the times, the production tools of Chinese iron painting are changing, and modern machines and tools are gradually used in the production of Chinese iron painting.

4) Comparison between machine and handmade Chinese iron painting

With the advancement of modern science and technology, Chinese iron painting uses some modern machines for production and processing, such as lathe pressing, chemical etching, laser engraving, etc. Most of these machines are used as early processing and forming or accessories, and Chinese iron painting craftsmen still need to process them again in the later stage. The following is a comparative analysis of three groups of Chinese iron painting products.

Table 5 Comparison between mechanical and handmade Chinese iron paintings

Category	Machine production	Handmade
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Picture		
Illustrate	It is machine-made with accurate shape and no hammered hand-made texture or volume.	It is hand-made, with a strong three-dimensional sense and traces of hand-beating, showing the muscle and structure of the horse.

Note. Researcher produced 2024

Table 6 Comparison between semi-mechanical and semi-manual production and manual production of Chinese iron paintings

Category	Half machine and half handmade	Handmade
Picture		
Illustrate	In the early stage, machine carving was used, which was more delicate; in the later stage, a combination of manual hammering and welding was used, which had a certain three-dimensional sense but lacked thickness.	Completely handmade, each object has thickness and volume, the threads are more verve after being hammered, and the picture presents the aesthetic conception of Chinese painting.

Note. Researcher produced 2024






From the comparison of the two groups of iron paintings in the table above, we can see that the machine, machine combined with handwork and handmade works present different forms and feelings. The machine-made works are accurate in shape and relatively regular, lacking the texture and feel of spatial changes and hand-made hammering. The machine-combined handmade works have accurate shapes, thin materials, weak three-dimensional sense, and lack of layers, especially on trees and rocks. The handmade works have a strong sense of three-dimensionality, obvious hammering marks, rich changes, and more realistic expressions, which can reflect the texture of iron that has been hammered thousands of times and the connotation of traditional Chinese aesthetics.


5) Comparison between Chinese iron paintings and other metal works

Compared with works made of silver, brass, copper, bronze, and stainless steel, Chinese iron paintings have their own advantages in material and color, but they are quite different in production process and aesthetics. The oriental charm and traces of

hand-beating of Chinese iron paintings are more suitable for people with a certain level of cultural literacy and aesthetic cultivation. The production process and expression forms of other materials can provide reference for the innovation of Chinese iron paintings.

Table 7 Comparison between Chinese iron paintings and other metal works

Material	Picture	Process and use	Features
Iron		Hand forging, decorative aesthetic	The material is cheap, has the implication of Chinese painting, black and white color is elegant
Silver		Hand chisel, decorative aesthetic	Expensive material, silver elegant, long production process
Stainless steel		Machine cutting, architectural decoration	Cheap materials, machine production, can be mass-produced, lack of manual beauty
Brass		Hand chisel, decorative aesthetic	Expensive materials, long production time, gorgeous colors
Red copper		Hand chisel, decorative aesthetic	The material is expensive, the production time is long, the unique color is beautiful

Bronze		Mold casting, Expensive materials, mold decoration making, unique color and aesthetic beauty
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Note. Researcher produced 2024



The above metal works of different materials reflect different textures and colors, and different production processes form different visual experiences. Most metals are made by engraving and casting, which are more common. The production process of Chinese iron painting uses iron heating and forging. It currently only exists in Chinese iron painting, which has its own particularity and its material has certain symbolic meaning.

6) Comparison between Chinese iron paintings and foreign iron art

By comparing the metals of Chinese iron paintings and related foreign iron art, we can find their differences and provide reference for the innovation of Chinese iron paintings. The following is the result of the comparison.

Table 8 Comparison of iron material works from different countries

Category	Picture	Materials and processes	Characteristic
Chinese iron painting		Iron, hand-forged	Hand-forged, with Chinese painting as reference, mainly line modeling, mostly decorative hanging paintings, requiring special production technology, and lacking practical functions.
Thai iron ornaments		Iron, manual welding	It is made by hand welding, has a strong three-dimensional effect, requires certain skills, and has a unique aesthetic.
French iron decorative sculpture		Iron, hand-forged	It is hand-forged, combining lines and surfaces, with a simple shape and strong decorative effect.

Japanese wrought iron candlestick		Iron, hand combined machine molding and welding	Handmade, simple and beautiful in shape, the curved shape gives people a friendly feeling and has practical functions.
American iron mural		Iron, machine cut and hand welded	It is made by combining manual and machine production, emphasizing visual beauty and color beauty, but lacking practical functions.

Note. Researcher produced 2024

Iron art is to turn forged and cast iron into works of art or ornaments with practical functions. Through iron art technology, iron gates, iron guardrails, and indoor and outdoor iron decorations can be created.

Chinese iron paintings are hand-forged, which requires high technical support, focusing on aesthetic expression and formal beauty of composition, mainly in black and white, emphasizing the charm of Chinese aesthetics.

Thai iron art ornaments focus on the expression of formal beauty and three-dimensional sense. There are casting and hand welding in the production, which lacks practicality. When viewed closely, there are traces of modern machine processing and lack of manual emotionality.

French iron art is mainly forged, and the decorative graphics used for building doors, windows and guardrails are more complex, emphasizing the sense of power; iron art sculptures focus on simplicity, life and positive emotional expression.

Japanese iron art is mainly handmade, emphasizing practicality and oriental softness, and is mostly used for home decoration.

American iron art has a variety of forms, with a variety of abstract and realistic expressions, both casting and handmade, emphasizing visual impact and personal emotional expression.

In summary, as a unique handicraft, Chinese iron painting has its own advantages and limitations. Foreign iron art production techniques are richer and have their own characteristics. The simple modeling and abstract expression are suitable for the aesthetic needs of modern people. The main purpose is to meet the decoration and practical life. The production technology, modeling and aesthetics of these foreign iron art can provide guidance and reference for this study.

2.1.5 Current Status of Chinese Iron Painting Development

For the current status analysis of the development of Chinese iron painting, researchers mainly focus on the innovative design fusion of Chinese iron painting. Through surveys, interviews, field visits and other methods, researchers understand the inheritance, product innovation and role of Chinese iron painting in local cultural exchanges. For example, the study found that Chinese iron painting is still inherited and applied locally, and with the development of tourism, Chinese iron painting, as a

cultural industry, has become a local cultural business card and has attracted the attention and popularity of the market. Through the collation and analysis of relevant research, it can be found that the craft characteristics, cultural art, aesthetic characteristics, product innovation design trends and consumer needs of Chinese iron painting. This is extremely important for the creative development of Chinese iron painting.

Since its development, Chinese iron painting has not only formed a complete inheritance system, but also has more than a dozen Chinese iron painting companies of different sizes, engaged in the production and marketing of Chinese iron painting. The larger companies include Feilong Iron Painting, Huiyifang Iron Painting, Chu's Iron Painting, Wendian Iron Painting, Yilei Iron Painting and Kaiyong Iron Painting. The number of employees, including mounting and sales personnel, is less than 100, and each is scattered in different places. Among Chinese iron painting craftsmen, there are currently 50 who are still engaged in Chinese iron painting production. They are basically over 40 years old, and there are basically no people under 35 years old. For example, Chu Jinxia, the national representative intangible cultural heritage inheritor of Chinese iron painting and a master of Chinese arts and crafts, is 79 years old this year, and Zhang Jiakang, the national representative inheritor of Chinese iron painting, is 75 years old this year.

According to Shen Tao, Secretary-General of the China Iron Painting Association, the annual output value of China's iron painting industry is about 20 million yuan, and the main product sales are gifts, souvenirs, home decorations and cultural and creative products given by the government and enterprises. The market size is still far behind the annual output value during the prosperous period. Feilong Iron Painting is a relatively large-scale Chinese iron painting company. It has an independent Chinese iron painting art creative park and exhibition hall. It adopts diversified development and has achieved outstanding results in the design of Chinese iron painting home decorations and cultural and creative products in the past two years. Huiyifang Iron Painting is the first Chinese iron painting company started by college students. It was established in October 2007. It was the first to expand traditional handicrafts to the online market, opened a Taobao store, established the Wuhu Iron Painting Network, the Iron Painting Online Mall and the Huiyifang corporate official website, expanded the publicity and promotion of iron painting art, opened up new channels for iron painting sales, and became a pioneer in the online promotion of traditional iron paintings. Chu's Iron Painting is an enterprise founded by Chu Jinxia. Relying on her unique personal identity, she cooperated with colleges and universities in the Wuhu area and built the enterprise in the school. While engaging in the creation and market sales of iron paintings, she also undertook the school's iron painting art teaching tasks. Orders are mainly government and corporate procurement customization.

1) The current situation and characteristics of Chinese iron paintings

First, production and sales have changed. Chinese iron paintings have changed in production and sales mode, from the original government-led design, production and sales to craftsman-led production, enterprise-led sales, and lack of design fusion. Practitioners have changed from state workers to craftsmen, without fixed economic guarantees and labor relations with enterprises. Enterprises are responsible for the rust removal, painting, framing and display and sales of Chinese iron paintings. The price

right is determined by the enterprise, and most of the economic benefits are taken by the enterprise. Enterprises use machines to intervene in the production of some processes, and reduce production costs by changing the production method, so that they can be recognized by consumers in terms of price; in addition, enterprises do not hire craftsmen who make Chinese iron paintings, nor do they hire designers. This production method and economic distribution reduce the enthusiasm of craftsmen to create, and some craftsmen have too low incomes and withdraw from the Chinese iron painting industry.

Second, the lack of innovative design capabilities. Chinese iron painting products lack innovative design, and product homogeneity is serious. Most Chinese iron painting craftsmen have low cultural levels and do not have painting and design capabilities. They generally copy and produce Chinese iron paintings or imitate painters' works for secondary creation. The practitioners have relatively low educational levels and lack professional talents who have received systematic training in painting and design (Song, 2023). Chinese iron painting companies do not have special design departments and designers, and craftsmen do not have modern design thinking and design methods. They still design and create based on Chinese paintings. The Chinese iron painting craftsmen must be enriched with some college art students with good comprehensive qualities. The addition of these fresh blood will definitely bring new atmosphere that traditional Chinese iron painting itself does not have (Chen, 2015). Shen Tao, president of the Wuhu Iron Painting Association, said: "In recent years, there have been no shocking works of iron painting, precisely because craftsmen and painters have not been combined."

Third, it is difficult to inherit the skills of Chinese iron painting. Chinese iron painting practitioners are older, the number of practitioners is small, the process is complicated and difficult to learn, the production is time-consuming, and the economic income is low. Most of the craftsmen engaged in Chinese iron painting are nearly 70 years old, and there are relatively few apprentices (Ma, 2021). The inheritance of skills is mainly master-apprentice inheritance, the learning cycle is long, the work is hard, the economic rewards are low, and few young people come to learn, which has caused the dilemma of inheritance and protection of this skill. The inheritance of Chinese iron painting is maintained by the master-apprentice relationship (Peng, 2020). Effective publicity and promotion are needed, especially to stimulate interest and desire in the younger generation to participate in Chinese iron painting.

Fourth, the thinking of Chinese iron painting craftsmen is solidified. Chinese iron painting craftsmen use Chinese painting as a reference, pursue the composition, aesthetics and ironmaking skills of Chinese painting, and their products are mainly traditional Chinese iron paintings, with relatively fixed themes and forms, lacking design and fashion. Some old Chinese iron painting craftsmen stick to traditional concepts, reproduce Chinese iron paintings, stay on traditional themes such as landscapes, flowers and birds, reject the use of new technologies, new tools and new design ideas, and do not actively communicate and interact with designers and artists. There is a certain degree of solidification in terms of skills, and a lack of innovative ideas (Cheng & Chen, 2023)

Fifth, the tools and equipment used for production are relatively old. The tools and equipment used are basically from the 1960s and 1970s. The lack of updating of

tools and equipment has led to the inability to improve the efficiency and precision of product production, and there are technical problems with innovative products. The main problem of old tools and equipment is that the economic income is not high, and they are unwilling to invest money to replace tools. Secondly, they lack the ability to improve tools and cannot make suitable tools independently.

Sixth, the market is small and the output value is low. Compared with other traditional arts and crafts in China, the market sales of Chinese iron paintings are not large in scale, the output value is low, and there is a lack of representative modern design products. This phenomenon is caused by the single decorative nature of Chinese iron paintings that cannot meet people's modern needs, and the traditional Chinese painting aesthetics cannot adapt to people's modern aesthetic requirements. People are more willing to use industrially produced practical items that are modern, simple, beautiful, reasonably priced and easy to buy. The contradiction between people's needs and the decorative nature of Chinese iron paintings, and the contradiction between modern aesthetics and traditional aesthetics, has caused Chinese iron paintings to be unable to meet market demand (Peng, 2020).

Due to its purely decorative function, Chinese iron paintings are mainly decorative paintings of various sizes. They have not deviated from the external form of the traditional farming era and lack practical use functions. The form and subject matter of Chinese iron paintings are too old, which cannot be coordinated with the spatial environment of modern homes, and cannot play a role in people's daily lives. They are out of touch with the daily lives of modern people. The value of Chinese iron paintings lies in their artistry and ornamental value. They are suitable as gifts for festival celebrations, travel souvenirs and interpersonal communication (Dai, 2015). With the richness and diversity of modern design products, modern products with functional beauty, simple beauty and fashionable beauty are increasingly accepted and loved by young people. The development of Chinese iron painting needs to be given new forms and functions through the fusion of design.

In short, Chinese iron painting is facing difficulties and has development opportunities. With productive protection as the main focus, focusing on cultural inheritance and innovation, transforming product forms through the intervention of design, giving new aesthetics and functions, and meeting the actual needs of personal and family life, the development of Chinese iron painting will surely be revitalized again. For an enterprise to develop and a product to survive, it must obey the needs of society. Only by maintaining strong innovation and adapting to the development needs of the times can Chinese iron painting achieve long-term development (Dai, 2015).

Table 9 *Characteristics of the current development status of Chinese iron painting*

Features	Description of the situation
Separation of production and sales	The main production and manufacturing is done by craftsmen and there is no sales involved. Enterprises use machines to produce cheap products and sell them, and the economic interests of the craftsmen are not protected.
The product lacks design	The forms and themes of Chinese iron paintings are too old-fashioned. Craftsmen produce them by repeating and imitating Chinese paintings. There is a lack of professional designers and

	innovative designs are seriously insufficient.
Difficulty in passing on skills	There are few practitioners, and the craftsmen are generally older and unwilling to communicate and interact, which fails to inspire young people's interest in learning.
Craftsman's thinking is fixed	Old craftsmen stick to traditional concepts and reproduce Chinese iron paintings, staying on traditional themes such as landscapes, flowers and birds. They reject the use of new technologies, new tools and new design ideas, and lack interaction and communication with designers and artists.
Old tools and equipment	The tools and equipment used in Chinese iron painting production are from the 1970s and 1980s, and there is a lack of use of new tools and equipment.
Small market, huge potential	The demand for traditional Chinese iron painting products has decreased, and the sales output value has become lower. The consumption use is mainly as gifts for government, enterprises and conference activities. Mass consumers pay more attention to personalized and innovative products, and the personal and family consumption market has great potential.

Note. Researcher produced 2024

As can be seen from the above table. First, the separation of production and sales of Chinese iron paintings, lack of designers, resulting in a lack of innovation in products. Secondly, it is difficult to pass on skills, the craftsmen's thinking is rigid and rejects new tools and technologies, and they do not communicate and cooperate with designers and artists. Thirdly, the production tools and equipment are old, which cannot improve production efficiency and enrich product forms, resulting in the market becoming smaller and smaller. Finally, the current Chinese iron painting market is small, but it has great potential. Consumers like products with characteristics, especially those that are handmade and have historical and cultural value. Changing the status quo of Chinese iron painting products through the fusion of design can be recognized and loved by the market.

2) Product positioning of Chinese iron paintings facing the market

Chinese iron painting products are currently mainly divided into traditional artworks, souvenirs, gifts and cultural and creative products.

Table 10 Market positioning and price segmentation of Chinese iron painting products

Categories	Price segmentation	Details
Traditional crafts and artworks	High-end market	Traditional handicrafts representing regional culture, secondary creations of Chinese paintings and calligraphy, finely crafted with the aesthetic characteristics of traditional Chinese paintings, suitable for middle-aged and elderly people who love traditional Chinese art.
Gift	Mid-range products	Products with cultural symbols and auspicious meanings are used as gifts for business openings and for friends and relatives.
Souvenir	Low-end market	Based on the Chinese iron painting craft, small

		products are mass-produced semi-mechanically and semi-manually, suitable for souvenirs of travel, conferences and group activities.
Cultural and creative products	Low-end products	Handmade or a combination of handmade and machine-made, it is artistic and practical, meets modern aesthetics and life needs, highlights local cultural characteristics, and demonstrates personal aesthetics, home and office space use.

Note. Researcher produced 2024

Existing Chinese iron painting products are positioned as artworks, gifts, souvenirs and cultural and creative products. As artworks, they are relatively expensive and are mostly made by Chinese iron painting masters and representative inheritors. They are based on traditional Chinese landscape paintings and emphasize the oriental aesthetic connotation. This aesthetic is full of connotation and interest in the sensual world. A prominent feature of traditional Chinese artworks is the emphasis on oriental aesthetic connotations. Works include hanging paintings, screens, etc. Gifts are one of the most popular products of Chinese iron painting at present, emphasizing symbolic meaning, such as welcoming pine, eagle pictures, magpies climbing plums, plum blossom pictures, etc. Souvenirs are mostly small-sized works, which have special commemorative significance as local specialties. Works include small-sized hanging paintings, ornaments and pendants. Cultural and creative products are products produced by Chinese iron painting to meet the needs of the modern market. They are cultural, emotional and practical. Such products have certain requirements for design, including hanging paintings, screens, ornaments, lamps and pendants. With the integrated development of Chinese culture and tourism, cultural and creative products have begun to be loved by young consumers, and products with local cultural characteristics and emotional expression have become a fashion. This is an opportunity for the fusion of Chinese iron painting design.

2.2 The Aesthetics and Value of Chinese Iron Painting

As a traditional culture and artwork, Chinese iron painting has multi-dimensional value in modern society. Artworks have

Aesthetic value: beauty, harmony; spiritual value: understanding, enlightenment, insight; social value: connection with others, a sense of identity; historical value: connection with the past; symbolic value: a repository or conveyor belt of meaning (Throsby, 2000). Iron painting is not only an object of art and life, but also a cultural object, reflecting the aesthetic taste of the people, with a strong national color and rich expressiveness, showing the Chinese nation's unremitting national spirit and the pursuit of the philosophical thought of "harmony between man and nature" (Q. Liu, 2013).

2.2.1 The Artistic Aesthetics of Chinese Iron Painting

As a static three-dimensional painting, the main function of Chinese iron painting is to beautify the spatial environment and enhance the cultural and artistic attributes of the environment. It can also be called a decorative painting, but it also has practical functions, such as Chinese iron painting screens and lamps. Chinese iron

painting originated from the combination of traditional iron smelting skills and Chinese landscape painting. It is a successful fusion of technological progress and artistic sublimation. In the subsequent development, it constantly absorbs and draws on the characteristics of other metal craft techniques and folk art, so that it can be extended from two-dimensional to three-dimensional in form, gradually breaking away from the constraints of the picture frame, and has rich artistic aesthetics. Chinese iron painting artists combine "iron" and "painting", and the iron paintings they forge have high aesthetic value (Zhou, 2018).

1) Black and white elegant beauty

Black and white elegant beauty mainly refers to the beauty of the picture set off by the simple black and white colors of Chinese iron painting. In traditional Chinese culture, only the night is the color of the emperor who dominates everything, and black symbolizes noble solemnity and mysterious complexity(Q. Liu, 2013). Traditional Chinese iron painting is mainly presented in black and white, with black as the picture and white as the background, similar to the black and white expression of Chinese painting. White represents simplicity and clarity, and black represents deep solemnity. The combination of the two produces a simple and elegant beauty. Chinese iron paintings have distinct black and white, with virtual and real contrasts, clear layers, strong three-dimensional sense, elegance, elegance, and dignified artistic characteristics(Shen, 1984). Chinese iron paintings contain the artistic characteristics of simple and rigorous composition, vivid and vivid modeling, and distinct black and white colors(Wang & Gao, 2014). The black and white of iron paintings are similar to the black and white of Chinese paintings. They simplify the complex and create a distant, mysterious, simple and noble artistic conception, showing vitality and fun(Q. Liu, 2013).

2) The beauty of virtual and real artistic conception

The beauty of virtual and real artistic conception refers to a kind of lofty and wonderful artistic conception pursued by Chinese iron paintings, and the picture emphasizes the near reality and the far virtual. Chinese iron paintings are made with Chinese paintings as reference, and they inherit the artistic conception aesthetic characteristics of Chinese paintings, and pay attention to the virtual and real, rhythm and artistic conception beauty of the picture. For example, when making landscapes, the lines near are thicker and have more hammer marks, while the lines far away are thinner and basically leave no hammer marks. Chinese iron painting uses virtuality and reality, black and white to express its artistic conception (Shen, 1984). Traditional Chinese iron painting mainly uses lines to shape, and pursues the beauty of rhythm in the forging of lines. Different lengths, thicknesses, thicknesses, and density of lines are used to express the virtuality and reality of the picture. The Chinese iron painting technique expresses the traces of calligraphy and painting, and artistic elements such as form and meaning, virtuality and reality, hardness and softness, form and spirit, hiding and revealing, release and collection, leaning and sideways, speed and astringency. The accumulation and fusion of these elements make Chinese iron painting a unique art (Wang & Shi, 2010).. Chinese iron painting works have the aesthetic taste of ethereal and profound artistic conception of Chinese paintings (Huang & Luo, 2016). Chinese landscape painting advocates that lines should be dry but moist, and that they should be both hard and soft. The myriad postures of the lines' ups and downs, and the mysterious organization of the lines' interweaving,

echoing, and interlacing are all blended with the emotions of life. These lines express artistic conception and rhythm in iron paintings (Q. Liu, 2013).

3) The beauty of three-dimensional light and shadow

Three-dimensional light and shadow beauty refers to the semi-three-dimensional and three-dimensional state of Chinese iron paintings, which form the beauty of light and shadow under the illumination of light. The production process of Chinese iron paintings adopts the segmented production of breaking the whole into parts, and the shapes are superimposed on each other, and then assembled as a whole through welding. The picture has a three-dimensional sense of high and low levels, and the light and shadow are formed by the illumination of light, which changes with the movement of the viewer. Chinese iron paintings are a combination of plane and three-dimensional, and the difference in front and back distances increases the rich layered picture effect (Shen, 1984). Chinese iron painting is a real three-dimensional painting, which allows the two-dimensional picture to break through into a three-dimensional space. The shadow projected on the canvas deflects as the viewer moves, making the thin flower branches feel like they are trembling on the branches (Jia & Lu, 2013). Iron painting is not only about black and white, but also about gray. The main body of the iron painting will reflect shadows on the white floor due to the irradiation of light. This is the invisible expression of the gray surface of the iron painting (Xing, 2018). It has both the three-dimensional beauty of sculpture and the two-dimensional beauty of paper-cutting art (Tang, 2024). If you look closely at the flying points and lines of the iron painting, the hammer marks are spotted, and it has the three-dimensional beauty of sculpture (Wang, 2013).



Figure 43 *Three-dimensional Chinese iron painting Bamboo*
 Note. Researcher Photograph, 2023

4) The beauty of material texture

The beauty of material texture refers to the beauty of the traces left by the iron material after being forged with a red-hot iron hammer. Different hammer heads and hammering methods produce different traces. In Chinese iron paintings, when making female figures, the head of the hammer is relatively thin, and the marks left are

relatively soft and regular; when making landscape Chinese iron paintings, the rocks in the vicinity are irregular, so the head of the hammer is relatively thick, and the marks left are relatively obvious. This kind of iron material has a special texture beauty after being hammered. Chinese iron paintings need to be carefully observed for the hammer marks. Chinese iron paintings have the beauty of hammer marks and fire quenching. The Chinese iron paintings created have a strong smell of fireworks, and the marks of hammering on the surface reflect the pure handmade craftsmanship texture and sensory experience (Chen, 2015). Each Chinese iron painting needs to be hammered hundreds or even tens of thousands of times. The countless layers of overlapping and mottled hammer marks have extremely strong visual impact and rich folk art characteristics, becoming the most unique artistic style of Chinese iron paintings (Jia & Lu, 2013).

5) Symbolic beauty

The symbolic beauty is a manifestation of the traditional Chinese culture that “pictures must have meanings, and the meanings must be auspicious”. Here, it refers to the symbolic meaning of the craftsmanship of Chinese iron painting itself and the beauty of the theme it expresses. Chinese iron painting embodies the spirit of iron. Its artistic effect is closely related to the texture of iron, which gives Chinese iron painting a solid and highly expressive characteristic, and can reflect the heroic, strong and tenacious temperament of the Chinese nation (Shen, 1984). The vigor of pine, the purity of bamboo, the pride of plum, the magnificence of mountains, and the courage of horses in Chinese iron painting give people inspiration and encouragement. The individual graphic characteristics and meanings of these natural scenes are endowed with extremely high aesthetic value (Lu, 2015). Artworks are the combination of materiality and spirit, exploring the inner meaning of material materials and achieving harmony with the subject's spirit. The texture of steel and bones is closely related to the fierce fire, full of masculine and solemn magnificence, and gives people an indestructible psychological suggestion, implying the steel will and unyielding character that the Chinese nation has long respected (Q. Liu, 2013). Iron painting, which uses iron as an artistic medium, transcends general visual aesthetics and embodies a spiritual pursuit. It reveals the strength and toughness of steel, just like the indomitable will of steel, thus becoming a medium for the transmission of human spirit (Q. Liu, 2013).

6) The beauty of craftsmanship

The beauty of craftsmanship refers to the ingenuity of the production process of Chinese iron painting. By heating the hard iron material to soften it, shaping and welding it, the iron is transformed into a unique iron painting artwork. In the Spring and Autumn Period of ancient China, the first traditional craft book "Kaogong Ji" recorded the beauty of craftsmanship, which refers to the exquisite and ingenious production process that can produce exquisite handicrafts. Chinese iron painting uses iron as raw material, which is smelted in a red furnace and then forged, drilled, lifted, pressed, welded, filed, chiseled and other techniques. It contains the wisdom of Chinese iron painting craftsmen and is also a presentation of China's advanced iron smelting technology. The iron painting forging technique is essentially the smelting and processing technique of iron metal. The blacksmith's iron-making technique is common, but the iron painting completed by the iron-making forging technique is elegant (Zhou, 2018). The Chinese iron painting production process is unique and

highly recognizable. As a material carrier of abstract culture and art, it is very representative in the handmade intangible cultural heritage of Anhui and even the whole country (Song, 2023). As a traditional arts and crafts work, Chinese iron painting has both the flat beauty and formal beauty of two-dimensional painting and the three-dimensional beauty of three-dimensional space. People can appreciate Chinese iron painting works from different perspectives, which have both the harmonious beauty between points, lines and surfaces, and the light and dark beauty of light and shadow. Through the expression of iron materials, Chinese iron painting makes it soft and agile with its hard and strong inner nature, combining hardness and softness, and is full of artistic appeal, while conveying the inner perseverance and ordinary character. The very rich texture effects produced during the forging process can be round, square, long, short, regular, random, rough or fine, faithfully preserving the emotional traces of the production process, with strong personalized characteristics and rich handmade beauty (Zheng & Wu, 2021).

2.2.2 The value of Chinese iron painting

As a traditional handicraft and an art form, Chinese iron painting reflects the progress of iron smelting skills and the sublimation of Chinese painting art. "Skills" are the foundation of iron painting, and "art" is its soul. The complementary nature of skills and art has made the glorious history of Chinese iron painting fundamental (Shi & Fei, 2020). Chinese iron painting contains rich cultural value, artistic value, craft value, practical value and economic value.

1) Cultural value.

Skills are an important carrier of traditional culture, which is accumulated through the production practice exploration of craftsmen. As the crystallization of the fusion of ironmaking skills and painting, Chinese iron painting carries the history of local culture, the epitome of the development of iron smelting technology and Chinese painting, conveys the thoughts and emotions of craftsmen, and is closely intertwined with people's lives. This wisdom is the precious traditional knowledge gained through rich experience passed down from generation to generation. The physical market determines the economic value of the work, and the ideological market determines the cultural value of the work. The fact that physical labor is the carrier of ideas transforms work from an ordinary economic commodity to a cultural commodity (Throsby, 2000).

Chinese iron painting is a product of great cultural significance. It has rich traditional iron smelting, painting knowledge and craft practice, reflecting the soul and cultural beauty of Chinese iron painters. Through Chinese iron painting works, we can understand the economic development level, social form, lifestyle and aesthetic taste of a certain historical period. Relying on the professional knowledge of craftsmen and the efforts of several generations, a unique local culture, Chinese iron painting, has been formed and developed. This regional identity is a combination of group phenomena, a cohesive habit of values, and establishes a sense of belonging of cultural identity. Liang Yingda, a Chinese iron painting craftsman in the Qing Dynasty, made iron painting lamps, breaking the pure appreciation of iron painting, combining decorative aesthetics with daily use and hanging them in front of the door and in the house. It can be seen that the people at that time not only had a high aesthetic taste, but also continued to shape and portray identity and emotional belonging. Chinese iron painting is a pearl in the treasure house of Chinese arts and

crafts, and it is also one of the representatives of Anhui's excellent traditional culture (Zhou, 2018).

2) Emotional value

As an art made of iron, Chinese iron painting has become a unique folk art due to the characteristics of the material, the complexity of the craftsmanship, and the three-dimensional and semi-three-dimensional forms. It has the charm of Chinese painting, the three-dimensional sense of sculpture, and the abstract and mottled artistic texture. In modern society, Chinese iron painting is regarded as a work of art, handicraft, tourist souvenir, and cultural and creative product. Its unique materials, craftsmanship, and modeling give it a strong artistic value. This artistic value varies with different craftsmen, and has personal experience and emotion. The metal materials used have a strong sense of volume and weight, which makes people feel powerful and upright (Guo, 2024). In urban environments, architectural spaces, and home decoration, Chinese iron painting is playing a unique role. Chinese iron painting craftsmen have made the "Welcoming Pine" displayed in the Great Hall of the People, conveying the spirit of iron bones, giving it a new artistic atmosphere, beautifying people's living environment, cultivating people's aesthetic sentiments, and enhancing people's cultural confidence. Chinese traditional moral values and outlook on life use landscapes to express the pursuit of virtue and beauty. Ancient literati often associated beauty with noble character, and regarded themselves as elegant and graceful in landscapes, thus showing their integrity. The unyielding spirit expressed in iron paintings expresses this spirit vividly (Zhong & Shi, 2020).

3) Craft value.

The craftsmanship of Chinese iron painting is complex and unique. It is the crystallization of thousands of years of traditional ironmaking technology in China. It has certain scientific and technological value. It includes key technologies such as mastering iron temperature, forging, welding, modeling, as well as rust removal, painting and mounting techniques. It contains the wisdom and creation concept of Chinese iron painting craftsmen. With the development of science and technology and the introduction of modern tools, the production process of Chinese iron painting has become more scientific and reasonable, and the tools are convenient and simple to use, forming a complete production process from production to mounting. This series of production processes has a high craftsmanship value after the exploration and practice of Chinese iron painting craftsmen of all generations.

4) Economic value.

The artist's vision, which bursts out from the complex process of creation, drives the generation of creativity; technical skills enable these ideas to be realized or embodied as actual works. The economic price is realized through market exchange, and the cultural "price" is realized at the same time through the acceptance, processing, dissemination and evaluation of the ideas it conveys (Throsby, 2000).

As a local craft, Chinese iron painting not only brings people aesthetic enjoyment, but also creates economic value. During the prosperous period, the annual output value exceeded 100 million yuan. At present, the annual output value of the industry is more than 20 million yuan, creating more than 100 jobs. Chinese iron painting is closely linked to economic factors in its historical development. Economic factors are the lifeblood of its inheritance and development. Craftsmen exchange economic rewards for making Chinese iron paintings to maintain their family life. The

driving force for the development of Chinese iron painting is to realize economic value. There were many blacksmith shops in Wuhu area in the Qing Dynasty, nearly 300 in total, and some of them also made Chinese iron paintings to obtain rich economic rewards. After the founding of New China, the production of Chinese iron paintings was organized for export to foreign countries to earn foreign exchange, which contributed to the development of local economy. At the beginning of the 21st century, Wuhu City once formed a Chinese iron painting street, selling different types of iron painting products, creating hundreds of jobs.

2.3 Traditional craft design fusion innovation

2.3.1 Overview of traditional Chinese creation ideas

Creation activities are the product of culture, and the traditional creation spirit has become an indispensable part of Chinese culture (Y. Wu, 2024). The two words "create" and "thing" are combined to express the meaning of creating the world. Creation activities are a complete system composed of important factors such as human needs and purposes, material craftsmanship and structure, technical principle combination, and aesthetic form of modeling (Wang, 2021). Chinese traditional cultural creation culture has a long history and is influenced by many cultural and social factors, including the ideas of unity of man and nature, humanism, beauty and goodness, and making tools and images.

1) Unity of man and nature

The unity of man and nature pursues the harmonious coexistence of man and nature. In creation design, it is achieved through materials, craftsmanship and design that adapts to the laws of nature to achieve harmony with nature. Chinese traditional culture is centered on Confucianism, which was first mixed with Taoism and later with Buddhism. With a positive attitude towards nature, one can reach a state of bliss that does not matter. Confucianism advocates "harmony between man and nature", that is, people should follow the laws of nature (Zhongyun, 1987). As a universal feature of Chinese traditional culture, the idea of "harmony between man and nature" emphasizes the interconnection and inseparability between man and nature, which also affects the traditional Chinese idea of creation. In Chinese culture, material objects have a great harmony and rhythm of spiritual and physical communication (QIAN et al., 2020). "Kaogongji" proposed: "The sky has time, the earth has air, the materials have beauty, and the workers have ingenuity. Only when these four are combined can it be good." Pursuing the unity of man and nature. "The Exploitation of the Works of Nature", the world's first comprehensive work on agricultural and handicraft production technology and experience, summarizes the scientific and technological creation concept and the Eastern philosophical concept of harmony between man and nature that the Chinese have inherited since ancient times (Wang, 2021). The ancient Chinese design concept of creation is reflected in the relationship between man and nature, that is, the unity of man and nature. The art of building the Temple of Heaven perfectly explains this idea (Y. Wu, 2024). The traditional concept of creation focuses on the performance and characteristics of nature, maintains a harmonious affinity with nature, and pursues the beauty of nature (He, 2013). This kind of beauty is a natural and harmonious beauty. Chinese traditional culture

emphasizes respecting heaven and respecting man, and believes in the principle of the unity of man and nature (Porncharoen, 2024).



Figure 44 *Beijing Temple of Heaven*

Note. <https://www.ccc-paris.org/decouverte-de-la-chine/le-temple-du-ciel/>

2) Human-oriented.

The idea of human-oriented means that the fundamental purpose of creation is to meet human needs. In the design of creation, by considering people's actual needs and aesthetic preferences, products with both practical and aesthetic value are created. In Chinese Confucianism, Taoism and Buddhism, humanism is very strong and is the tone of Chinese thought. People are the center of Chinese government, art and religion. The "benevolence" in Confucianism is "goodness" in the embodiment of the beauty of objects. The design of ancient Chinese objects follows the practical spirit of "goodness" as beauty, and always adheres to the design principle of objects for people. Good functions are the goal of object design and production, which embodies the concept of creation that is people-oriented (Liang, 2018). Chinese artists paint landscapes with the purpose of purifying emotions, stimulating thoughts, and creating an emotion. When the reader or bystander is freed from this emotion, he will become more noble, more noble in spirit, and more friendly to his neighbors (Moore, 1978). The "Kaogongji", a book about craftsman culture in the Spring and Autumn and Warring States Periods, reflects the people-oriented design concept, considering the convenience of production and use of objects, which is the same as the user-oriented "ergonomics" concept in modern design concepts (Wang, 2021). "Xunzi Zhengming" proposed that we should pay attention to the functions of people and objects, so that objects can serve people, and pointed out that the design of creation should meet people's needs, reflecting the people-oriented design concept (Y. Wu, 2024). The design process is people-centered, and the design of products is designed to improve people's lives (BATTISTON, 2014). The ancient Chinese design thought "emphasizes oneself and serves objects", pays attention to the subjective status of people, and advocates that the design of objects should adapt to people's needs (Qian & Meng, 2006). The ancients emphasized that creation is people-oriented, first of all, it requires that the quality of objects and personality and body and mind are consistent, so as to achieve a seamless combination of physics and humanity (He, 2013).

3) Beauty and goodness are mutually beneficial

The idea of beauty and goodness being mutually beneficial means that design should not only pursue beauty, but also meet practical and moral needs. In the design of objects, reasonable functions and aesthetic designs are used to achieve the harmonious unity of practicality and aesthetics. The idea of "beauty and goodness being mutually beneficial" originated from Xunzi's discussion. For objects, the aesthetic attributes and usage functions of products should complement each other and be integrated with

each other. "The Doctrine of the Mean" is an important idea in Confucian culture and the source of the traditional aesthetic idea of "craftsmanship and moderation" in objects. Confucius proposed "culture and quality are both good and bad", believing that "quality is better than culture, then it is wild, and culture is better than quality, then it is sloppy". For objects, the pursuit of harmonious unity of function and form is important (Qian & Meng, 2006). Around the 4th century BC, Zhuangzi, an influential Chinese philosopher, proposed that art is a skill that coexists with principles, morality and virtues, and should coexist with the universe (Wang, 2007). Confucius used objects to illustrate virtue many times in the Analects, and later literati inherited and developed this idea. Dig out moral and symbolic meanings from beautiful natural objects (pine, bamboo, plum, orchid, chrysanthemum, etc.), and apply them to artificial objects, giving artificial objects the beauty of humanity, so that those inanimate objects have special meanings. By using such artificial objects with human symbolic meanings, users can gain spiritual sustenance, establish a spiritual model and constraints, thereby helping users to sublimate their self-spiritual to a higher level and bring a sense of goodness and beauty (He, 2013). In traditional Chinese philosophy, man is the unity of form and spirit, that is, the unity of body and spirit. Taoism and Confucianism both advocate the combination of beauty and goodness (Ye, 1999). Auspicious culture is also a manifestation of beauty and virtue. The picture must have meaning, and the meaning is auspicious. Traditional creations often express auspicious themes and people's pursuit of ideals and wishes. Most of the content is auspiciousness, wealth, survival, avoidance of evil, etc., using a kind of allegorical object to express this ideal (Lv, 2005). In terms of craftsmanship and technology, people consciously or unconsciously pay attention to the emotional communication between people and objects, thus showing a strong sense of humanity in the works. This is a manifestation of the "seeking good" feature of Chinese craft creation (Pan, 1992). Taoism and Confucianism advocate the cultivation of both spirit and body, the combination of beauty and goodness, and emphasize that craft products should nourish both the body and spirit of people, so as to achieve the dual effects of physical comfort and mental relaxation(He, 2013)..

3) Making tools with images

The idea of "making objects with images" comes from "The Book of Changes: The maker of objects should value their images" (Zhou, 2008). The idea of "making objects with images" emphasizes that design should be based on natural and cultural symbols, convey deep cultural and spiritual values through design, and create products with symbolic meaning by imitating natural and cultural symbols in the design of objects. The content of "making objects with images" has the image of imitating objective things, and the shape or decoration of the objects has symbolic meaning (Yi, 2008). Chinese philosophy exists and is expressed in the daily life and daily speech of the Chinese people. The close relationship between theory and practice is not only a belief in China, but also a proven fact (Moore, 1978). The metaphysical objects created in ancient China are symbols of art and culture that are close to people's daily life. These metaphysical objects have a universal connection with the surrounding things, acting on people's consciousness and spirit, reflecting the speculative thinking of traditional Chinese creation, and reflecting the ancient Chinese people's yearning for a beautiful spiritual realm and exploration of the laws of the universe (QIAN et al., 2020). The image of objects in traditional creation is formed

after abstract generalization of thinking, which is different from the original image and contains symbolic meaning (Lv, 2005). The emotions that ancient creation art wants to express are the emotions from the heart of individuals, and they are also emotions that are inseparable from the realization of the social nature of human beings. As the material medium of objects, materials, shapes, patterns, etc. are the carriers of expressing emotions (He, 2013).



Figure 45 *Cuojin Boshan Furnace (Han Dynasty)*
 Note. Hebei Provincial Museum, 2023

Chinese traditional creation ideas are similar to modern design concepts and are the source of modern design. Professor Li Lixin of Nanjing University of the Arts proposed that Chinese traditional creation ideas can inspire modern handicraft innovation design and modern design theory innovation (L. Li, 2023).

2.3.2 Concept and characteristics of design fusion

1) Concept of design fusion

Modern design is a design philosophy and practice developed in modern times, mainly originated in Europe in the early 20th century. The core concept is to closely combine form, function and material to create the most optimized products and environment (Zhou, 2023). Design fusion is a component of cultural fusion and has the characteristics of cultural fusion. The theory of cultural fusion believes that the world is an information environment where multiple cultural heritages compete, complement and stir each other. In this process, cultural evolution is diversified and expanded, leading to pan-evolution, which promotes a sharp increase in interconnectivity and interactivity (Kramer, 2019). Co-design is collective creativity, which is applied to the entire design process. Design fusion refers to the creativity of designers and people who have not received design training working together in the design development process (Sanders & Stappers, 2008). Design fusion is to deeply understand and grasp the characteristics, functions and values of various elements, and carry out purposeful and strategic fusion and innovation, so that the fused design can achieve a more excellent level in terms of function, aesthetics, user experience

and other aspects. Cultural fusion will produce different degrees of fusion in the process of mutual cultural adaptation. In the design experiments between the East and the West, the intention and motivation of cultural fusion is to revitalize and innovate the mother culture, and develop a new product design practice model by integrating contemporary Western culture (Leong & Clark, 2003).

2) Characteristics of design fusion

Culture is constantly changing and merging in the process of absorbing foreign influences. Design, by absorbing other elements and cultures, is also constantly promoting the fusion of elements and enriching the meaning of culture in dynamic development. Cultural fusion is the process of consciously combining different sources and different elements to create new cultural products. The different elements of the composition retain their respective identities to a certain extent (Cohen, 1999). In contemporary times, the most prominent example of artistic fusion is the fusion of Western art styles and forms with regional cultural elements. This fusion aims to bridge the gap between global style and regional culture, so that foreign styles are closer to the aesthetic needs of local audiences and gain recognition for artists and the regional culture they represent (Cohen, 1999). Here, artists become a bridge between different worlds without losing their local voices and identities. Mr. George Yarrow, a famous designer, believes that the connotation of design depends on culture, and art design is an expression of culture and thought (Zhang, 2016). Cultural fusion is different from assimilation. The independent identity of the constituent elements is preserved in the fusion, rather than dissolved in the new fusion. The characteristics of these different elements are the unique qualities of the fusion, which give them aesthetic appeal (Cohen, 1999).

Fusion is not an object or behavior. It is a process of stirring experience, involving the continuous fusion of incoming information, which has a profound impact on understanding, meaning construction and behavior (Kramer, 2019). Fusion is not assimilation, that is, a component disappears due to the pressure of conformity. Fusion recontextualizes and preserves cultural elements. These cultural elements remain prominent in the process of being transferred, adopted, rejected, imitated, etc. Fusion enables innovation and new meanings to be inherited and spread (Kramer, 2019). The importance of design fusion lies in its ability to promote cultural innovation, meet the increasingly diverse needs of users, and promote communication and understanding between different cultures. Through the fusion of craftsmanship and design, not only can more attractive and competitive products be created, but also culture can be inherited on a broader level. Western design methods can solve most design problems in daily life (QIAN et al., 2020).. Design is a catalyst that brings additional value to what already exists and triggers actions or reactions in the environment where it is introduced (BATTISTON, 2014). Design is an integrator, a gatherer, a melting pot that creates opportunities for dialogue between customers and artisans, between buyers and exporters, between markets and villages (Kasturi, 2005).

2.3.3 Traditional crafts and modern design fusion

Traditional crafts are usually passed down from generation to generation. After long-term practice and evolution, they have continuously accumulated experience and skills, have diverse media languages, and have unlimited creative possibilities and rich forms of expression. In Chinese culture, traditional handicrafts play an important role. They are not only the expression of material culture, but also the carrier of

spiritual culture. They contain rich cultural connotations and reflect the values and aesthetic tastes of ancient Chinese society (Y. Wu, 2024). The fusion of traditional crafts and modern design is that traditional crafts provide cultural materials and inspiration sources for modern art design, and modern design injects new vitality into the inheritance and development of traditional crafts. In the process of integrating traditional handicrafts with modern design, it is necessary to take consumer demand as the main line of design, cultural connotation as the core of design, and innovative thinking as creative practice to achieve the dual goals of design innovation and practicality (Zhou, 2023).

1) Insufficient innovation of traditional crafts

Due to the advancement of science and technology and the innovation of production technology, China's traditional handicraft industry has been adversely affected by inheritance and development. Traditional handicrafts lack innovation and development awareness, and are affected by long-term traditional inertia and technological limitations, resulting in the homogenization of commodity categories and the phenomenon of mutual plagiarism between regions, making it difficult for products to adapt to and meet the attention of consumers. Mass-produced products are low-priced, stable in quality, and have competitive advantages. Chinese traditional craft products are no longer suitable for the lifestyle of modern Chinese people (QIAN et al., 2020). The fusion of China's cultural industry and Internet technology has brought huge economic growth to China's cultural industry (QIAN et al., 2020). This fusion is to increase sales through e-commerce, and it does not solve the innovation and inheritance problems of traditional culture itself, and can only bring short-term benefits. In the process of innovative design of handicrafts, the design works presented are often similar. There are generally deficiencies such as product design not breaking away from the original form and traditional function, poor design innovation, and serious product homogeneity. It is difficult to meet the current aesthetics of the Chinese people and the needs of the domestic mass market (Zhang, 2021).

A successful product should keep up with the development of the times, because only by meeting the needs of social groups can it be widely accepted and used. The fusion of craft and design is manifested as a design practice and design model, which provides a promising strategy for future product development (Tung, 2012). Collaboration between craftsmen and designers may be a feasible approach. The experiential learning and knowledge gained through collaboration are important factors in the professional development of practitioners (Szabó & Négyesi, 2005). In the commercialization of traditional handicrafts, fusion is the expression of the producer's personal efforts and the response to market demand or competition - mainly to adapt the product to the aesthetics and needs of consumers. This fusion may provide new means of self-expression for individual craftsmen, who are proud of their ability to apply their inherited skills to a variety of novel products that are unrelated to their cultural traditions (Cohen, 1999).

2) Mutual promotion of traditional craft and design fusion

The craftsman usually works alone, and he needs to undertake business activities and play different roles (BATTISTON, 2014). This diversity of work makes him have less experience and time to consider design issues. Collaboration between designers and craftsmen means exposure to local culture, traditions and technical know-how,

which is valid all over the world (BATTISTON, 2014). Designers can provide craftsmen with methodology to explore new areas, improve craft products with competitive characteristics, and guide innovation; craftsmen provide designers with effective reference points for local identity, traditions, and manual techniques (Mazzarella & Peruccio, 2012). Tung proposed a collaborative process of craft and design to solve the problem of regeneration of traditional crafts, combining "what crafts need" with "what design can do". Promote knowledge creation and knowledge transfer through cooperation (Tung, 2012) The collaboration between craftsmen and designers provides fertile soil for innovative thinking and research. When analyzing the desired functions, aesthetics, and symbolic meanings, the methods of the two groups can enhance each other and create goods that are very valuable and meaningful to both consumers and producers (Branco, 2023).

Traditional handicrafts and modern design each have their own characteristics and advantages. Traditional handicrafts can pass on culture and skills, and modern design can provide innovation and practicality (Zhou, 2023). Traditional crafts and design are different disciplines, giving different symbolic meanings to the works. Craftsmen endow products with profound cultural and historical significance, and designers endow the image and information of products with the same degree of symbolic significance (Tan & Ming, 2003). Compared with modern design, traditional handicrafts are more environmentally friendly, unique and national, which is an important factor in integrating traditional handicrafts with modern design. Traditional handicrafts and modern design highlight different cultural connotations and emotional implications. There are obvious similarities and differences between the two and their respective advantages. The fusion of traditional handicrafts and modern design can create more unique and culturally meaningful products, and can also promote the inheritance and development of traditional culture (Zhou, 2023). Design and craft collaboration is considered a multidisciplinary collaboration, through which each party can acquire other skills and knowledge, thereby enriching their knowledge (DYKES et al., 2009).

3) Methods of traditional crafts and design fusion

The collaboration between craftsmen and designers provides fertile soil for innovative design and cultural heritage, and puts forward goals and requirements for the fusion of traditional crafts and modern design. Designers and craftsmen can benefit from the development of local crafts, and the joint creation of craftsmen and designers uses collective creativity as a method for the development of local crafts (Reubens, 2010). In the process of integrating design and crafts, designers can act as a bridge to transfer ideas from one source to another. Designers can propose new concepts based on their experience in various fields and create new innovation opportunities (Tung, 2012).



Figure 46 Works completed by designers and craftsmen: Bamboo jewelry
 Note. Provided by Zhang Lili, Shanghai University Public Visual Art Center 2023

Sanders and Stappers studied the collaborative design of traditional craftsmen and designers and proposed three concepts: "fuzzy front end", "design development" and "shared knowledge". In the process, the front end is valued and blurred, the needs of consumers are understood, and the design is carried out after the fuzzy front end. The idea of the product is developed into a concept, and then a prototype is formed, and it is improved based on user feedback (Sanders & Stappers, 2008). Tung further refined the cooperation method between craftsmen and designers through design practice and case studies, pointing out that the "fuzzy front end" stage includes understanding the local environment, crafts, products and materials to identify current problems, discover design opportunities and directions; "design development" is an iterative process that combines sketching, discussion, prototyping and display; "sharing knowledge" aims to promote the professional capabilities of craftsmen and designers (Tung, 2012).



Figure 47 Collaborative work between designers and craftsmen: bamboo kaleidoscope
 Note. Provided by Zhang Lili, Public Visual Art Center of Shanghai University 2023

Craftsmen can be more involved in the artistic and creative aspects of the craft, which in turn improves their technical and design capabilities. Through the collaborative process, design practitioners can find possibilities for optimizing the local craft industry by exploring the knowledge base beyond local crafts (Tung, 2012). A good example of design fusion is the glass pyramid at the new entrance of the Louvre, which was built in the 1980s and is functionally subordinate to the purpose of the museum, but its modernist appearance makes it eye-catching enough (Cohen, 1999). The above content illustrates the feasibility and value of the fusion of culture and design. However, the fusion with design in Chinese iron painting is still a case, and design has not been fully reflected. The fusion of craftsmanship and design using the collective creativity of craftsmen and designers can provide great opportunities for the development of Chinese iron painting.

2.3.4 The influence of Chinese painting on Chinese iron painting

1) Using Chinese painting as a reference

In traditional Chinese painting, landscape painting is the highest art in China. It contains the basic principles of art and is the true representative art of China (Moore, 1978). Chinese iron painting is made of iron based on the composition, modeling and aesthetics of Chinese landscape painting. Iron painting is suitable for outlining with lines, which is very similar to the brushwork of Chinese painting. Various shapes borrow from the brushwork techniques of Chinese painting, fully exert the expression and structural modeling capabilities of lines, and achieve the combination of painting and craftsmanship, achieving the effect of clear black and white, relative virtuality and reality, and strong three-dimensional sense (Ding et al., 2010). Tang Peng uses ink painting as the basis and uses wrought iron to make various landscapes and flower and bird patterns (Messerschmidt, 2014). The birth opportunity and creative inspiration of iron painting come from landscape painting. The content of iron painting is mainly drawn from traditional Chinese calligraphy and painting art, depicting landscapes, flowers and birds, figures, and calligraphy works in Chinese paintings, which makes the artistic beauty of landscape paintings more prominent (Liu, 2022). The skill of furnace hammer is connected with the theory of Chinese painting, forming the crystallization of "skill" and "art" - iron painting. Xiao Yuncong's landscape painting likes to use fine and strong lines to outline mountains, rocks and trees, with light side brushstrokes, which looks refreshing and neat, and is very suitable for making iron paintings (Q. Liu, 2013). Drawing on the ink, composition, layout, and line application of Chinese painting, the iron painting art that combines traditional Chinese painting with iron forging skills is created (S. Liu, 2013). Liang Yingda is good at Chinese painting, familiar with composition, brushwork, and artistic conception. The iron paintings he created have a wide range of themes and ingenious composition and layout. He is the first person in the history of iron painting to "forge paintings with literature" (Wu, 2014). In the painting "Reed and Crab", there is a clump of reeds and three crabs, and on the left side of the painting, there is a seal of "Zaibang". Although the scenery in the painting is extremely simple, the author divides the space of the painting into appropriate density and just the right amount through exquisite composition, outlining a golden autumn scene with fat crabs and beautiful water. It is a rare iron painting art masterpiece (Wu, 2014). It reflects the influence of Chinese painting on Chinese iron painting works. Chu Yanqing and Wang Shicen's communication and creation together is another cooperation between

blacksmiths and water and mountain painters, reproducing the historical story of Xiao Yuncong and Tang Tianchi, and confirming the fundamental foundation of iron painting creation - it is inseparable from the nourishment of traditional Chinese painting (Liu, 2022). The development of iron painting relies on traditional Chinese calligraphy and painting, and has a close connection with landscape painting, constantly absorbing the nutrients of landscape painting (Liu, 2022).



Figure 48 *Liang Zaibang's Reed Crab, (Qing Dynasty)*
 Note. Provided by Gao Wenqing 2023

2) The influence of Chinese calligraphy

The Chinese painting master Huang Binhong once said: "Painting and calligraphy have the same origin. If you want to understand painting, you must first study calligraphy. Painting emphasizes the vividness of spirit and charm, and so does calligraphy" (Tang & Wen, 2010). Calligraphy emphasizes the technique of "iron strokes and silver hooks", and its traces can be seen in many iron paintings (Hu & Jin, 2019). The "Wuhu County Chronicles" records that Tang Peng was good at flying hammers to connect calligraphy and painting, and was especially famous for his cursive script (Zhu, 2019) Tang Peng's iron characters, now in the collection of the Anhui Museum, reflect the influence of Chinese cursive script on him (Wu, 2014). This work is a pair of cursive couplets. The first couplet is "clear window flowing bamboo dew", and the second couplet is "night rain grows orchid buds". The upper right corner of the first couplet has the year "Dingmao Spring Three", which is the 26th year of Kangxi (1687), and the lower left corner of the second couplet is inscribed "Jiujiang Tang Tianchi". The structure of cursive script is simple and the strokes are continuous, while iron painting mostly uses lines. There are certain similarities between the two. In this work, the iron bars are cleverly used to follow the strokes of cursive script, and the whole work is completed in one go, thus forging a cursive couplet with connected but clean strokes, which gives people a sense of fullness and excitement. It can be said to be a representative work that pioneered the art of iron calligraphy (Wu, 2014).



Figure 49 Tang Tianchi Iron-lettered Couplet
 Note. Provided by Gao Wenqing, 2023

3) Aesthetic influence of Chinese painting

Iron painting originated from Chinese painting. In terms of expression, it has the profound and far-reaching artistic characteristics of Chinese painting, such as expressing spirit with form and integrating emotion into scenery (Hu & Jin, 2019). Iron painting art basically adopts the composition method of "flat and distant" in Chinese painting, expressing the realm of plainness and harmony, the style of sparseness and desolation, and the artistic conception of emptiness and tranquility (Xing, 2018). In Chinese painting, blank space is often left to express the sky, water surface, mist, and flowing clouds. By leaving blank space, space is created to trigger the reader's free imagination, which is a unique artistic expression of Chinese painting. Black and white are the main colors of iron painting. The black material iron forms a sharp contrast with the white of the lining board. The black iron and the blank space complement each other, expressing the artistic style of iron painting that is both hard and soft, thin and simple, cold and stubborn (Xing, 2018). Iron painting is based on the techniques and skills of Chinese painting, and is an artistic sublimation of the original painting. It expresses the life outside the world and the combination of reality and illusion, which coincides with the unchanging traditional Chinese aesthetics (Wang & Shi, 2010). Following the modeling principles of Chinese painting, it mainly uses the freehand painting method to vividly convey the charm of the things to be expressed, and has the simple and rigorous temperament of Chinese painting (Wang & Gao, 2014). The shapes expressed in traditional ink painting are combined and expressed in the form of interlacing and forging. Compared with Chinese painting, it strengthens the modeling characteristics and adjusts the virtual and real relationship of the picture (Zhong & Shi, 2020). Iron painting refines the artistic conception of ink painting, giving it a three-dimensional sense of sculpture that is difficult for traditional ink painting to have, which is strong, elegant, majestic, and natural (Zhong & Shi, 2020).

The reference, absorption and expression of traditional Chinese painting by Chinese iron painting can no longer meet the needs of modern consumers. Traditional artistic language can no longer meet the needs of the modern market, and traditional craftsmanship is still struggling to innovate in the form of expression. In the context of today's era, if iron painting wants to develop in an orderly manner, its production

must break through the limitations of traditional craftsmanship, carefully observe the dynamics of surrounding life, extract important elements found around, combine traditional iron painting skills with modern high technology, new materials and modern aesthetic concepts, and effectively innovate in subject matter, design, craft techniques, materials, mounting, derivative products, etc., to create excellent works that conform to the aesthetics of the times, while inheriting traditional culture to the greatest extent, and taking the road of sustainable development and innovation (Zhong & Shi, 2020).

4) Comparison between Chinese iron painting and Chinese painting

The composition and aesthetics are similar. The formation of Chinese iron painting comes from the reference to Chinese painting. The two are similar in composition and aesthetics, showing a composition that highlights the elegant, withered and cold artistic style. However, Chinese painting cannot show the three-dimensional sense and light and shadow sense of Chinese iron painting. Chinese iron painting is more three-dimensional than Chinese painting, and has more visual impact and attraction. Chinese iron paintings have strong contrast between light and dark, and a strong sense of three-dimensionality. The details of each iron painting are finely hammered, welded, and interlocked, and its three-dimensional artistic form is vivid on paper (Guo, 2024).

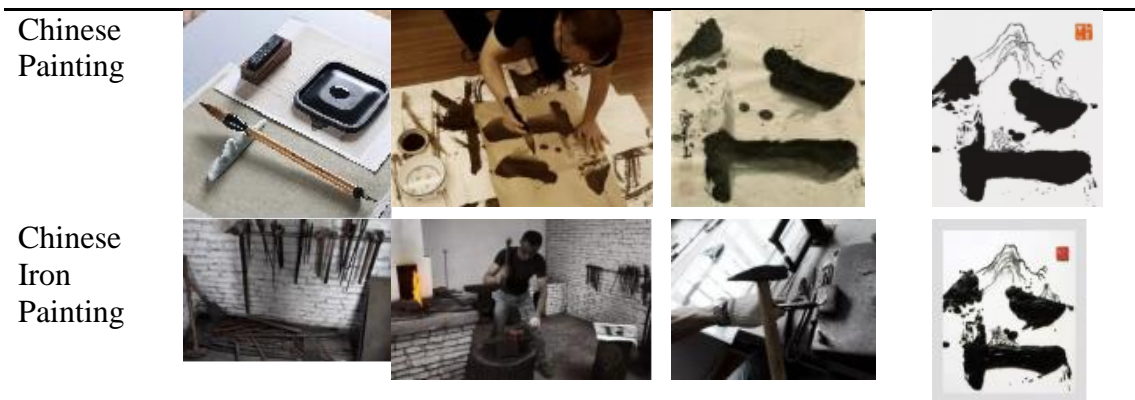
Different production processes. Chinese painting uses a brush dipped in ink to paint on paper, which has certain requirements for ink, paper, and brushes. The painting time is short, saving time and effort, and requires painting skills; Chinese iron paintings use machines to heat iron wires and use hammers to forge iron wires to paint. There are certain requirements for tools, the production time is long, and certain production techniques are required. Chinese iron paintings express the techniques of "working", "writing", "texturing", "drawing", and "rendering" in Chinese paintings through forging techniques such as "smelting", "forging", "drilling", "cutting", and "filing" (Guo, 2024).

Different color expressions. The colors of Chinese paintings have a gradient of light and dark, while Chinese iron paintings can be black and white, colorful, gold, silver, and rust. The colors are more vivid and full. Chinese iron paintings cannot show the light and dark smudge effect of Chinese paintings.

Different uses and preservation. Chinese paintings are mostly works of art, mainly for collection and decoration. Chinese iron paintings are mostly handicrafts, mainly used as gifts, decorations and for practical purposes, such as Chinese iron painting lamps and screens, which play the role of lighting and dividing space. Chinese iron paintings are easy to preserve and are not afraid of moisture and high temperature; Chinese paintings need to be stored in a dry space and are afraid of moisture and high temperature.

Table 11 *Comparison of Chinese painting and Chinese iron painting production*

Category	Materials and Tools	Creative stage	Completed
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Note. Researcher produced 2024

The above table shows the different characteristics of Chinese painting and Chinese iron painting. Chinese iron painting is produced based on Chinese painting drafts. Strictly speaking, the production stage of Chinese painting belongs to the design and creative stage of Chinese iron painting, and they are subordinate to each other. From the above table, we can see that the tools, materials and methods of production are different. The finished works have a high degree of similarity. Chinese iron painting has more visual impact and has the texture and weight of iron forging.

5) Comparison of abstract Chinese iron paintings that integrate traditional realism and design

Chinese iron paintings are good at expressing realistic works, such as plant themes such as pine trees, plums, orchids, bamboos, and chrysanthemums, as well as animals such as horses, eagles, and chickens, which are relatively common in Chinese iron paintings and have caused people's aesthetic fatigue.

At present, abstract works of Chinese iron paintings mainly refer to the freehand expression of Chinese paintings, using concise lines and jumping ink colors to express the charm of objects. Emotions are conveyed through subjective expressions of shapes and colors. They do not directly depict the natural world, but can create a unique atmosphere and emotion through the combination of colors, lines, and blocks. There are currently few abstract works of Chinese iron paintings in the modern sense. They are mainly home decoration ornaments integrated with modern design, which are very popular among modern people. One of the future development directions of Chinese iron paintings in home decoration is to expand the design into abstract works.

Table 12 Comparison of traditional Chinese iron paintings and iron paintings integrated with design

Traditional realistic lotus	Design-integrated Hui-style architectural iron painting
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Traditional iron painting hanging paintings in the form of Chinese painting fans, with flowers as the subject matter and lotus as the element, and acrylic coloring to make the work more realistic. It has symbolic and auspicious meanings and is mainly used as a decoration for architectural spaces. The production is relatively time-consuming and requires certain technical requirements.

The Chinese iron painting design fusion works simplify the design of the representative horse head wall in Huizhou architecture, and combine it with incense culture, Buddhist figures and boats to convey the story in an abstract form. It has decorative and practical functions and meets the aesthetic and life needs of modern people. It is simple to make, takes a short time, and does not require high production technology.

Note. Researcher produced 2024

The above table presents a comparison between traditional realistic iron paintings and iron paintings that integrate modern design. The iron paintings that integrate design design express traditional architectural elements through iron paintings, and integrate Buddhist culture and incense culture, making them function as incense holders. At the same time, they convey Buddhist culture and a leisurely lifestyle. They have advantages in sense of form, functional use, production methods and consumer aesthetic preferences. This is the change and value that design fusion has brought to Chinese iron painting products.

2.4 Design of Chinese iron painting cultural and creative products

2.4.1 Cultural and creative industries and cultural and creative products

1) Cultural and creative industries

In 2003, UNESCO defined cultural and creative industries as: "Industries with intangible and cultural content as their essence, which are combined with creativity, production and commercialization, and are protected by intellectual property, and are expressed in the form of products or services s (Wang & Jiang, 2017). Looking back at the time when culture became an economic resource, it should be after 1987, when culture began to be used as a potential economic resource in the UK (O'Connor, 2007). In the late 1990s, creative industries were applied to British cultural policy and higher education, which was an attempt to link art and cultural industries at the national level (Hesmondhalgh, 2008). The rise of cultural industries with creativity and innovation as their core concepts has formed a unique cultural industry brand in the world, known as cultural and creative industries (Xiaojin Zhang & Yi Xie, 2022). In 2001,

Hawkins proposed a new economic transformation based on creativity, and the creative economy will become the main economic form in the 21st century (Hesmondhalgh, 2008). The cultural and creative industry is a dynamic and innovative industry with a strong ability to continuously develop new products, which contributes to the diversification of the cultural market. It provides opportunities for entrepreneurs and also creates jobs, contributing to the development of the national economy (Cui et al., 2024). The cultural and creative industry is considered to be responsible for above-average growth and job creation, is a carrier of cultural identity, and plays an important role in promoting cultural diversity (Hani et al., 2012).

In 2002, the 16th National Congress of the Communist Party of China announced that the development of cultural industries is a key task of the "15th Five-Year Plan"; in December 2005, Beijing included the term "cultural and creative industries" in its development strategy (Hesmondhalgh, 2008). Creative industries are those industries that originate from individual creativity, skills and talents and have the potential to create wealth and jobs through the generation and use of intellectual property (DCMS, 1998). The cultural and creative product design business has become an important pillar of economic development in some countries (Malek et al., 2024). The cultural and creative industry is an emerging industry with creativity as its core. It is a modern product that presents cultural resources through unique and novel design methods based on cultural resources and combined with modern design and creative methods. Designers bridge the gap between thought and practice and connect artistic and creative elements with practical and achievable results (Dodgson et al., 2005). The result of this connection is cultural and creative products. The creative design industry is an important driving force that can effectively transform culture into an economic value (Zhang, 2018).

2) Cultural and creative products

Cultural and creative products are products that include both cultural and creative aspects, referred to as cultural and creative products (Zhao, 2016). Cultural and creative product design is an important way for the innovative development of contemporary traditional culture. It combines cultural creativity with modern design concepts, and improves product added value and market competitiveness by innovating and changing the design of traditional cultural products. As an integral part of product design, cultural and creative products express cultural value, commemorative significance and practical functions. Cultural and creative design is a good carrier and platform for handicrafts, intangible cultural heritage and other crafts and modern creative design (Zhang, 2018). Cultural and creative products are centered on cultural elements. Through unique interpretation and re-creation of cultural symbols, they form specific commodity forms and play an important role in the cultural consumption market (Ji, 2021). China's cultural and creative industries are booming, and the design of cultural and creative products based on traditional Chinese culture has become one of the main trends in cultural and creative product consumption. Cultural and creative industries are considered to contribute more to growth and employment than average creation, and they are also a carrier for cultivating cultural diversity and cultural identity.

2.4.2 Characteristics of cultural and creative products

In China, traditional crafts are included in the cultural and creative industries, and the innovative design products produced belong to the category of cultural and

creative products. Cultural and creative products produced by design means contain rich cultural connotations and symbolic meanings, making culture evolve into cultural symbols with new era values and connotations, and high value-added commodities, giving new vitality to traditional culture, and playing a positive role in promoting cultural inheritance and innovation. The transformation of traditional culture into cultural and creative products through design can solve the contemporary inheritance problem of traditional culture, meet people's life needs, and realize social and commercial value. The fundamental goal of design is to solve the problems in people's daily life. Whether it is practical function or aesthetic consideration, it aims to improve the convenience of life and bring comfort and convenience to people (Wang, 2017).



Figure 50 Cultural and creative jewelry made using traditional embroidery
 Note. Winning works of the 3rd Cultural and Creative Design Competition 2024

Cultural and creative products have the following characteristics.

1) Highlighting cultural nature.

Cultural and creative products have a distinct cultural background, integrated with profound cultural heritage, aiming to meet people's needs for destination cultural experience, and presenting unique cultural characteristics. Culture refers to all human spiritual activities, including knowledge, cultivation and concepts, as well as products related to spiritual activities. The most important thing about cultural and creative products is their cultural connotation, which can meet some cultural needs of users. This is the biggest difference between cultural and creative products and other products (Yang, 2017). The essence of cultural and creative products lies in the fusion of cultural heritage and innovative design concepts to achieve modern interpretation and effective communication (Du, 2024).

2) Emphasis on artistry.

Cultural and creative products should embody design and aesthetics through creativity, bring fun and aesthetic feelings to people, and achieve reasonable and unexpected artistic effects. Cultural and creative products carry the aesthetic characteristics and artistic interests of consumers and have unique artistic appreciation. When designing the culture, materials, and environment of cultural and creative products, their artistic elements will be constantly reconstructed and innovated according to different era backgrounds and aesthetic situations. Cultural and creative products must be innovative and artistically aesthetic, and in the information society, visual symbols are widely used as an important means of communication (Ye & Niu, 2023). Products that can be considered eye-catching, innovative, and well-designed are more likely to stand out and attract customers' attention (Idemen et al., 2021).

3) Focus on functionality.

Cultural and creative products focus on certain practicality, not just beauty, but also need to focus on market value and high cost performance. Functional elements are the basic elements of cultural and creative products, with practicality, ease of use and creativity. The practical functions of cultural and creative products meet the usability needs of users in the use scenarios, mainly creative cultural crafts, office supplies, consumer daily necessities, decorations and other life products. While maintaining the cultural connotation of the product, by adding new functions and optimizing the use experience, cultural and creative products can be closer to consumers' daily lives (Du, 2024). Consumers attach great importance to hedonic beliefs, but they usually need to meet a certain number of functional aspects to feel satisfied (Chitturi et al., 2008). These aspects together reflect the personality of the product and can influence consumers' views.

4) Contain emotionality.

Emotional elements are to establish emotional cognition with consumers from three aspects: lifestyle, cultural background, and aesthetic imagery, and continuously sublimate the emotional value of cultural and creative products. Behind cultural and creative products are profound historical and cultural implications and stories, condensing the unique spiritual values and social connotations of the Chinese nation. In the process of cultural and creative product design, emotional elements are the most direct design elements to improve user pleasure. It is necessary not only to establish a connection with consumers' values, but also to combine cultural elements with the characteristics of the times, life stories, and emotional memories, constantly interpret and reshape cultural connotations, and build emotional resonance with consumers. By utilizing symbolic design elements, a unique image can be created and stand out from competitors, because uniqueness can be a key point of differentiation (Rui-Bo et al., 2014; Tan & Ming, 2003). In new product development, designers must consider the symbols they incorporate into the product because they can directly affect consumers' cognition and purchasing decisions (Tan & Ming, 2003). Give cultural and creative products applicability, which is the expansion of practical functions at the material level and the enrichment of additional functions beyond the practical part at the spiritual level (N. Wu, 2024).. Designers respect the emotional appeal of the product, can evoke consumers' memories, and provide an intimate appeal that resonates with consumers (Sameti, 2022). We should pay attention to people's spiritual needs and emotions, so that the design conforms to the cultural tastes of different people (Qian & Meng, 2006).

The visual presentation of cultural symbols in cultural and creative product design is a kind of surface, and excellent quality and appropriate functions are the foundation of cultural and creative product design. Through a product design, cultural symbols and cultural patterns are transformed into a carrier of cultural experience, integrating the appearance of cultural symbols, the core of commemorative value, and the daily use functions given to them. It has received widespread attention from all walks of life and has become a contemporary cultural and design phenomenon.

Table 13 *Elements of Cultural and Creative Product Design*

Serial number	Elements	Features
1	Cultural	The value foundation and inspiration source of cultural

	elements	and creative product design
2	Elements of Art	Cultural and creative products embody the aesthetic characteristics of consumers and have the characteristics of artistic appreciation.
3	Functional elements	Basic elements of cultural and creative products
4	Emotional Factors	Cultural and creative products trigger emotional resonance among consumers

Note. Researcher produced 2024

2.4.3 Market demand and development trend of cultural and creative products

Cultural and creative product design is a product design method that takes culture as the core and combines culture with modern design concepts. Compared with other products, the development of cultural and creative products should pay more attention to the cultural nature, regional characteristics, design aesthetics, practicality and market value of the products. Cultural and creative products are the extension of tourists' travel experience and the carrier of travel memories. At present, the number of tourists in China is increasing year by year, and cultural and creative products have become the main consumer object of people's travel. Domestic and foreign designers and design companies have begun to pay attention to the fusion and application of traditional culture in the creation of cultural and creative products.

The industry characteristics of China's cultural and creative products are that intangible cultural heritage enters life in the form of cultural and creative products, expanding the protection and inheritance model of intangible cultural heritage. From the beginning of the 20th century to today, cultural and creative products pay special attention to intangible cultural heritage and folklore. In 2023, the market size of China's cultural and creative products reached 16.38 billion US dollars, a year-on-year increase of 13.09% (Mob, 2024).

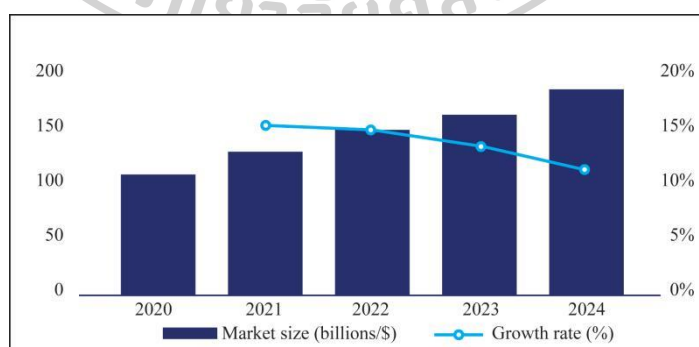


Figure 51 Market size and growth rate of cultural and creative products in China from 2020 to 2024

Note. The researchers drew this figure based on the 2024 Cultural and Creative Industry Report 2024

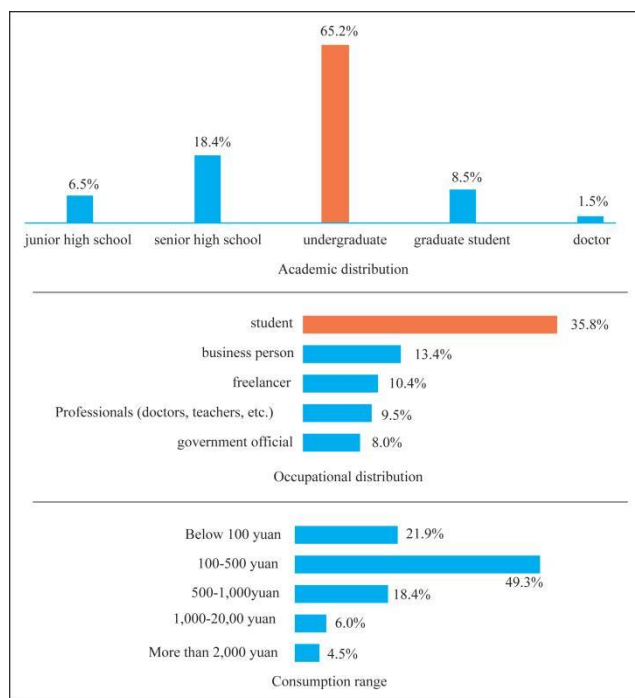


Figure 52 Educational background, occupational distribution and consumption range of cultural and creative product consumers
 Note. The researchers drew this figure based on the 2024 Cultural and Creative Industry Report 2024

The report of the cultural and creative industry in 2024 shows that in the 2023 China Cultural Products Fair, the proportion of cultural and creative products has exceeded 14%, a year-on-year increase of 6.5%. The scale of cultural and creative products continues to expand, injecting strong development momentum into the entire industry. The survey also shows that undergraduates are the main consumer of cultural and creative products. According to the 2024 Cultural and Creative Industry Report, the educational level of cultural and creative product consumers is mainly undergraduate, accounting for 65.2%, and the occupational distribution is mainly students 35.8%, followed by company white-collar workers 13.4%, and freelancers 10.4%. The consumption budget of cultural and creative products is mainly concentrated in 100 to 500 yuan, accounting for 49.3%, followed by less than 100 yuan, accounting for 21.9%, and then 500 to 1000 yuan, accounting for 18.4%. These data show that consumers of cultural and creative products have certain cultural knowledge, mainly young college students, and product prices between 100 and 500 can meet most consumers. .

Data shows that as many as 95.5% of the surveyed population showed strong interest in purchasing cultural and creative products, demonstrating the broad appeal of the cultural and creative industry. In this trend, collection and daily use have become the main purchase purposes, injecting strong momentum into the cultural and creative product market (Mob, 2024). In recent years, China's cultural and creative industry is in a stage of rapid development. More and more cultural and creative parks and creative markets can be seen everywhere, which have been widely welcomed by

the public. Cultural and creative industries have gradually been integrated into every corner of the city and our daily lives. In the cultural and creative industry, future consumer groups will be the key driving force of diversified, small and beautiful, and multi-channel cultural and creative models. Cultural tourism and intangible cultural heritage inheritance are the core areas of cultural and creative products. Cultural and creative products are becoming an important carrier of cultural inheritance, emotion, and concept expression, involving all aspects of our lives.

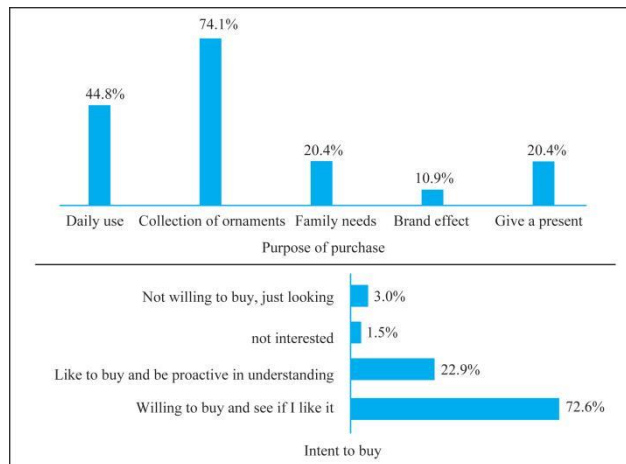


Figure 53 Purpose of purchasing cultural and creative products and product intentions
 Note. The researchers drew this figure based on the 2024 Cultural and Creative Industry Report 2024

The above chart shows that 95.5% of consumers will buy cultural and creative products, 74.1% of consumers buy cultural and creative products for collection and display, and 44.8% of consumers buy cultural and creative products for daily use. It can be seen that cultural and creative products have very stable consumers and market potential, and aesthetics and practicality are the main purposes of cultural and creative purchases

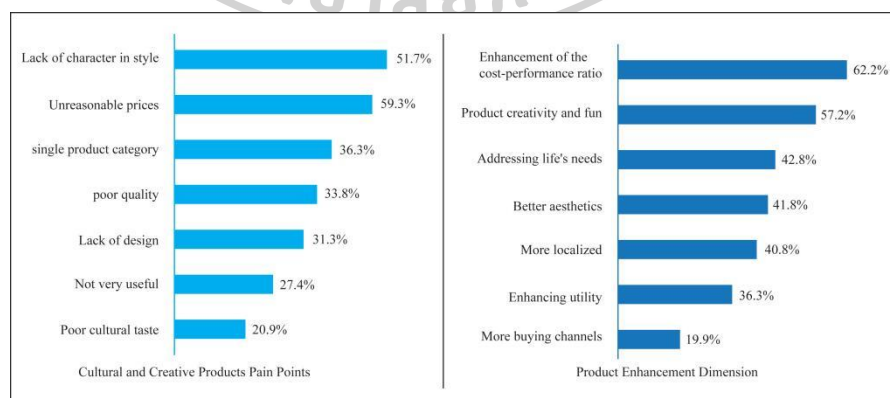


Figure 54 Pain points and improvement dimensions of cultural and creative products
 Note. The researchers drew this figure based on the 2024 Cultural and Creative Industry Report 2024

The above figure shows that the current cultural and creative products have the problems of popular styles, lack of characteristics, unreasonable prices, single categories, and lack of design sense. In addition to cost-effectiveness, more than 50% of consumers hope that cultural and creative products can be more creative and interesting, close to life needs, beautiful and practical, and have local cultural characteristics (Mob, 2024).

The market demand, purchase purposes, pain points and improvement dimensions of the above cultural and creative products can provide guidance and help for this study. The development of China's cultural and creative products is still in a slow rise period, and some feasible paths are gradually forming in a relatively disordered state. The support policies given by the state have made cultural and creative products highly popular, and the business opportunities they have also attracted many practitioners from other fields.

2.4.4 Chinese iron painting cultural and creative products and cases

1) Design of traditional craft cultural and creative products

Traditional crafts are the technical crafts and related products formed and passed down by people of all ethnic groups through long-term social life practices, and are an important part of intangible cultural heritage (Zhong et al., 2023). Lin Rongtai, a professor at the School of Design of the National Taiwan University of the Arts, uses the concept of "three levels of culture" in the design of cultural and creative products, which are divided into external, intermediate and internal levels. From a cultural perspective, the external level is tangible, the intermediate level is ritual customs, and the internal level is intangible spirit; from the perspective of product attributes, the external level talks about appearance, the intermediate level emphasizes function and operation, and the internal level appeals to emotion (Yang, 2017). This is the basic idea of designers using cultural analysis in the process of cultural and creative product design.

The design of traditional handicraft cultural and creative products is a design process that integrates creativity, culture, and art into products. In this process, it is necessary to use appropriate methods and practical mechanisms to cleverly integrate the cultural connotation of the product with artistic aesthetics. Based on safety and environmental protection, we should grasp the fun, artistry and emotionality of the products, and then through the humanized and emotional design of home furnishings, we can make them form unique and distinctive fashion, entertainment and leisure characteristics on the basis of playing the basic application functions, which can stimulate diversified application value (Cao & Zhu, 2018). Due to different personal aesthetic preferences, design fusion products must be diversified. Only with distinctive personality, cultural characteristics and diverse functions can traditional crafts be effectively integrated into contemporary design. The essence of product design lies in its aesthetics, culture and function. The fusion of traditional crafts and modern design concepts may produce products that are closely connected with today's consumers while protecting their cultural heritage (Zbucheá, 2022).

The realization of modern design transformation of traditional crafts requires practitioners to integrate into contemporary social life and design the functions of traditional handicrafts from the lifestyles chosen and recognized by consumers (N. Wu, 2024). By combining traditional handicrafts with contemporary design, cultural and creative projects gain more value and uniqueness. This fusion promotes the long-

term development and recognition of traditional arts and crafts, ensuring that cultural and creative products maintain their relevance, importance and economic viability in today's globalized economy (Shanshan, 2024). Provide information for the continuous enhancement of craft knowledge from a design-oriented perspective (Brown & Vacca, 2022). As a prototype work that embodies customs, relationships, knowledge and techniques passed down from generation to generation in a localized context, traditional crafts are regenerated through a series of design-led translation and communication processes (Brown & Vacca, 2022). In the design of traditional handicraft cultural and creative products, we focus on sustainable development, emphasize the unity of form and meaning, advocate practical value, strengthen productive protection, embed cultural connotations, base on regional characteristics and introduce brand concepts (Yang & Mao, 2023).

The design of traditional handicrafts not only focuses on the creativity and production of a certain product, but also focuses on the universal application of traditional skills in social life (N. Wu, 2024). At present, the overall phenomenon of cultural and creative products is the lack of culture and aesthetics. A considerable number of traditional crafts simply copy old designs or imitate designs of other categories. To make effective and appropriate designs, designers must carefully integrate traditional craft techniques into cultural and creative products (Lan, 2022). As the popularity of intangible cultural heritage has gradually increased in the past decade and has received active attention from the public, cultural and creative products with intangible cultural heritage as the theme have also flooded into the market. Looking at the current cultural and creative design, some products lack deep cultural characteristics in design. Designers usually find some traditional handicrafts, select a graphic from them, and directly transfer it to some products. This copy-style use lacks creativity and is superficial in cultural expression. The design of cultural and creative products with culture as the core does not cut into the core of culture, but simply relies on superficial and visually impactful graphics. Works that use culture as material to piece together and pile up do not have enough culture and aesthetics (Yang, 2017). The key problems of cultural and creative products in today's market are lack of creativity, few types, and serious homogeneity. The existing traditional craft cultural and creative products have a serious phenomenon of convergence in appearance and explicit elements, which makes it difficult to meet the emotional needs of consumers, and the design ideas and methods of the products tend to be similar (Yang & Mao, 2023).



Figure 55 The cultural and creative products of the Beijing Palace Museum and Zhejiang's "Chaodai Cultural and Creative" brand are very similar
Note. Taobao2023

2) Design of Chinese iron painting cultural and creative products

At present, the design of Chinese iron painting products for the public is monotonous, simple to make, lacking in creativity, and highly homogenized. It is out of touch with the daily life of the public. It is mainly for display and decoration, and lacks daily practical functions. The existing iron painting cultural and creative products are mainly screens, decorative hangings, and desktop paintings. Most iron painting cultural and creative products are inconvenient to carry, which also makes consumers hesitate when buying. Portability, functionality, and artistry are all important factors for consumers to consider (Chen & Zhu, 2022). Activating and reorganizing iron painting resources through design is an important way for iron painting to gain new life. Combining the artistry and practicality of iron painting, it can make its artistic and functional aspects better (Jiang, 2014). Iron painting cultural and creative products can be practical and uniquely designed home decorations, or artistic and commemorative gifts and souvenirs (Tao, 2024). For example, some companies commission professional painters to carry out innovative designs for iron paintings. Some craftsmen cooperate with designers, artists and university design teachers to design innovative Chinese iron painting products with certain formal beauty and practical functions. This phenomenon is still an individual case in Chinese iron painting. The design of Chinese iron painting cultural and creative products is still in the initial exploration stage. It is more about simplifying, reorganizing and appropriating traditional Chinese iron paintings. It does not cut into the characteristics and cultural connotations of iron paintings. It is only repeated in content and form. This shows the lack of design in iron paintings. Design is an implicit element and constituent element of handicraft practice. The lack of design leads to the decoupling of products and the market.

As a traditional Chinese arts and crafts, iron painting is looking for new technical paths in the changes of visual aesthetics to adapt to the aesthetic needs of the times (Zhong & Shi, 2020). Chinese iron painting cultural and creative products need to enter from modern design concepts and methods, and it is by no means a simple reorganization and appropriation of elements. Modern product design has three dimensions for consumers: functionality, aesthetics and symbolism (Homburg et al., 2015).. These three levels include cultural and emotional levels. The aesthetic dimension refers to the sensory and emotional aspects of a product's appearance, such as color, shape, texture, and style (Hagtvedt & Patrick, 2014). The functional dimension refers to the technical and performance aspects of a product's design, such as durability, reliability, and ease of use (Kumar & Noble, 2016). The symbolic dimension refers to the cultural or social meanings associated with product design elements (Rui-Bo et al., 2014). Functionality is the overall ability required by consumers to determine satisfaction, and participants rated it as one of the most important reasons because products need to be practical and improve efficiency (Kumar & Noble, 2016). Aesthetics is the main visual appeal of a product's appearance, influencing consumers' first impressions and changing the user experience (Lin & Chang, 2021). The perception of aesthetics varies according to different people's culture and experience. Symbolism is the meaning conveyed by a product, and understanding its meaning or history is crucial to ensuring the creation of a successful product (Rui-Bo et al., 2014). When using a product, users directly perceive the shape, color, and pattern of the product. The product function meets the



user's practical needs and meets the user's aesthetic needs, allowing the user to gain a sense of pleasure and utility, thus entering the practicality and comfort stage of cultural and creative products, that is, the aesthetic layer, and generating emotional identification with cultural and creative products.

The design of cultural and creative products for Chinese iron paintings needs to be interpreted from the perspective of modern design, exploring the intersection between Chinese iron paintings and contemporary life, using cultural and creative products as a carrier for creative transformation, applying the elements and cultural connotations of iron paintings to cultural and creative products, and breaking through the lack of practicality and The limitations of homogeneity, while improving the quality of iron painting cultural and creative products.

3) Chinese iron painting cultural and creative product design cases

The cultural and creative products of Chinese iron painting are basically transformed from traditional Chinese iron painting, such as changing the size, changing the mounting form, simplifying the elements, changing the color, combining with other art types, etc. These products have brought changes to Chinese iron painting to a certain extent, which shows the positive impact of cultural and creative products on the development of iron painting during the revitalization and exploration period, and also implicitly reveals the importance of design. The following are the cultural and creative product designs of Chinese iron painting in the current market, including decorative lamps, decorative ornaments and decorative screens.

Table 14 *The current representative cultural and creative products of Chinese iron painting*

Category	Product name and function	Picture
Lighting	Chinese iron painting lamps have the functions of decoration and practical lighting, while reflecting personal cultural taste and meeting the needs of home use.	
	Chinese iron painting lamps have the functions of decoration and practical lighting, and the plum blossom has cultural connotations and emotional expressions.	

Chinese iron painting lamps have the functions of decoration and practical lighting, and the pine tree has cultural connotations and emotional expressions.



Chinese iron painting lamps have both decorative and practical lighting functions. The magpie and plum blossom symbolize auspiciousness and joy.



Chinese iron painting lamps, with decorative and practical lighting functions, Chinese landscape and residential architecture.



Decorations Chinese iron-painted porcelain plate ornaments have decorative functions, and the lotus color is elegant, with cultural connotations and emotional expressions.



Chinese iron painting gold-plated ornaments have decorative functions. The pine tree has cultural connotations and emotional expressions, and the gold color highlights nobility. It is suitable as a gift and commemoration.



Chinese iron painting ornaments have a decorative effect, and chrysanthemum has a special meaning.



The Chinese iron painting incense burning ornaments have both decorative and incense burning functions and are suitable for placement in clubs and tea rooms.



Chinese iron painting desktop painting, with decorative function, highlighting the fun and personal aesthetics, suitable for home display or as a gift



Chinese iron painted fan ornaments have decorative functions and cultural symbolic significance, and are suitable for home display or gifts.



Chinese iron paintings are decorative ornaments that have decorative functions and are suitable for home placement and as gifts.



Chinese iron painting relief ornaments have decorative functions and symbolic meanings, and are suitable for home placement and corporate opening ceremony gifts.



Chinese iron painting ornaments, combined with ceramics, have a unique aesthetic.



Screen

Chinese iron painting table screen has decorative and practical functions, rich cultural connotations, and is suitable for home display and gifts.



Chinese iron painting table screens have both decorative and practical functions, and the Welcoming Pine has special meaning and symbolism.



Chinese iron painting table screen has decorative and practical functions, rich cultural connotations, and is suitable for home display and gifts.



The Chinese iron-painted inkstone screen has both decorative and practical functions and rich cultural connotations, making it suitable for home display and gifts.



Chinese iron painting table screen has decorative and practical functions, rich cultural connotations, and is suitable for home display and gifts.



Chinese iron painting table screen has decorative and practical functions, rich cultural connotations, and is suitable for home display and gifts.



Chinese iron painting table screen has decorative and practical functions, rich cultural connotations, and is suitable for home display and gifts.

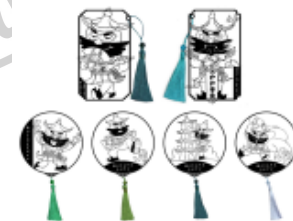


Chinese iron painting table screen has decorative and practical functions, rich cultural connotations, and is suitable for home display and gifts.



Other
categories

Bookmarks



Widgets



As can be seen from the table above, the cultural and creative design of Chinese iron painting is mainly based on lamps, ornaments and screens, and has basically not changed the traditional two-dimensional form of expression. Among them, lamps and screens have dual functions of decoration and practicality, which can meet the needs of some people. The elements used in these cultural and creative products are all common contents in Chinese iron painting, expressing auspicious meanings. The way of use is to simplify and appropriate the elements, without changing the traditional form of Chinese iron painting. Chinese iron painting has not been closely integrated with design at present, which is also the value and significance of this study.

2.4.5 Positioning of Chinese iron painting cultural and creative products

Product positioning refers to the design method, target audience, purpose and key features of the product (Li, 2023). For Chinese iron painting cultural and creative products to have significant cultural and commercial value, it is necessary to identify the target consumer group who is interested in traditional culture and has consumption potential. According to the age and characteristics of the consumer group of cultural and creative products, the consumers of Chinese iron painting cultural and creative products are positioned in the youth group, aged 20-35 years old. This group has a certain aesthetic and cultural level and likes new things and cultural and creative products with unique characteristics. Effective product positioning will help to ensure the market demand for cultural and creative products. The stability of the economic survival ability of craftsmen is important for their well-being (Mohlman, 1999). Good economic income will arouse the interest of young people in this industry. The inheritance of traditional crafts mainly lies in the youth group. Their aesthetics and needs determine the development direction of traditional crafts. More and more young people should understand Chinese iron painting and be willing to learn this craft and buy products made using this craft.

2.5 Cultural inheritance of Chinese iron painting

2.5.1 Protection and inheritance of Chinese traditional crafts

In 2003, UNESCO issued the Guidelines for Building a Dynamic National Human and Financial System, which clearly pointed out that one of the ways to protect the sustainability of intangible heritage is to encourage the public to appreciate or use it. In 2005, the State Council's Notice on Strengthening the Protection of Cultural Heritage defined the working principles of intangible heritage protection as "protection first, rescue first, reasonable use, inheritance and development". The 2011 Intangible Heritage Law of the People's Republic of China pointed out that China encourages and supports the reasonable use of representative intangible cultural heritage projects and the development of cultural products with local and ethnic characteristics and market potential. In 2017, the General Office of the CPC Central Committee and the State Council issued the Opinions on Implementing the Inheritance and Development Project of China's Excellent Traditional Culture, pointing out that intangible cultural heritage should be integrated into production and life, so that China's excellent traditional culture can be better integrated into production and life (Xiao, 2021). China has established a four-level intangible cultural heritage representative project list system and a representative inheritor system in the

practice and system construction of intangible cultural heritage protection, encouraging intangible cultural heritage inheritors to improve their personal qualities and skills and to accept apprentices to pass on their skills. In terms of protection concepts, a variety of protection concepts have been formed, including holistic protection, authenticity protection, legal protection, digital protection, educational protection, dynamic protection and productive protection (Ma & Chang, 2021). These protection concepts are all aimed at cultural inheritance. This study mainly focuses on the productive protection concept.

Regarding productive protection, it is emphasized that traditional handicrafts must be protected in production practice, and traditional crafts must be transformed into products that meet the aesthetic and usage needs of modern people, so that excellent traditional culture can serve people's daily lives. The people are the testers and judges of the integrity and innovation of intangible cultural heritage. The people's sense of identity and continuity of intangible cultural heritage is the foundation of the protection, inheritance and innovation of intangible cultural heritage (Chenyang Wang, 2024). Only when consumers feel the unique charm of traditional crafts through the use of products, will they love it as the owner and be willing to protect and inherit it. In terms of the protection and inheritance of traditional skills of intangible heritage, China follows the concept of productive protection, allowing the people's intangible heritage to be shared with the people, and promoting people's use through production, so as to protect and inherit. Productive protection is a compromise between radicals and conservatives in the process of intangible cultural heritage protection. It emphasizes exploring protection methods from the essence of intangible cultural heritage, that is, production. It is a sustainable protection method that conforms to the essence of intangible cultural heritage (Song, 2012). Productive protection is the best way for traditional crafts. It maintains its core skills and core values in life and is closely connected with people's lives, so that it can be passed on in life for a long time (Zhu, 2015). In order for traditional crafts to innovate in inheritance, craftsmen need to be familiar with production skills and have certain theoretical literacy, and have the awareness and ability of conscious innovation (Ji & Chen, 2019). If craftsmen lack theoretical literacy and innovation awareness, the best way is to achieve this inheritance and innovation through fusion with design. The task of inheritance is given to craftsmen, and the work of innovation is undertaken by designers.

2.5.2 The current situation and dilemma of the inheritance of Chinese iron painting

1) The current situation of the inheritance of Chinese iron painting

At present, the research on the inheritance of Chinese iron painting culture focuses more on the inheritance of skills and its inheritance methods, mainly relying on government policies and financial assistance, and rarely achieves sustainable inheritance through cooperation with external forces. The main ways of inheritance of iron painting include master-apprentice inheritance, family inheritance, enterprise inheritance, training class inheritance and school inheritance (Hu & Fan, 2020). The form of master-apprentice inheritance is more common in iron painting, and the researcher himself is also a beneficiary of master-apprentice inheritance. Family inheritance is rare, and the younger generation is unwilling to follow their parents to engage in such work where the economic income and effort are not proportional. Enterprise inheritance mainly involves learning from the master within the enterprise.

Training class inheritance is mainly short-term public welfare training provided by the government or industry associations. School inheritance is a way of inheritance through school-enterprise cooperation or iron painting masters entering campus activities, where training is held in schools. The above five ways of inheritance all focus on the inheritance of skills, and do not protect inheritance from the perspective of productive protection. There are about 60 craftsmen engaged in Chinese iron painting, and more than 10 iron painting companies with stores. Among them, Wuhu Arts and Crafts Factory, Feilong Iron Painting, Chu's Iron Painting, Huiyifang Iron Painting, Kaiyong Iron Painting, Wendian Iron Painting and Yilei Iron Painting have a certain degree of popularity and influence.

2) Dilemma of inheritance of Chinese iron painting

Chinese iron painting faces many dilemmas, which restrict the inheritance and development of Chinese iron painting.

First, enterprises excessively pursue profits and fail to establish a healthy labor or cooperative relationship with craftsmen. The prices given by enterprises to craftsmen make them lack the enthusiasm to make and develop new products, resulting in a large difference between the form and quality of products and consumer demand. At the same time, enterprises do not have dedicated designers to design products. Low product quality leads to low public satisfaction, which cannot attract the active participation of the public, resulting in fewer and fewer consumers and a gradual shrinking of market demand. The economic interests of enterprises and craftsmen are not guaranteed, which has entered a vicious circle, restricting the entry of outstanding talents and the expansion of the inheritance population, and ultimately affecting the effective inheritance of Chinese iron painting.

Second, there is a lack of young practitioners to join. The quality of an industry can be judged by the attraction of young practitioners. There are basically no practitioners under the age of 35 in Chinese iron painting. According to field investigations, there are currently only 3 people under the age of 35 in the iron painting industry, all of whom are newly joined apprentices. The old generation of craftsmen are aging, and the construction of the new generation of echelons has not been formed. The iron painting industry has entered a dangerous situation where there is no successor (Ma & Fan, 2023).

The main reason for this phenomenon is that economic income is not guaranteed. Without a stable source of income, craftsmen will not recruit apprentices, and apprentices will not come to learn without income. The attractiveness of the iron painting industry is disappearing, and the enthusiasm for iron painting is not high (Ma & Fan, 2023).

Thirdly, craftsmen lack painting and design skills. The existing iron painting craftsmen are relatively old, most of them have not been to school, lack painting and design skills, and the market for iron painting cultural and creative products that meet people's daily use has not yet been developed.

The drawings or design drafts they make for Chinese iron paintings are printed and imitated after searching in books and on the Internet, which cannot express the aesthetics and artistic conception of the works. This phenomenon has led to the inability to produce original works that meet consumer needs, and excessive imitation of traditional themes has caused aesthetic fatigue among consumers. In order to better develop iron paintings, new products must be designed, and efforts must be made in

terms of ideology, artistry, and practicality to make the products conform to the principle of "use and appreciation" (Yang, 2020).

Finally, with the addition of machine production, craftsmen's orders have decreased. The existing Chinese iron painting production model is that enterprises place orders to craftsmen, and the semi-finished products produced by the craftsmen are given to enterprises, which then paint and install them before selling them. With the mass production of iron paintings by machines, the already small market orders have become even smaller, causing iron painting craftsmen to leave the iron painting industry and engage in other work. Iron paintings that are mainly made by hand forging are gradually replaced by mechanical processing assembly line production (Ma & Fan, 2023).

The way out for Chinese traditional culture lies in continuous self-renewal based on inheritance (Zhu, 2019). The way out for Chinese iron paintings requires the intervention of external forces, which requires craftsmen to cooperate with designers to achieve the renewal of their own thoughts, qualities and design capabilities.

2.5.3 Design fusion promotes the inheritance of Chinese iron painting culture

1) Promote the inheritance of the implicit culture of iron painting.

The inheritance of Chinese iron painting culture needs to uphold the dynamic state and production, and explore and transform traditional culture with a dynamic vision and thinking. The first thing is to pay attention to the aesthetic concepts and creation ideas hidden behind it, which is the core of culture. Iron painting is a spiritual product and a material commodity. The fusion and unity of form and soul have made iron painting depict profound meanings with a beautiful posture (Wang & Shi, 2010). Culture is something deeper than visible behavior; it is a thought, value and concept shared by society and spread by society, which is used to give meaning to experience, generate behavior and be reflected by behavior (Haviland et al., 2017). The inheritance of culture needs to become a visible object, and through the use of promoting the enthusiasm of practitioners to make, maintain the sustainable inheritance of skills. Design is a form of constructing the retelling of invisible culture, realizing the modern transformation of design that returns products to social life, and is the key to the effective inheritance and development of traditional handicrafts in the contemporary era (N. Wu, 2024). As an excellent traditional culture, Chinese iron painting has unique craftsmanship, aesthetic characteristics and cultural connotations, which need specific products to show. Each local craft has a unique feature, which is formed by the materials and skills used. Designers can reveal the authenticity of local craftsmanship by working with craftsmen and highlight their regional characteristics through design (Tung, 2012).

As a spiritual product, it needs to have cultural and emotional characteristics. As a commodity, it has certain aesthetics and functionality. Designers and craftsmen need to explore its core cultural connotations and craftsmanship characteristics. Knowledge creation and transfer through design intervention is the source of innovation and a key factor in stimulating the development of local culture (Bathelt et al., 2002). Modern design can make good use of the characteristics of Chinese iron painting materials, craftsmanship and culture, realize the transformation from art to practical life, and enable consumers to feel the spirit and traditional creation ideas of Chinese iron painting in use. Under the new historical conditions, the cooperation and fusion of

literati and artists will burst out with huge energy and lead traditional crafts to a higher level (Hua, 2021).

2) Improve the market competitiveness of iron painting products.

In order to achieve productive protection, Chinese iron painting needs to improve the market competitiveness of products. Use is the best inheritance, which not only brings stable and objective economic income to the craftsmen, but also allows more consumers to experience the cultural and artistic charm of iron painting through use. However, due to the limitations of their own culture and vision, it is difficult for craftsmen to create beautiful and practical products that meet the needs of modern people. Through design, what is possible? What is needed in the craft? What can design achieve? The possibility of design is to tap the ideal characteristics of the craft (Tung, 2012). The cultural inheritance of Chinese iron painting needs to start with the uniqueness of its own craftsmanship, aesthetics and cultural connotations. Chinese iron painting needs to explore its own characteristics, inject Chinese visual language into practicality and fashion, and create modern artworks that conform to modern life and modern environment, so as to adapt to the development trend of modern art and be favored by the modern economic market (Zhong & Shi, 2020). Designers can help revitalize the handicraft industry and meet the needs of modern society by linking tradition with modernity (Duque et al., 2005).

In order for Chinese iron painting to achieve sustainable cultural inheritance, products need to meet the needs of consumers and establish a benign relationship with consumers. Regarding the relationship between consumers and products, they either stay away from it or get close to it (Brakus et al., 2009). Traditional culture cannot be separated from creative design to drive industrial innovation and change. Based on innovative design, exploring the combination of traditional culture and modern life not only inherits the traditional context and historical memory, but also promotes the creative transformation and development of creative products (Hua & Dai, 2024). Modern design concepts and methods are already very mature. The inheritance and development of traditional crafts require the intervention of design knowledge. This method can achieve the self-renewal of Chinese iron painting. Designers can play a catalytic role, promote the creation and transfer of knowledge, and thus cultivate local craft industries (Tung, 2012). By integrating with design, the market competitiveness of Chinese iron painting products can be enhanced, and the overall improvement of the industry can be achieved. Traditional crafts with innovative design can be better integrated into contemporary life, and it can be promoted to become an organic part of contemporary lifestyle, which is the best inheritance and development; the design of cultural and creative products based on traditional craft cultural elements, using traditional culture to enhance the added value of products, will promote the popularization and inheritance of traditional crafts (Zhang, 2020).

3) Attract young people to join the iron painting industry.

The training of iron painting inheritors is mainly the master-apprentice style experience transfer. They strictly follow the traditional way to achieve the inheritance of technology through repeated practice. The current situation is that there are basically no young practitioners under the age of 35 in the Chinese iron painting industry. College students who have inherited from colleges and universities basically do not enter this industry after graduation. What causes this phenomenon? People are the core. Only when more people are engaged in this industry can the inheritance of

Chinese iron painting culture be truly realized. There are two main reasons why young people are unwilling to join the iron painting industry; one is low economic income, which is the main reason; the other is hard work, and they are not interested in traditional products that are repeatedly produced. The key to solving these two problems lies in the innovation of iron painting products. By developing iron painting cultural and creative products that meet market demand, it will bring about an increase in production and sales, thereby achieving economic income and attracting young college students to join. Their joining can promote the development of iron painting. In the context of modern aesthetics, the protection and creative development of iron painting art requires professional cultural and creative talents, and the generation of good ideas depends on excellent design (Zhan, 2011).

The inheritance model directly plays a key role in the inheritance and development of iron painting culture (Hu & Fan, 2020). Only by inheriting the aesthetic characteristics and cognitive philosophy and combining the spirit of the times with productive protection can we truly realize the inheritance and innovative development of Chinese culture (Zhu, 2023). Young college students have a sensitivity to new things and professional knowledge of learned in college. Their joining can make new expansions on the basis of inheritance, maintain the vitality and productive protection and inheritance of iron painting. On the basis of inheriting the traditional iron painting forging skills, we strive to create new works that reflect the themes of contemporary social life, and protect and utilize iron painting through production (Fan, 2015). The fusion of iron painting and design research and innovative ideas will benefit the younger generation and promote the sustainable development of the inheritance of iron painting culture. The continuation of iron painting culture will promote sustained economic growth, create employment opportunities and income sources, and improve people's quality of life.

4) Promote sustainable inheritance and innovation.

The fusion of Chinese iron painting and design is a good solution to the dilemma of its inheritance and innovation. By building a co-creative ecosystem, organizations gather the collective wisdom, experience and creativity of all parties to achieve breakthrough innovations and enhance customer experience and competitiveness (Franke & Piller, 2004). Designers are able to bridge the gap between thought and practice and link artistic and creative elements with practical and achievable results (Dodgson et al., 2005). Design is a widely effective way to revitalize local crafts and stimulate economic development (Bell & Jayne, 2003). Through design, cultural advantages are transformed into resource advantages, allowing iron paintings to be integrated into current industrial production.

Given the role of design in the inheritance of traditional culture and the transformation of traditional handicrafts, designers should assume their social responsibility, integrate design with traditional culture to meet the needs of consumers, create economic value, and promote the sustainable inheritance of culture. Designers work with craftsmen to apply new technologies to create different products, change people's lifestyles, and create a world of sustainable products with design and ecology (Chele et al., 2012). This sustainability promotes cultural inheritance on the one hand and brings economic benefits to practitioners on the other. At present, traditional handicrafts need to be transformed into a modern product that can promote cultural inheritance and have market demand, so that people's quality of life and happiness can

be improved, while enhancing cultural identity. Chinese iron painting needs new forces to join. This force was a combination of craftsmanship and painting in history, but now it needs a combination of craftsmanship and design. Through modern design, new content, new carriers and new methods are used to make traditional craftsmanship burst into vitality. The positive role of artistic practice in local revitalization is to inspire people to recognize the value of local culture, thereby promoting the return of local people and re-evaluating traditional customs (Lu & Qian, 2023).

The fusion of Chinese iron painting and modern design has positive significance for the inheritance of craft culture. In the process of mutual inspiration and fusion between traditional handicrafts and modern design, we need to learn from and absorb advantages, break through and innovate continuously, so as to create better works that can lead the times. The combination of the two can realize the inheritance of culture and meet the needs of modern consumers, and at the same time make the design more creative and artistic (Zhou, 2023). Designers can give full play to their professional knowledge and thinking ability to transform Chinese iron painting into cultural and creative products to meet people's spiritual and material needs. Traditional metal crafts have been widely welcomed by people for thousands of years. They are not only exquisite in craftsmanship, but also sustenance of people's spiritual pursuits. However, the cultural and creative products of traditional metal crafts have lagged behind the development of the times and cannot meet the spiritual needs of consumers (Shanshan, 2024). Modern people have basically realized the need to strengthen the design of traditional culture through art and design. The cultural level and vision of craftsmen themselves limit their ability to design products that conform to modern social life (Lu & Qian, 2023). Design can be a bridge, continuously injecting vitality into iron paintings through the creation of materials and objects, and stimulating product production. Productive protection and inheritance is an effective way to promote the fusion of Chinese iron paintings with contemporary social life.

2.6 Research gaps and potential opportunities

Gaps in Chinese iron painting research: There are relatively few studies on the inheritance of Chinese iron painting culture through innovative design. Chinese iron painting cultural and creative design is mostly concentrated in corporate practice and lacks systematic theoretical research. Influential iron painting cultural and creative products are designed by artists or designers and made by iron painting craftsmen. How to build a design fusion path based on the current situation of Chinese iron painting to enhance the contemporary aesthetics and practicality of the product is a research gap.

Potential opportunity direction:

1) Adding value: Design can add practical, aesthetic and symbolic value to Chinese iron painting, and designers can identify and use potential elements to enhance product market competitiveness.

2) Enriching forms: Creating new forms, design helps Chinese iron painting products to achieve breakthroughs in design, material expansion and enriching forms.

3) Cultural inheritance: Chinese iron painting needs more documentary records to ensure that people understand the history and craftsmanship so that it can be preserved in the future and cultural inheritance can be carried out through craft

practice and design fusion. New iron painting design products can contribute to the documentation and dissemination of traditional knowledge and cultural resources (including creation ideas, patterns, and crafts), while helping to increase the economic income of craftsmen and attract more young groups to join.

4) Optimize the process: through appropriate technical changes and optimization, the design can follow the principle of sustainability in the post-production or pre-production process without neglecting the inheritance of traditional culture and values in the process.

5) Strengthen the characteristics: Design can help make full use of regional resources, highlight the characteristics of the craft and the spiritual value contained, enhance the cultural regionality and characteristics of Chinese iron painting, and become a product that young consumers are willing to buy. Through use, let Chinese iron painting enter people's daily life

6) Communication, interaction and collaboration: Chinese iron painting craftsmen and designers can cooperate for a long time and achieve excellent results. Chinese iron painting craftsmen rarely cooperate with craftsmen and non-craftsmen. They often complete the process from design to production alone within their own scope, resulting in a narrow vision and a distance from the understanding of mass consumption needs. At the same time, they can improve the economic income of craftsmen through products. The stability of the craftsman economy is important for their well-being.

The above findings in the literature study have become potential thematic directions for design fusion and ultimately become the basic issues of the research. Involve designers in the innovation of Chinese iron painting, such as redesigning key parts of production process elements, and effectively expressing craft practices and heritage values, so that people can pay attention to the cultural connotation and spiritual value of traditional culture. Chinese iron painting is an important part of the creative cultural industry, which complements the dominant position of industrialization. Designers interact and cooperate with craftsmen to jointly create new Chinese iron painting products and interpret new meanings.

2.7 Theory and Related Research

2.7.1 Cultural Level Theory

1) Concept of Cultural Level.

With the advent of the industrial age, products have become more diverse, and people have begun to pursue design products with cultural differences. Leong and Clark proposed the cultural level theory of design in 2003, namely the external layer of tangible materials, the middle layer of behavioral systems, and the inner layer of ideology and thinking (Leong & Clark, 2003). The tangible level refers to the form of human use of materials; the middle level is the spiritual form of systems, customs, behaviors, etc. expressed through materials as carriers; the inner level mainly refers to the human concepts and consciousness contained in philosophical thoughts. This cultural level theory is widely used in the field of cultural and creative design (Jiao & Li, 2024). More and more designers have begun to think and reflect on their own culture, striving to transform it into creativity and create cultural and creative products that are recognized by the local community (He et al., 2020).

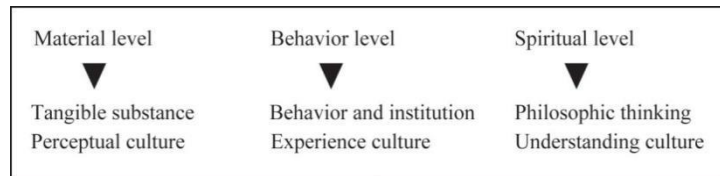


Figure 56 The corresponding functions of different levels of culture
 Note. Made by researchers 2024

The above figure shows the role of culture at different levels. The material layer as a tangible material form can perceive culture, the behavioral layer interacts with the product, and the craftsmanship, system and function can enhance the cultural experience. The spiritual layer is the inherent philosophy of the product, which can understand culture and form cultural identity.

2) Analysis of Chinese Iron Painting Culture.

Material Culture Layer.

This is the most intuitive and external form of iron painting culture, and it is the material basis for the existence of iron painting. The first thing people see and touch is the iron painting works themselves and the materials and tools used to make them. Including materials, tools, shapes, patterns, colors, textures, three-dimensional sense, etc.

Behavioral Culture Layer.

Behavioral culture emphasizes the activities related to iron painting, from the processing of raw materials to the final completion of the work, which is a dynamic process, as well as the inheritance methods and systems, the use of iron painting, exhibitions and communication activities. Including process specifications, inheritance systems, production techniques, product functions, usage methods, exhibitions and exchanges, etc.

Spiritual Culture Layer.

The spiritual culture level is the core and soul of iron painting culture, which is deeper and more implicit than the material and behavioral system levels. Iron painting works have rich symbolic meanings to convey specific cultural connotations and emotions. These symbols and meanings are closely linked to Chinese traditional culture and humanistic spirit, making iron painting have a profound cultural heritage. Including aesthetic awareness, cultural traditions, symbolic meanings, metaphorical values, and symbolic concepts.

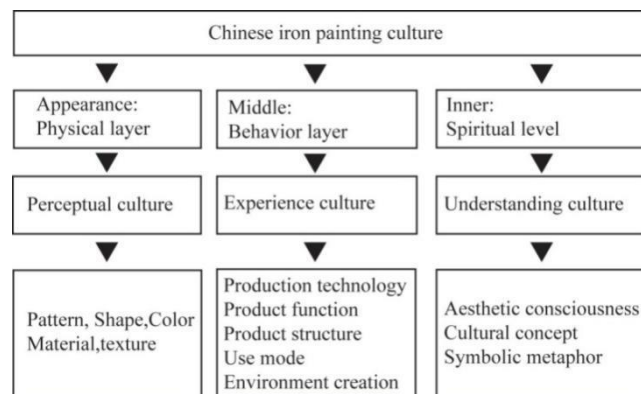


Figure 57 *Decomposition model of cultural characteristics of Chinese iron paintings*
 Note. Produced by researchers 2024

2.7.2 Emotional hierarchy theory

1) Concept of emotional hierarchy theory.

Emotional hierarchy theory was proposed by foreign scholar Norman in his book "Emotional Design" (Norman, 2005). The design goals are mainly divided into three levels, namely instinctive design, behavioral design and reflective design. The instinctive level refers to the focus on the appearance of the product itself and the visual experience it brings to the user. People are visual animals and are instinctively attracted to things with beautiful appearance; the behavioral level mainly refers to the interaction, function, fun and efficiency of the user with the product during the use of the product; the reflective level focuses on the user's emotional needs and cultural heritage, and pays attention to the impact of the product on the user's self-image, satisfaction, memory, and cognition and thinking of traditional culture. Capturing the meaning of the product, the influence of ideas, the sharing of experience and the influence of culture, and deepening the user's memory and feelings about the product, this level is the key to realizing the true value of the product. From the three levels of instinctive level, behavioral level and reflective level, analyze the user-centered fusion of Chinese iron painting and cultural and creative product design.

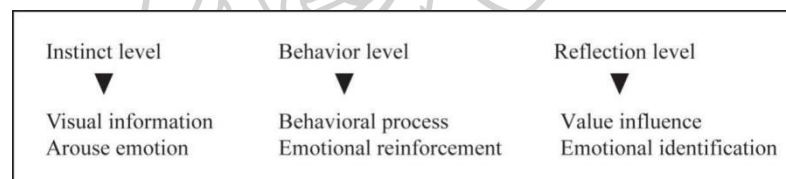


Figure 58 *The role of emotions at different cultural levels*
 Note. Produced by the researcher 2024

The above figure shows the role of different levels on emotions. The instinctive level as visual information can stimulate emotions, the behavioral level as interaction with the product can enhance emotions, and the reflective level is the value and significance of the product that can form emotional identification.

2) Analysis of the emotional levels of Chinese iron paintings.

Instinctive level.

At the instinctive level, iron paintings mainly trigger people's emotional responses through their basic visual and tactile properties. This is the most direct and instinctive emotional level, which is mainly based on human physiological perception. The iron material used in iron paintings itself has a unique texture and luster, giving people a solid and stable feeling. When people touch or watch iron paintings, the characteristics of this material will directly stimulate people's senses and trigger instinctive emotional reactions.

Behavioral level.

The emotional response of the behavioral level is related to people's behavior and experience. At this level, iron paintings are works of art and products, objects that can be used and interacted with, and people generate emotions through interaction with iron paintings. As an art form with regional characteristics and cultural

connotations, iron paintings are closely linked to specific historical cultures, customs and lifestyles. When people understand the cultural background and behind iron paintings, they will have emotional identification and belonging to them.

Reflective level.

The emotional response of the reflective level is the deepest level, which involves people's thinking and reflection on the cultural significance, historical value and social impact of iron paintings. At this level, people will think deeply and reflect on the ideas, values and cultural connotations conveyed by iron paintings, which will trigger a deeper and more complex emotional experience. At the reflective emotional level, people will think about how to protect and inherit this unique art form of iron paintings, and how to innovate and develop it in modern society. This concern and sense of responsibility for cultural inheritance and development will inspire people to have a deeper emotional investment and action support for iron paintings.

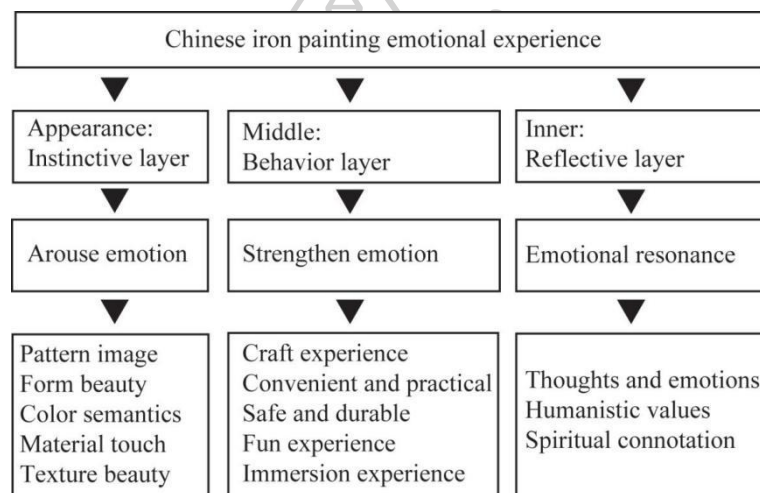


Figure 59 Chinese iron painting emotional factor decomposition model
Note. Made by researchers 2024

2.7.3 Modern design concept

1) Overview of modern design concept.

Design is a widely effective method to revitalize traditional industries and stimulate sustainable development. The design concept is the dominant idea throughout the design process of a work, which gives the work cultural connotations and style characteristics. The basic principles of modern design include harmony and coordination, functional and practical, economical and affordable, beautiful and generous, caring for humanity, ecological and environmental protection, innovation and change, etc. Therefore, the modern design concept includes functional concept, people-oriented concept and aesthetic concept (Wang, 2016). The modern design concept is a design thinking method that focuses on innovation, practicality, sustainability and humanity, emphasizing functionality, aesthetic value, sustainability and humanity (Changning Wang, 2024).

American designer Henry Drefuss is a pioneer in humanistic design. He was the first to put the needs of "people" at the top of the design purpose (Liu, 2012). After that, "humanistic design" continued to develop in depth, proposing that design should

not simply stay at physiological needs, but should also consider the needs of things related to people and psychological needs. From the beginning of design, there is a recognition of form and pursuit of formal beauty. This exploration of beauty promotes the formation of design aesthetics. Humanized design is user-centered, and the first thing is to clarify the product design positioning. Product positioning refers to the design method, target audience, purpose and emotional appeal of the product. For product design, the target user must be selected as the effective consumer group. Independent individuals have no reference value, and the quantifiable needs of the target consumer group must be understood. Product design must clarify three issues: target consumers, product carriers, product culture and emotional appeal. Based on these three issues, the visual presentation, use process and emotional appeal of cultural and creative products are determined, while highlighting aesthetics, interaction, experience, communication and other innovative cultural elements.

2.7.4 Productive protection concept

"Productive protection" is an important protection strategy for intangible cultural heritage, which aims to give traditional culture new life protection measures so that it can be integrated into people's life needs to enter a virtuous circle and maintain consumption and cultural inheritance. Productive protection is to introduce traditional handicrafts into contemporary social life and industrial systems, so that they are actively protected in the production activities of creating social wealth, without violating the laws of handicraft production and the operation mode of handicrafts themselves, and without distorting the natural development trend of handicrafts (Lv, 2020). Productive protection refers to the transformation of intangible heritage and its resources into cultural products through production and other means, with the core of maintaining the authenticity, integrity and inheritability of intangible heritage and the premise of effectively inheriting intangible heritage skills (Xiao, 2021). Productive protection aims at the revitalization and sustainable development of China's intangible cultural heritage, and puts forward the basic idea of rational use and transformation into productivity (Zhu, 2023). Productive protection of intangible heritage is the only way for creative change and innovative development (Xiao, 2021).

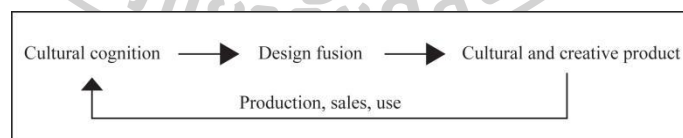


Figure 60 Productive protection model

Note. Researcher produced 2024

2.7.5 Design Fusion Method

Unique design can differentiate from existing products, and differentiation is a key factor in product competitive advantage. Unique design can make old competitors immediately obsolete (Bloch, 1995). Differentiation is one of the goals pursued by design fusion to develop innovative and eye-catching. New product design is a discipline responsible for creating the appearance, function and usability of products (Patil et al., 2017).

1) TASA proposes four steps for new product design (TASA, 2023):

a. Design investigation: understand the relevant culture, technology, materials, uses and knowledge, as well as market and customer needs.

b. Design conception: refine and expand ideas to create a new concept, design sketches, and evaluate the feasibility of the concept based on production process characteristics and market potential.

c. Design production: production practice, the transition from concept to actual product creation. Direct and multidisciplinary communication and cooperation to bring the product to life, including engineering, prototyping, testing and improving the design until a functional prototype is achieved.

d. Design completion: release the product and create a social economy that promotes culture, knowledge and craftsmanship. This includes planning and executing product launches, gathering customer feedback, and incorporating improvements to ensure the long-term sustainability of the product.

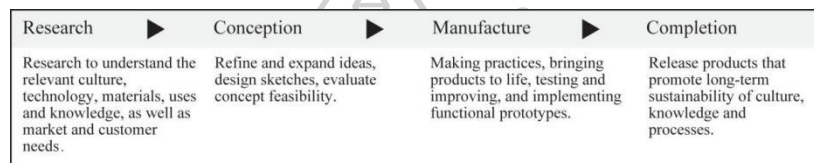


Figure 61TASA design method model
Note. Drawn by researchers based on text description 2024

2) The method and process of integrating craft and design proposed by Tung (Tung, 2012):

a. Fuzzy front end: understand and collect information, identify problems and design opportunities.

b. Design development: including sketching, discussion, prototyping, and prototype display, which is a cyclical process.

c. Shared knowledge: craftsmen and designers enhance each other's knowledge and capabilities.

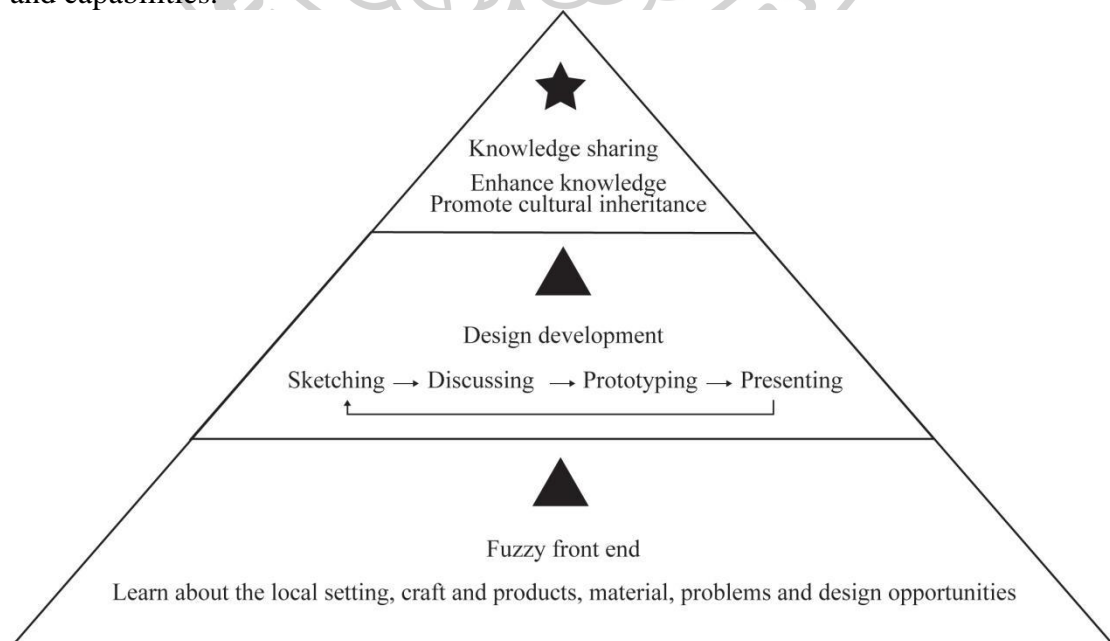


Figure 62Craft and design fusion method

Note. The researcher drew the description of the craft and design method proposed by Tung

The model is presented in the form of a pyramid. The first stage is to blur the front end and understand the problems and opportunities through a lot of research. The second stage is to design with craftsmen experts on the basis of the first stage until innovation is achieved. The third stage is to realize the fusion and sharing of knowledge on the basis of the first and second stages, on the one hand, to promote the common improvement of designers and craftsmen, and on the other hand, to achieve sustainable cultural inheritance.

1) Conceptual model of design fusion.

The product design method proposed by TASA focuses on understanding the market and consumer needs in the early stage, and craftsmen are involved in the design and production stage. The traditional craft product design method proposed by Tung is to blur the front end, through comprehensive analysis of problems and design opportunities, without clear target consumers, focusing on the second stage of designers and craftsmen to cooperate in designing and developing prototypes, and evaluate and improve the prototypes through consumer participation experience. Tung's design method is more suitable for the innovative design of traditional crafts. This study proposes a design model of Chinese iron painting based on Tung's design method, as shown in the figure 63.

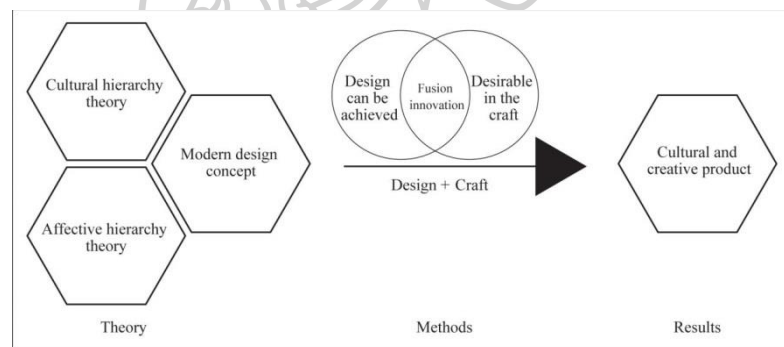


Figure 63 Chinese iron painting design fusion model

Note. The researcher drew it based on Tung's description of craft and design methods

This framework brings together the cultural level theory, emotional level theory and modern design concepts. These fields together constitute a conceptual framework, which is finally integrated into cultural and creative products through the method of craft and design fusion. The advantage is that the most perfect presentation of craft can be achieved through design. Consumers have an intricate connection with Chinese iron painting through the use of cultural and creative products, which promotes the inheritance and development of Chinese iron painting culture.

2.8 Summary

Since contemporary people live in an era of rapid technological development and material abundance, the development of traditional crafts has been challenged, especially traditional crafts such as Chinese iron painting that lack practicality. It is

necessary to achieve a collection of product aesthetics, functions and culture through design fusion to achieve productive protection and sustainable inheritance. This chapter first discusses and analyzes the historical status, craftsmanship, aesthetics and value of Chinese iron painting. Secondly, it analyzes the profound influence of Chinese painting on Chinese iron painting. Thirdly, the literature analysis and summary of the fusion of traditional crafts and design, cultural and creative products and the inheritance of Chinese iron painting culture are carried out. Finally, the design concept of the research is proposed to guide the design fusion of Chinese iron painting. This study aims to use the advantages of modern design and apply it to the innovative design of Chinese iron painting, so as to enhance the aesthetics, functions and emotions of the products and promote the inheritance and development of Chinese iron painting culture. In terms of design approach, considering the characteristics of Chinese iron painting culture and stakeholder participation, a method of integrating craft and design was chosen.

Chinese iron painting has important values and can provide a better future in terms of sustainability, identity and meaningful well-being. As a traditional craft, Chinese iron painting is an important cultural asset and maintains cultural identity, connecting the present with the past. With culture at its core, Chinese iron painting products evoke a sense of place and express unique craftsmanship and aesthetics through emotional communication. As the younger generation tends to look for other attractive and high-income jobs, a new strategy is needed to ensure the sustainable inheritance of Chinese iron painting in this context. Revitalize Chinese iron painting through design strategies and explore the broad horizons of craft and design.

The study includes three key areas: Chinese iron painting, cultural and creative products, and consumers.

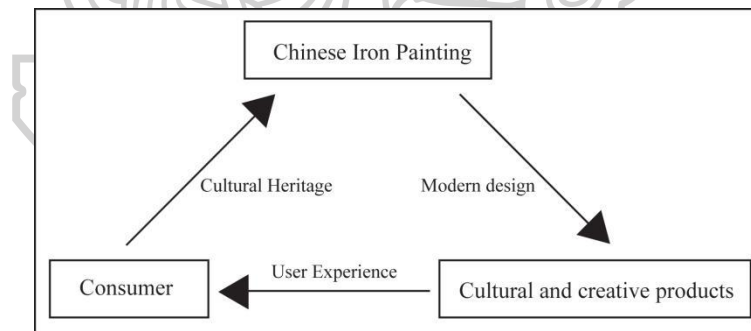


Figure 64 *Research Conceptual Framework*
Note. Drawn by the researcher 2024

The fusion of Chinese iron painting and cultural and creative products is based on modern design. Consumers and design products are connected through experiential participation in the products, and consumers have an intricate connection with Chinese iron painting through cultural heritage. This concept emphasizes the fusion of Chinese iron painting with modern design to innovate iron painting products, meet the living needs of consumers, and promote the productive protection and inheritance of iron painting culture through use. This concept may achieve the sustainable inheritance and development of Chinese iron painting.

CHAPTER 3 RESEARCH METHODS

Effective organization of the research process is a necessary condition for achieving research goals. The choice of research methods in designing and conducting research depends largely on the nature and purpose of the research. Exploratory research "rarely produces clear answers, it must be creative, open and flexible"(Lawrence, 2007). Therefore, exploratory research mostly uses qualitative methods. According to the nature of the research, this study mainly uses qualitative research methods, but also involves some quantitative data, such as audience questionnaire satisfaction assessment tools in design practice.

The design fusion of Chinese iron painting is centered on craftsmanship and design, including skills, materials, aesthetics, function and culture. Given that this study is exploratory, the research questions involve the questions of "what is ideal in iron painting culture" and "what can design achieve". The research adopts literature research, field surveys, case studies, expert interviews and participatory design practice methods. The researchers conducted a detailed analysis of Chinese iron painting and cultural and creative product design, with the aim of enabling designers to better understand Chinese iron painting culture and cultural and creative design, not only to make the innovative design of Chinese iron painting inspiring and provide new ideas, but also to promote Chinese iron painting culture and promote the sustainability of cultural inheritance by enhancing product market competitiveness.

This chapter contains the following parts:

- 3.1 Research methods
- 3.2 Research sample group
- 3.4 Research data collection
- 3.5 Research data analysis
- 3.6 Summary of research methods

3.1 Research Methods

Qualitative research methods are often exploratory and useful when the research topic is new and has not yet been discussed with a specific population(Yusof, 2021). Qualitative methods are mainly used for exploratory research, which is suitable for this study to explore the knowledge system and the current understanding of Chinese iron painting culture. The research methods include literature review, field investigation, case study and expert interview, which provide research data for design practice through systematic analysis and summary.

3.1.1 Literature Research

In order to identify knowledge gaps, this study conducted a comprehensive analysis of the development, craft characteristics, product categories, aesthetics and value, as well as the development status and product positioning of Chinese iron painting through a systematic literature analysis method. This process is to review the key topics related to the research field and find the relationship between them.

First, the researchers searched Google Scholar, Scopus, Web of Science, and the Silpakorn University Library and China National Knowledge Infrastructure Chinese databases by keywords. Relevant literature and picture materials on Chinese iron

painting were widely collected through various channels, and the theoretical viewpoints were deeply analyzed and summarized. In order to ensure the depth and breadth of the research, the researchers also purchased and consulted a large number of paper books, conducted detailed reading and investigation, and strived to have a deeper understanding of the craftsmanship, themes and elements of Chinese iron painting, and its cultural significance. On this basis, the core factors that promoted the development of Chinese iron painting in different historical periods were sorted out, and the changes in the production process and tools of Chinese iron painting were revealed through the analysis and comparison of the production process and tools. In the literature study on the aesthetics and value of Chinese iron painting, the importance of innovative inheritance of Chinese iron painting was further demonstrated. In this process, the researchers analyzed the design fusion innovation, explored the traditional Chinese creation ideas, the fusion of traditional crafts and modern design, and the influence of Chinese painting on Chinese iron painting, so as to have a more comprehensive understanding of the design fusion innovation of Chinese iron painting. Finally, by analyzing the cultural heritage of cultural and creative product design and Chinese iron painting, it is revealed that the productive protection and inheritance of Chinese iron painting can be achieved through cultural and creative products.

The application of literature research provides a solid theoretical basis for this study. Through a comprehensive analysis of relevant domestic and foreign literature, the researchers not only mastered the multi-dimensional interpretation of Chinese iron painting, the fusion and innovation of traditional craft design, cultural and creative product design, and cultural heritage, but also provided rich theoretical support and framework foundation for subsequent research, which helps to ensure the academic innovation and cultural heritage of the research.

3.1.2 Field investigation

The salient feature of the field investigation method is the observer's purposeful and planned conscious cognitive activities, which is the most effective method to directly obtain original and real data. According to the needs of the research, a field survey was conducted in Wuhu, the city where Chinese iron painting is located. The survey areas and venues include Wuhu Arts and Crafts Factory, China Iron Painting Creative Industrial Park, Chu's Iron Painting, Huiyifang Iron Painting, Feilong Iron Painting, Wendian Iron Painting, Ling Xiaohua Master Studio, Nie Chuanchun Wuhu Vocational and Technical College Master Studio, and Yang Yong Master Studio. Studio, Wuhu Museum and other places. By adopting open-ended observation, a large amount of data can be collected, including rich photos, videos, etc., while the recorded text is mainly descriptive. These photographs, combined with on-site observation tools and production processes, enable researchers to gain a deeper understanding of the characteristics and cultural connotations of Chinese iron painting.

3.1.3 Case Study

Case study mainly analyzes representative design cases in Chinese iron painting. Through in-depth analysis and investigation of specific iron painting design works, we can understand the innovative design concepts, design methods and evaluation of design results of iron painting. Case study of traditional crafts is a suitable method because it allows researchers to explore, unravel and understand problems(Yusof,

2021). The purpose of the case study of innovative design of Chinese iron painting is to enrich and expand the theory of design fusion through actual cases, provide design ideas and methods for iron painting cultural and creative products, and evaluate the effect and impact of design practice. In addition, through the case study of design works, the general and special laws in design can be discovered to guide design practice.

Design case study plays an important role in academic research and practice because of its ability to provide in-depth case analysis and theoretical combination, helping designers and researchers to deeply understand the complexity and diversity of design.

3.1.4 Expert Interviews

Expert interviews are a powerful research method that can solve complex design problems, gain the key to professional knowledge, and enable researchers to understand phenomena that cannot be understood in other ways. A series of interview questions were designed in advance based on the research questions. All interviews in this study were audio-recorded and summarized in the form of note-taking. Interviews were conducted at the participant workshop or arranged meeting location, and each interview took about 30 minutes. During the interview, key information was hurriedly recorded in field notes, and field notes helped to keep the interview on track and ensure that all research questions were answered. Through communication and interaction with experts, researchers learned about the advantages and disadvantages of Chinese iron painting, the latest design trends, technological innovations, design practice experience and other information. The expert consultation method will bring together the wisdom of multiple experts in the field to form a systematic theoretical framework, which will not only help solve the key problems in this study, but also provide practical design references for this study and provide theoretical and design guidance for subsequent research work.

3.1.5 Design practice

Design practice is based on the data of theoretical research, emphasizing the importance of design practice and theory. Theory guides design practice, and design practice verifies the authenticity of theory.

The design practice of this study is divided into two stages.

The first stage is the iron painting innovation design workshop. The researcher shared the previous research data through ppt, combined with the volunteers' mastery of Chinese iron painting knowledge and craftsmanship, selected the iron painting elements of interest for creative design, and finally determined 1-2 design plans and completed the production. Volunteers master iron painting production and modern design, and are also potential consumers. Their design works help researchers inspire inspiration and find design opportunities. The completed works are exhibited, and experts are invited to conduct satisfaction evaluation. The data results of experts' satisfaction with innovative design works are used to further study and design planning to solve existing problems.

The second stage is to carry out design practice based on cultural level theory and emotional level theory with modern design concepts and methods, and display the final results. The research results are evaluated through expert satisfaction evaluation and consumer questionnaire satisfaction evaluation. At the same time, product

reservations are provided at the exhibition site to test the market recognition of the products through reservations.

3.1.6 Expert evaluation

Expert evaluation is a qualitative research method that invites experts in the fields of traditional crafts, Chinese iron painting, and product design to consult and provide feedback, obtain in-depth insights and guidance, and gradually reach a consensus. This research method is suitable for exploring and analyzing the satisfaction of Chinese iron painting cultural and creative product design.

The expert evaluation is divided into two stages. The first stage is to conduct a satisfaction evaluation on the research results of Design Practice 1, mainly to discover design works with cultural and market potential, and put forward suggestions for improvement. The second stage is to conduct a satisfaction evaluation on the research results of Design Practice 2, and evaluate from three aspects: aesthetics, functionality, and culture. Different experts are selected in the two stages for satisfaction evaluation.

3.3.7 Questionnaire evaluation

Questionnaire evaluation is a quantitative research tool. Only when the sample size is large enough can the results be presented objectively. The audience satisfaction questionnaire evaluation of this study is divided into three levels, namely aesthetic level, functional level and cultural level. Three questions are set for each level. The Likert scale is used to understand the audience's satisfaction with the research results.

3.2 Research Sample Group

The group and sample as the participants of the research profoundly affect the final quality of the research and it is considered a key component of any research. It mainly involves selecting people to interview or situations to observe in order to produce a strong, rich and deep understanding of the phenomenon being studied (Gray, 2018). This study involves five groups of samples, who are carefully selected experts in traditional crafts, product design and Chinese iron painting, and can provide professional support and guidance for this study from multiple perspectives.

3.2.1 Group 1: Expert Group

1) The population is experts who have been engaged in traditional craft research, Chinese iron painting research, product design, Chinese iron painting production and management for more than 15 years.

2) The sample group is 10 experts in the following fields:

2 experts in traditional craft research.

Wan Fubin, professor, vice president, and doctoral supervisor of Guangxi University for Nationalities, is engaged in the research of traditional crafts, bronze drums, technology history and science and technology culture. He has presided over and completed 2 National Social Science Fund Art Projects.

Li Jianhua, professor, doctor, and vice dean of the School of Fine Arts and Design of Hunan University of Arts and Sciences, research direction is the inheritance and innovation of traditional crafts. Director of the China Arts and Crafts Association, member of the Hunan Provincial Art and Design Professional Committee, and head of

the Guangxi Traditional Crafts Workstation. He has presided over and completed 1 national social science project and 3 provincial and ministerial projects.

2 experts in Chinese iron painting research.

Yao Mingqi, associate professor and director of the Arts and Crafts major of the School of Design of Anhui University of Technology, is engaged in the research of iron painting inheritance and innovation.

Xing Ping, associate professor of the School of Art and Media of Wuhu Vocational and Technical College, and head of the Iron Painting Education and Training Base. Published the book "Basics of Iron Painting Forging Techniques".

2 product designers.

Liu Binhui, Vice Dean and Professor of the School of Fine Arts and Design of Yulin Normal University. He presided over and completed 1 National Art Fund project, won 15 provincial and ministerial awards, and engaged in lacquerware product design.

Li Yin Hai, Design Director of Guangdong Foshan Yaku Home Furnishing Co., Ltd., engaged in home furnishing and interior product design.

2 Chinese iron painting craftsmen.

Chu Jinxia, Chinese Arts and Crafts Master, National Representative Inheritor of Chinese Iron Painting.

Ling Xiaohua, Anhui Arts and Crafts Master, Municipal Representative Inheritor of Chinese Iron Painting.

2 Chinese Iron Painting Managers.

Shen Tao, Secretary-General of China Iron Painting Association, Senior Arts and Crafts Artist.

Gao Wenqing, Head of Feilong Iron Painting Enterprise, Senior Arts and Crafts Artist.

Table 15 Identity and details of Panel 1

No.	Name	Gender	Age	Identity	Job title	Years of working experience	Interview Date	Interview location
1	Wan Fubin	male	82	Traditional craft research expert	Professor	60	2023.12.24	Nanning, Guangxi
2	Li Jianhua	male	48	Traditional craft research expert	Professor	24	2024.01.10	Changde, Hunan
3	Yao Mingqi	male	55	Iron painting research expert	Associate Professor	34	2023.12.25	Wuhu, Anhui
4	Xing Ping	female		Iron painting	Associate Professor		2024.01.06	Wuhu, Anhui

		e		research expert				
5	Liu Binhui	male	45	Product Designer	Professor	20	2023.1 2.20	Yulin, Guangxi
6	Li Jinhai	male	43	Product Designer	Design Director	23	2024.0 1.06	Telephone interview
7	Chu Jinxiang	female	79	Iron painting craftsman	National inheritor and national iron painting master	63	2023.1 2.29	Wuhu, Anhui
8	Ling Xiaohua	male	58	Iron painting craftsman	Municipal inheritor and provincial iron painting master	38	2023.1 2.26	Wuhu, Anhui
9	Gao Wenqing	male	54	Iron painting business manager	Senior Arts and Crafts Artist	33	2023.1 2.30	Wuhu, Anhui
10	Shen Tao	male	65	Manager of Iron Painting Industry Association	Senior Arts and Crafts Artist	40	2023.1 2.26	Wuhu, Anhui

Note, produced by researchers, 2023

Table 16 Identity information of the volunteer group

No.	Name	Gender	Age	Major	Grade
1	Ren Weijian	Male	24	Arts and Crafts	Fourth year of university
2	Zhao Linlin	Male	23	Arts and Crafts	Fourth year of university
3	Huang Bohao	Male	24	Arts and Crafts	Fourth year of university
4	Ren Zhengdao	Male	24	Arts and Crafts	Fourth year of university
5	Cui Marui	Female	23	Arts and Crafts	Fourth year of university
6	Huai Qian	Female	22	Arts and Crafts	Fourth year of university

7	Huang Haihua	Female	23	Arts and Crafts	Fourth year of university
8	Li Xiaoling	Female	26	Environmental Design (Diploma to Bachelor's Degree)	
9	Luo Yingying	Female	24	Environmental Design (Diploma to Bachelor's Degree)	Junior year
10	Qiu Xiamei	Female	25	Environmental Design (Diploma to Bachelor's Degree)	Junior year
11	Mo Lizhen	Female	23	Environmental Design (Diploma to Bachelor's Degree)	Junior year
12	Zhang An	Male	26	Environmental Design (Diploma to Bachelor's Degree)	Junior year
13	Tan Liuxing	Female	24	Environmental Design (Diploma to Bachelor's Degree)	Junior year
14	Liu Tao	Female	23	Environmental Design (Diploma to Bachelor's Degree)	Junior year
15	Mou Xixi	Female	24	Environmental Design (Diploma to Bachelor's Degree)	Junior year

Note, produced by researchers, 2023

3.2.3 Group 3: Expert Evaluation Group 1

1) The population is a group of experts in traditional craft research, product designers and Chinese iron painting craftsmen.

2) The sample group consists of 5 experts in the following fields.

a. Intangible cultural heritage and traditional culture research expert: Cheng Xinyuan

Cheng Xinyuan, professor and doctor of Yulin Normal University, is engaged in the research of intangible cultural heritage and traditional culture.

b. Chinese iron painting production expert: Yu Yang

Yu Yang, a Chinese iron painting craftsman, Anhui iron painting arts and crafts master, is engaged in the production and design of iron paintings.

c. Cultural and creative product design expert: Zhang Zhong

Zhang Zhong, professor and vice dean of the School of Fine Arts and Design of Yulin Normal University, is engaged in the design of architecture and cultural and creative products.

d. Traditional arts and crafts product designer: Lin Benyao

Lin Benyao, president of Yulin Arts and Crafts Association, representative inheritor of intangible cultural heritage fabric painting, is engaged in innovative design of traditional crafts.

e. Interior and home product design expert: Wei Xuefei

Wei Xuefei, professor and doctor of Yulin Normal University, director of the Design Department of the School of Fine Arts and Design, is engaged in interior and home product design.

3.2.4 Group 4: Expert Evaluation Group 2

1) The population is product design experts and Chinese iron painting researchers and producers who are mainly engaged in traditional culture

2) The sample group consists of 6 experts in the following fields.

a. Expert in Chinese iron painting culture research: Yao Mingqi.

Yao Mingqi, director and associate professor of the Arts and Crafts Department of Anhui University of Technology, is engaged in the research of inheritance and innovation of Chinese iron painting.

b. Product and lighting design expert: Qian Tao.

Qian Tao: Associate professor and vice dean of the School of Design of Anhui University of Technology, is engaged in product design and lighting design research.

c. Cultural and creative product design expert: Wu Hongfang.

Wu Hongfang: Professor of the School of Design of Anhui University of Technology, is engaged in the design and research of traditional culture-related products.

d. Chinese iron painting craft master and intangible cultural heritage inheritor: Ling Xiaohua.

Ling Xiaohua, Anhui Province Arts and Crafts Master of Chinese Iron Painting, representative inheritor of Chinese Iron Painting at the Wuhu Municipal Level, is engaged in the production of Chinese iron painting.

e. Manager of Chinese iron painting craft enterprise: Gao Wenqing

Gao Wenqing, general manager of China Feilong Iron Painting Co., Ltd., professor-level arts and crafts master.

f. Chinese iron painting industry manager and cultural heritage researcher: Shen Tao.

Shen Tao, Secretary General of the China Iron Painting Association, senior arts and crafts artist, is engaged in research on Chinese heritage innovation and publicity management

3.2.5 Group 5: Audience Evaluation Group

1) The audience is general consumers who are interested in traditional culture and are interested in the fusion and innovation of Chinese iron painting design.

2) The sample group of 369 people is interested in the design innovation and cultural heritage of Chinese iron painting

3.3 Data Collection

3.3.1 Literature Data Collection

A literature review is the beginning of a study. Through a comprehensive review and analysis of existing knowledge in the current research field, research deficiencies and potential opportunities are sought. The researcher searches for relevant books, journals and academic papers through libraries and online bookstores, and obtains traditional paper documents. Online searches are conducted using academic databases,

online journals and professional databases. Since the content of the study is about Chinese iron painting, China's online academic databases "HowNet" and "Super Star" are indispensable resources. These documents are collected for analysis and to form a conceptual framework.

3.3.2 Field Survey Data Collection

Through field surveys, in-depth observations are made in specific venues such as Chinese iron painting enterprises, personal studios, iron painting stores and museums. First-hand data is collected in multiple dimensions through visual observations such as taking photos and videos and text records.

3.3.3 Expert Interview Data Collection

Interviews are a common qualitative method in the data collection process, which enables researchers to understand phenomena that cannot be understood in other ways. Researchers directly ask questions face to face with experts and conduct in-depth interviews. Face-to-face interviews can help explain problems, provide more detailed explanations, and follow up immediately when necessary. In the in-depth interviews with experts, the researchers conducted interviews and recorded answers, photos, recordings, etc.

3.3.4 Case Study Data Collection

There are many ways to collect data for case studies, including observation through online search, on-site photography, interviews, and literature analysis. Online search is collected through online news reports, WeChat, and Xiaohongshu. On-site photography is collected through field investigations and visits to iron painting companies, stores, and personal workshops. Interviews are to collect representative case works by talking with Chinese iron painting craftsmen. Literature analysis is to collect cases from existing research literature. Through multi-dimensional case collection, representative case works can be collected more comprehensively.

3.3.5 Expert evaluation data collection

Data collection from the expert evaluation team is divided into two stages. In the first stage, after the "Contemporary Heritage and Innovation Design Workshop of Iron Painting", the researchers held an exhibition of works and held an expert seminar to discuss opinions on the results of the design experiment research project. The researchers took photos and recorded audio of the expert group seminar to record data. In the second phase, after the "Design Practice of Iron Painting Series Lamps Based on the Modeling Language of Chinese Painting", an exhibition of the design results of iron painting lamps and an expert seminar were held to evaluate and verify the effectiveness and satisfaction of the design results. The researchers took photos and videos to record the data.

3.3.6 Questionnaire evaluation data collection

The Likert five-level scale was used to evaluate the audience satisfaction with the design practice results. The questionnaire was distributed online through "Questionnaire Star", and the audience participating in the exhibition filled it out online by scanning the code on their mobile phones.

3.3.7 Product reservation data collection

Design and produce product reservation registration forms, record the personal information, contact information, model and color of the reservation in the form of on-site text records, and provide online reservation via WeChat.

3.4 Data analysis

3.4.1 Literature research data analysis

By comparing different literature viewpoints, find out the problems that need to be solved, and lay the foundation for subsequent empirical research or theoretical innovation.

3.4.2 Field survey data analysis

The researchers sorted out the photos and observation text records to form a complete data set. In the data analysis stage, the researchers summarized the observation text records into organized text information, and classified the pictures according to categories. Provide research support for the innovative design of Chinese iron paintings and provide reference for the design of cultural and creative products.

3.4.3 Analysis of expert interview data

After the expert interview, the researcher sorted out and analyzed the opinions of the experts and extracted the core content related to the research topic. In the analysis process, the researcher integrated the opinions of different experts through induction and classification, identified the key issues with consensus, and paid attention to the different views of experts on the innovative design of Chinese iron paintings to enrich the research perspective. Through the opinions and suggestions of experts, the researcher improved the research framework in the data analysis process. The information from the expert interview can provide authoritative support for the theoretical research on the fusion of Chinese iron painting design, and can also provide specific guidance for the application of design in practice.

3.4.4 Analysis of case study data

The case study data uses the researcher as a tool, and after the researcher's descriptive analysis, an inductive analysis is conducted to find out key information and knowledge. The case analysis data provides creativity and direction for design practice and guides design practice.

3.4.5 Analysis of expert evaluation data

The expert evaluation data adopts inductive analysis. By converting the recording into text, the opinions of different experts are analyzed inductively. These data lay the foundation for the second stage of design practice to complete the improvement and strengthening of design innovation.

3.4.6 Questionnaire evaluation data analysis

The researchers used quantitative research methods to analyze the audience's questionnaire evaluation data. Using quantitative research statistics, the data is presented in a table and analyzed in percentages (%).

3.4.7 Product reservation data analysis

Based on the product reservation data, the consumer's purchase recognition of the product, product model and color preferences are statistically analyzed, and the quantitative product reservation rate is used for analysis, which is presented in percentages (%).

3.5 Summary

This study mainly adopts qualitative research methods, including literature research, field investigation, case study, expert interview and design practice methods, and audience satisfaction evaluation adopts quantitative research methods. Different research methods are organically combined to comprehensively promote the research on the fusion of Chinese iron painting design at the theoretical and practical levels.

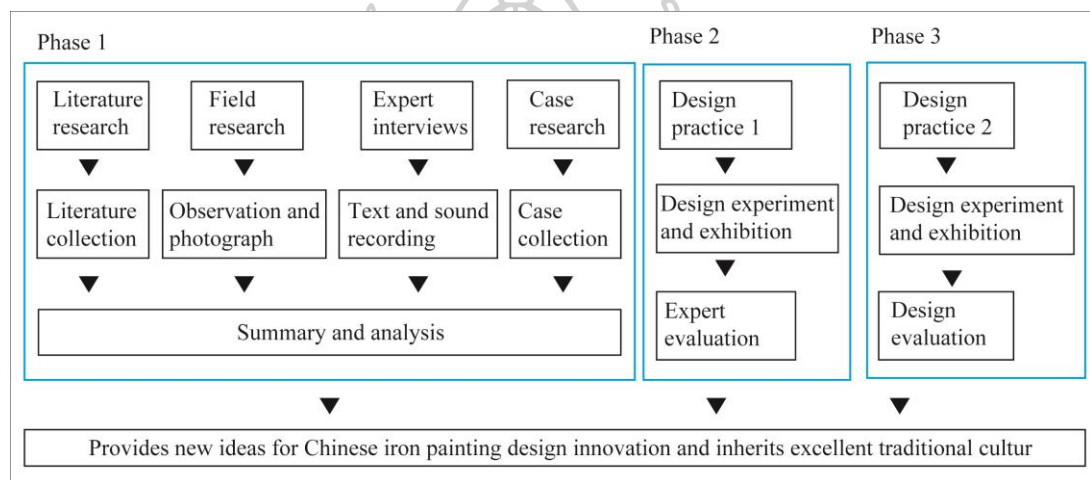


Figure 65 Research Methods Conceptual Framework

Note. Prepared by researcher 2024

The first stage is theoretical research. Including literature research, field investigation, case study, expert interview, these studies find out the key factors and research problems, and the results of the research will lay the foundation for design practice.

The second stage is design practice 1, exploring how to achieve innovation in Chinese iron painting through modern design. The target consumers become a volunteer team to carry out innovative design according to their aesthetic preferences, which will provide further design practice mining.

The third stage is design practice 2, which improves and perfects the innovation through the research results of design practice 1 and the opinions of expert evaluation. The conclusion of the overall results answers the research questions and tests the hypotheses of the research. The result will be a discussion and presentation of the research results, other related analyses, and suggestions for further research and development.

Finally, an in-depth discussion of the best solution for the fusion of Chinese iron painting design.

CHAPTER 4 DATA ANALYSIS AND DESIGN RESULTS

This chapter introduces the research results of the fusion of Chinese iron painting design and summarizes the main findings of each stage of the research. The research is divided into three main stages: research results and analysis (stage 1), design practice 1 (stage 2), and design practice 2 (stage 3).

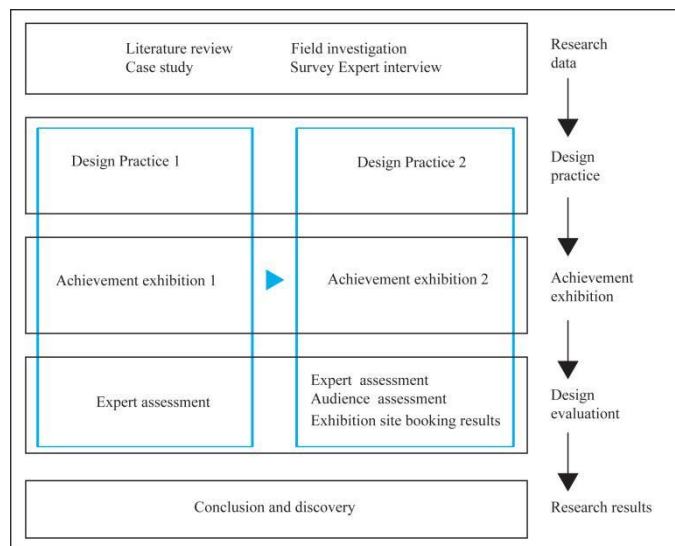


Figure 66 *Research conceptual framework*
Note. Produced by the researcher 2024

The following will gradually explain the research results, so that everyone can fully understand the research results and their inspiration for the innovative design of Chinese iron painting.

Phase I: Research Results and Analysis

4.1 Literature Research Results and Analysis

4.1.1 The fusion of craftsmanship and art promotes the development of Chinese iron painting

The development history of Chinese iron painting shows that the key factor that promotes the development of iron painting in different periods is the cooperation between craftsmen and artists. In the formation and maturity of Chinese iron painting, it was the personal cooperation between painters and iron craftsmen that formed Chinese iron painting. In the trough period of the development of Chinese iron painting, Monk Liaochen cooperated with blacksmiths to enable Chinese iron painting to continue to be inherited and developed. In the prosperous period of the development of Chinese iron painting, relying on the leadership of the government, painters and iron painting craftsmen cooperated again, created a large number of representative iron painting works, and cultivated a group of iron painting craftsmen who understand and can paint. In the current revitalization period of the development

of Chinese iron painting, influential representative works are also the result of cooperation between artists and iron painting craftsmen, including painters, sculptors and designers. The lack of cultural level and design ability of Chinese iron painting craftsmen themselves makes them only have "skills" but not "painting and design ability". The fusion of craftsman's technology and painter's art has promoted the development of Chinese iron painting.

4.1.2 The fusion of craftsmanship and design promotes the innovation of traditional craft products

Existing literature research shows that the fusion of traditional craftsmanship and design can promote the innovation of craft products and enhance market competitiveness. Traditional craftsmanship and modern design have their own characteristics. The fusion of the two can promote each other. Traditional craftsmanship provides cultural materials and inspiration for modern design, and modern design injects new vitality into the inheritance and development of traditional craftsmanship. In the process of integrating traditional handicrafts with modern design, consumer demand is the main line of design, cultural connotation is the core of design, and innovative thinking is the creative practice to achieve the dual goals of design innovation and practicality. Through design fusion, the innovation of traditional craft products can be promoted and the revitalization of traditional craftsmanship can be realized. Chinese iron painting belongs to traditional craftsmanship. It is still a case in the fusion and interaction with modern design, and the design has not been fully reflected. The fusion and development with modern design and the use of the collective creativity of craftsmen and designers can provide huge development opportunities for the development of Chinese iron painting.

4.1.3 Design fusion promotes iron painting product innovation and productive protection and inheritance

Due to the lack of artists and designers in Chinese iron painting, it faces the dilemma of product innovation and cultural inheritance. Iron painting cultural and creative products lack creativity and design sense, and cannot attract young people to join the industry, resulting in the obstruction of skill inheritance. Chinese iron painting practitioners have basically realized that modern design has not really intervened in Chinese iron painting. It is necessary to strengthen the formal beauty and practical functions of iron painting products through art and design, and continue the aesthetics of traditional Chinese painting in terms of artistry. Modern design can become a bridge to continuously inject vitality into Chinese iron painting, transform it from a simple decoration to a living product, and promote the fusion of Chinese iron painting with contemporary social life to achieve productive protection and inheritance.

In the context of the integrated development of culture and tourism, the revitalization of Chinese iron painting should be considered from both the subject and the object. In addition to paying attention to the "productive" attributes of iron painting itself, it is also necessary to focus on its "living" attributes that serve people, and transform value recognition into consumption recognition. The fusion of Chinese iron painting and cultural and creative product design has broad market prospects. By constantly exploring new forms of expression and life-oriented application strategies, it can strengthen its advantages in the field of cultural and creative product design and

broaden the scope of iron painting culture. At present, there are still few relevant research and practical cases on the fusion of Chinese iron painting and cultural and creative product design. Chinese iron painting companies, craftsmen and designers need to strengthen the advantages of iron painting in the field of cultural and creative product design through cooperation, and launch innovative and fashionable Chinese iron painting cultural and creative products based on the preferences and needs of young people to stimulate their desire to buy.

4.1.4 Potential opportunities and directions

Chinese iron painting is an important part of the creative cultural industry, which complements the dominant position of industrialization. Through the fusion of design and technology, it can create new Chinese iron painting products and interpret new meanings. There are relatively few studies on how Chinese iron painting promotes the innovation of iron painting products and cultural inheritance through the fusion of modern design, and lacks systematic theoretical research. Influential iron painting innovation products are the result of the participation of artists or designers. How to build a design fusion path based on the current situation of Chinese iron painting to enhance the contemporary aesthetics and practicality of the product is a research gap.

Potential opportunities in the future are mainly to increase the value of iron paintings by integrating with design, enriching product forms, strengthening product features, attracting young people to join, and promoting long-term cooperation between craftsmen and designers. Product innovation can enhance market competitiveness and the economic income of craftsmen. The stable economic income of craftsmen is important to their well-being, which can stimulate their enthusiasm and attract young people to join.

4.2 Field survey results and analysis

4.2.1 Classification of Chinese iron paintings

The existing classification methods of Chinese iron paintings cannot accurately summarize the existing products of Chinese iron paintings. According to the analysis of the results of the field survey, the following classifications are more comprehensive and reasonable, namely theme classification, content classification, form and color classification.

1) Classification by theme

There are six categories, namely religious themes, historical themes, natural themes, custom themes, auspicious themes, calligraphy and literati themes, and abstract and decorative themes.

Religious themes: involving Buddhism, Taoism and Christianity. Iron paintings often show images of religious figures such as Buddha, Bodhisattva, Arhat, and patterns related to religion.

Historical themes: historical figures and events. Iron paintings often use historical figures, heroes or major historical events as themes, such as Yue Fei, Guan Yu and other characters or historical stories.

Natural themes: landscapes, flowers and birds. Works with natural landscapes as the theme are very common in iron paintings, such as mountains and rivers, plum, orchid, bamboo, chrysanthemum, pine, etc., as well as iron paintings with themes of

animals such as dragons, phoenixes, tigers, horses, cranes, etc., which have strong cultural symbolic significance and show the beauty and vitality of nature.

Customs theme: folk customs. Iron paintings that reflect folk life and customs, such as traditional festivals, farming scenes, fishing and hunting activities, etc., show the diversity of people's daily life and the characteristics of regional culture.





Auspicious themes: patterns that symbolize auspiciousness. Iron paintings often use patterns with auspicious meanings as themes, such as Fu Lu Shou, Yu Yue Longmen, and Song He Yan Nian, which convey good wishes and expectations.

Calligraphy and literati themes: poetry and calligraphy. Iron paintings with ancient poems, couplets, and celebrity calligraphy as themes reflect the spiritual pursuits and artistic tastes of literati and scholars.

Abstract decoration themes: geometric patterns and abstract art. Some iron paintings use geometric figures or abstract forms, mainly used for decoration and modern art design, showing unique aesthetic tastes.

These themes not only demonstrate the diversity of Chinese iron paintings, but also reflect the profound connotation and artistic expression of Chinese traditional culture.

Table 17 Theme classification of Chinese iron paintings

Subject Category	Representative Works	Contents
Religious Themes		It depicts Zhong Kui, the Taoist master who exorcises demons and catches ghosts. It depicts the Buddhist monk Tang Monk and his disciples going to the West to obtain Buddhist scriptures.
Historical Themes		It depicts the war figures of the Chinese People's Volunteer Army in history. It depicts the story of the Three Kingdoms period in ancient China.
Nature Theme		It depicts the common landscapes and countryside in Chinese paintings. It depicts flowers, plants and animals.
Customs Theme		It shows the leisurely life in the market, and the old man teases the toad. It shows the scene of a rural doctor picking herbs.

Auspicious theme		<p>It represents bamboo, which symbolizes youth and success. It represents the traditional auspicious culture of continuous happiness, and includes magpies and persimmons.</p>
Calligraphy literati theme		<p>The paintings and calligraphy of Bada Shanren have strong literati characteristics. The paintings and calligraphy of Chinese calligraphy.</p>
Abstract decorative motif		<p>Representing abstract landscapes and figures. Representing abstract architecture.</p>

Note. Produced by researchers 2024







The above table shows the classification of different themes of Chinese iron paintings. From the market point of view, works with natural themes, auspicious meanings, calligraphy and literati themes, and abstract decorative themes are more popular, while works with historical, religious, and folk themes are relatively rare, and market recognition is gradually declining. In the future, the development focus of Chinese iron paintings should be natural themes, auspicious meanings, and abstract decorative themes, which are more in line with the preferences of modern young consumers. With the public's appreciation of traditional culture and the diversification of aesthetic interests, these themes are expected to be favored by the market.

2) Classification by content

The first category is tree iron paintings, such as the Welcoming Pine; the second category is animal iron paintings, such as Immediate Success; the third category is flower series iron paintings, such as plum blossoms; the fourth category is fish and insects, such as crabs and shrimps; the fifth category is landscape series iron paintings, such as antique landscapes; the sixth category is calligraphy font iron paintings; such as various calligraphy; the seventh category is figures, such as ladies' paintings

Table 18 Representative works and descriptions classified by content

Performance content	Representative Works	Contents
Trees		<p>The depiction is of the Welcoming Pine of Mount Huangshan</p>

Animals		The horse is shown
Flowers		The chrysanthemum
Fish and Insects		The crab
Landscape		It shows the landscape
Calligraphy		Expressive Chinese calligraphy
Characters		It shows a group of famous Chinese doctors

Note. Produced by researchers 2024

The table above shows the seven main types of expressions of Chinese iron paintings. Among them, landscapes, flowers, animals, fish and insects are more popular. The design fusion direction of Chinese iron paintings should be analyzed and expressed from these contents.

3) Classification by form

The forms of Chinese iron painting products can be summarized as: iron painting hangings, iron painting ornaments, iron painting pendants, iron painting screens, and iron painting lamps. Among them, iron painting hangings, iron painting ornaments, and iron painting pendants are mainly for decorative aesthetics; iron painting screens and iron painting lamps have both decorative and practical functions. Iron painting hangings. Refers to traditional Chinese iron paintings based on Chinese paintings. Chinese iron paintings are mounted on wooden frames and hung on the wall with nails or ropes. They can be single or multiple, and are easy to combine. This type of Chinese iron painting is the most original product category and the most representative Chinese iron painting work. It is mainly based on line modeling, with rich mounting forms and various sizes and specifications.



Figure 67 Chinese iron painting hanging painting "Still withering in winter"
 Note. Photographed by researchers 2023

Iron painting ornaments. Chinese iron painting products placed on desktops or cabinets for decoration for people to appreciate, such as porcelain plate iron paintings, three-dimensional iron paintings, etc. The size and form of such works are suitable for modern home decoration. They are small in size, light in weight, easy to carry, and are deeply loved by consumers.



Figure 68 Chinese iron painting ornaments
 Note. Photographed by researchers, 2023

Iron painting pendants. Mainly refers to Chinese iron painting works presented in the form of hanging, including Chinese iron painting bookmarks, which are mostly used for door and window, car decoration, and as bookmarks. They are not only small and beautiful but also auspicious. Pendants are innovative products of modern

Chinese iron painting, with small size and specifications, cheap price, and can meet the consumption needs of the tourism market.



Figure 69 Chinese iron painting pendant
Note. Photographed by Ren Weijian 2023

Iron painting screen category. Screens are used to block wind or shield indoors. They are usually made of bamboo or wood frames, and Chinese iron paintings are placed in the frames. This type of work is developing towards miniaturization, suitable for office or desk placement, becoming a decoration, and its practical function is weakening. It is divided into standing screens, folding screens, and inkstone screens. A standing screen is a screen with a base. Standing screens are mostly placed at the entrance of a room to buffer the airflow coming directly from the door, to store wind and gather energy; or they are displayed in buildings with larger indoor spaces to block sight, divide space, guide landscape, and form a winding path. Folding screens are foldable screens without a base. They are often folded into a zigzag shape to separate space and can be changed frequently. It is a mobile furniture with no fixed display location. There are hooks and buttons between each door, which can be disassembled and assembled at will, and are light and flexible. The inkstone screen is the same in shape as the single-leaf pedestal screen, but is smaller in size and often placed on a table. It is an ornamental small screen used for display and furnishing, also known as a table screen or desk screen.



Figure 70 Chinese iron painting screen stored in the reception hall of the Great Hall of the People

Note. Provided by Gao Wenqing 2024

Chinese iron painting lamps. Historically, Chinese iron painting lamps were very popular among dignitaries and were called flower lanterns or lanterns. This type of lamp is three-dimensional and is made of four faces. Each face is used to make an iron painting work, which has a strong artistic effect and practical function. Due to the time-consuming and high price of manual production, coupled with the beautiful, light and cheap modern lamps on the market, few people buy traditional Chinese iron painting lamps. Now Chinese iron painting craftsmen basically no longer make such lamps. Instead, Chinese iron painting modern lamps are mainly used for modern homes. These Chinese iron painting lamps are mainly used for modern homes. They use modern shapes and LED lamp beads or light strips. They can be used as decorations or lighting fixtures, and have unique aesthetics and practical functions.



Figure 71 Chinese iron painting lamps in the Qing Dynasty

Note. Photographed by researchers 2023

Currently, the products on the Chinese iron painting market are mainly Chinese iron painting hanging paintings and ornaments. Chinese iron painting lamps, pendants and screens are gradually increasing, especially small-sized screens are more popular with consumers, mainly used as home or commercial space desktop decorations. The future product innovation direction of Chinese iron painting needs to expand new categories or update existing categories while maintaining the existing categories to meet the needs of modern life. Chinese iron painting works must innovate in form to meet the actual needs of the market (QIAN & DONG, 2019). With the advancement of science and technology, the innovation of technology and tools, and the changes in the modern home living environment, Chinese iron painting has slowly developed from hanging paintings to ornaments, screens and lamps. The characteristics of the works are small size and convenient placement, light weight and easy to move, beautiful and practical, and rich in cultural and auspicious meanings.

4) Classification by color

Chinese iron paintings are mainly black, gold and color, supplemented by dark gray sprayed with transparent paint after forging iron. Black is the main color of Chinese iron painting, and color is mostly used for flowers and birds. Dark gray is the original color of iron painting after forging. After completion, transparent paint is sprayed. Most of them are finely made and highly artistic works. Black is sprayed with black paint by machine to enhance the black and white contrast between Chinese iron painting and the background, and at the same time play a moisture-proof role. Gold is electroplated, which is particularly expensive and mostly small pieces. Color is hand-painted with acrylic, which is colorful and highlights realism and beauty. Some are also sprayed with colored paint.



Figure 72 Chinese iron painting after coloring but not mounted
Note. Photographed by the researcher 2022

Table 19 Different colors in Chinese iron painting

color	black	gold	color	Dark Gray
picture				

Note. Made by researchers 2024

The table above shows four colors of Chinese iron painting, namely black, gold, color and dark gray. Different colors represent different emotions and aesthetics. Diversified colors help improve consumers' purchasing choices and product market competitiveness. Iron painting cultural and creative products need to be comprehensively improved in shape, color, pattern, texture and artistry to promote the innovation and inheritance of iron painting culture.






Figure 73 Investigation of the iron painting production workshop of Wuhu Arts and Crafts Factory

Note. Photographed by Xia Shuaiguo 2023

4.2.2 Pattern elements of Chinese iron painting

Chinese iron painting expresses themes of different cultural significance through specific elements. These elements are common things in life, including plants and flowers, such as pine trees, bamboo, plum blossoms, orchids, chrysanthemums, grapes, peonies and lotus flowers. Animals, insects and birds, such as eagles, horses, chickens, birds, tigers, deer, fish, egrets, cows, etc. Figures, such as opera characters and historical figures. Calligraphy fonts, traditional landscapes and architecture elements.

Table 20 Common specific elements in Chinese iron painting

Category	Element	Picture
Landscape	landscape	
Plants and flowers	Pine	
	Plum blossom	

Orchid



Bamboo



Chrysanthemum



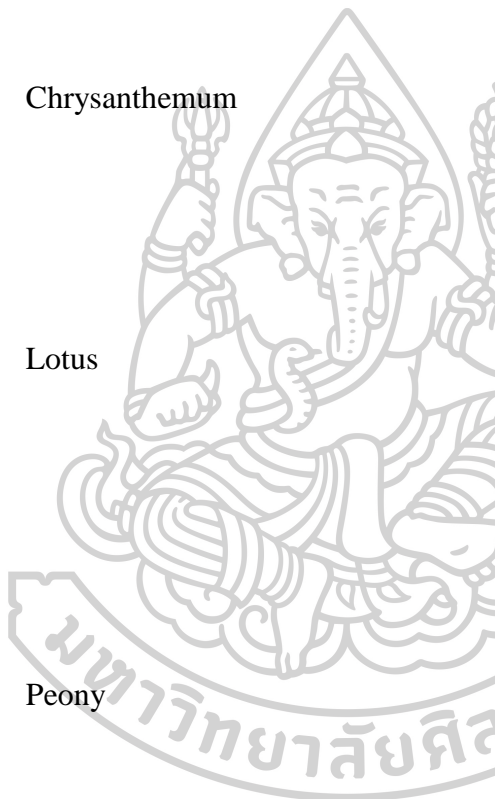
Lotus



Peony



Grape



Radish



Animals,
insects, fish

Horse



Eagle



Magpie



Fish



Chicken



Crab



Tiger



Heron



Dragon and Phoenix



Butterfly



Architecture	Residence	
Characters	Three Ladies	
Text	Chinese calligraphy	

Note.Made by researchers 2024

The combination of these elements constitutes the different themes of Chinese iron painting. The repeated use of inherent elements of Chinese iron painting has led people to believe that it is conservative and out of touch with modern needs. By understanding the existing pattern elements of Chinese iron painting, it is possible to explore and develop different modern elements. In this innovative context, it is crucial to let "old trees bloom new flowers", inherit artistic classics, and choose themes and patterns suitable for Chinese iron painting wrought iron craftsmanship (Yang, 2020).

At present, how to effectively utilize the existing elements of Chinese iron painting requires combining them with modern lifestyles and aesthetic tastes, enriching the forms of expression through modern design, and enhancing their artistic and practical value.



Figure 74 Investigation of the China Iron Painting Exhibition Hall of Wuhu Arts and Crafts Factory

Note. Photographed by Xia Shuaiguo 2023

4.2.3 Representative inheritors of Chinese iron painting and their works

The following are the influential craftsmen and representative inheritors in the Chinese iron painting industry.

Chu Jinxia, female, born in November 1945, has been in the art industry for 63 years. She is the eldest daughter of Chu Yanqing, a master of Chinese iron painting, a representative of the 9th National People's Congress, a national intangible cultural heritage inheritor of Chinese iron painting, a Chinese arts and crafts master, and a senior arts and crafts artist. She participated in the forging of important works such as the giant iron painting "Welcoming Pine" in the Great Hall of the People in Beijing in 1959. Representative works: "Chicken Fun Picture", "Lotus Chanting Picture", "Plum, Orchid, Bamboo and Chrysanthemum".

Zhang Jiakang, male, born in August 1949, has been in the art industry for 62 years. He is a member of the Communist Party of China, a national intangible cultural heritage inheritor of Chinese iron painting, a master of arts and crafts in Anhui Province, and a disciple of Wu Zhixiang, an old Chinese iron painting artist. Representative works: "Fuchun Mountain Dwelling", "Tiger", and "Antique Landscape".

Tang Chuansong, male, born in December 1945, has been in the art industry for 63 years. He is a provincial intangible cultural heritage inheritor of Chinese iron painting, a master of arts and crafts in Anhui Province, and a disciple of Yan Changgui, an old Chinese iron painting artist. His representative works include "Green Bamboo Shade", "Cai Wenji", and "Ancient Landscape".

Ye He, male, born in October 1959, 47 years old. He is a provincial intangible cultural heritage inheritor of Chinese iron painting and a master of arts and crafts in Anhui Province. His representative works include "Successful Examinations All the Way" and "Pine Eagle Picture".

Zhao Changjin, male, born in September 1966, has been in the art world for 38 years. He is a member of the Communist Party of China, a municipal intangible cultural heritage inheritor of Chinese iron painting, a master of arts and crafts in Anhui Province, and a senior arts and crafts artist. He studied under Chu Jinxia, a national intangible cultural heritage inheritor and a Chinese arts and crafts master. His representative works include "Great Wealth", "Birthday Wishes", and "Long History".

Ling Xiaohua, male, born in November 1966, has been in the art world for 38 years. He is a municipal intangible cultural heritage inheritor of Chinese iron painting, a master of arts and crafts in Anhui Province, and a senior arts and crafts artist. He studied under Chu Jinxia, a national intangible cultural heritage inheritor and a Chinese arts and crafts master. Representative works: "Virtue and Virtue", "Autumn Scenery of Huangshan", "Character He Jiaying".

Zhou Junwu, male, born in April 1968, has been in the art world for 41 years. He is the inheritor of the municipal intangible cultural heritage of Chinese iron painting, the master of arts and crafts of Anhui Province, and a senior arts and crafts artist. He studied under Tang Chuansong, the inheritor of the provincial intangible cultural heritage of Anhui Province and the master of arts and crafts of Anhui Province. Representative works: "Summer under the Willow Shade", "Picture of Bamboo and Rock", "High Mountains and Long Rivers".

Teng Shiyong, male, born in May 1972, has been in the art world for 31 years. He is the inheritor of the municipal intangible cultural heritage of Chinese iron

painting and the master of arts and crafts of Anhui Province. He has successively studied under Ye He, the inheritor of the municipal intangible cultural heritage of Wuhu City and the master of arts and crafts of Anhui Province, and Chu Jinxia, the inheritor of the national intangible cultural heritage and the master of arts and crafts of China. Representative works: "Colorful Feathers", "Eagle Strikes and Blooms", and "Morning Light of Huangshan".

Chu Tiewi, male, born in November 1972, has been in the art world for 35 years. He is the inheritor of Anhui provincial intangible cultural heritage of Chinese iron painting and the master of arts and crafts in Anhui Province. He has successively studied under Zhang Jiakang, the inheritor of national intangible cultural heritage and the master of arts and crafts in Anhui Province, and Chu Jinxia, the inheritor of national intangible cultural heritage and the master of arts and crafts in China. His representative works include "The Benevolent Enjoy the Mountains", "Double Eagles", and "Horse".








Chu Liwen, female, born in January 1974, has been in the art world for 32 years. He is the inheritor of municipal intangible cultural heritage of Chinese iron painting and the master of arts and crafts in Anhui Province. He studied under his mother, Chu Jinxia, the inheritor of national intangible cultural heritage and the master of arts and crafts in China. His representative works include "Nuwa Patching the Sky", "Teng Luo Myna", and "High Morality".

Nie Chuanchun, male, born in February 1978, has been in the art world for 27 years. He is the inheritor of provincial intangible cultural heritage of Chinese iron painting and the master of arts and crafts in Anhui Province. He studied under Chu Jinxia, the inheritor of national intangible cultural heritage and the master of arts and crafts in China. His representative works include "No Withering in Winter", "Welcoming Pine", and "Prosperity".

Zhang Zhenggui, male, born in September 1984, has been in the art world for 24 years. The county-level inheritor of Chinese iron painting, he studied under Chu Tiewi, the provincial intangible cultural heritage inheritor of Chinese iron painting and the master of arts and crafts in Anhui Province. Representative works include "Zhong Kui" and "Fu Lu".

These Chinese iron painting artists are generally older, and their representative works are mainly traditional Chinese iron paintings, which are used as gifts and souvenirs, continuing the traditional aesthetics and forms of Chinese iron paintings, lacking the intervention of modern design. The inheritors of Chinese iron painting emphasize the production technology and the artistry of the works in their own cognitive world, and rarely pay attention to products that meet modern aesthetics and life needs. In the production, the degree of production refinement is the main reference, and the aesthetics and composition of Chinese paintings are used to judge the artistry of the works. The works are mainly based on traditional iron paintings and themes, and there is a lack of three-dimensional Chinese iron paintings with a sense of design. This phenomenon is caused by the influence of long-term traditional Chinese iron painting production. Modern young people like works with strong visual impact and design creativity. How to strengthen the fusion of design in Chinese iron painting and combine the artistry of painting with the visual beauty of design is one of the key factors that determine the sustainable development of Chinese iron painting in modern society.

Table 21 Representative inheritors of Chinese iron painting and their works.

Author	Representative works pictures	Topics, Categories, and Elements	Award or Collection
Chu Jinxia		Theme: Nature Category: Hanging painting Elements: People and lotus	Huigong Award Gold
Zhang Jiakang		Theme: Nature Category: Hanging painting Elements: Landscape, trees	Huigong Award Gold Prize, Wuhu Museum Collection
Tang Chuansong		Theme: Auspicious meaning Category: Hanging painting Element: Plum blossom	Huigong Award Gold
Ye He		Theme: Auspicious meaning Category: Relief Elements: Heron and lotus	Wuhu Museum Collection
Zhao Changjin		Theme: Nature Category: Hanging painting Element: Flowers	Wuhu Museum Collection
Ling Xiaohua		Subject: Nature Category: Hanging painting Elements: Bamboo, rocks, birds	Huigong Award Gold
Zhou Junwu		Theme: Customs Category: Folding screen Elements: Willow, people	Huigong Award Silver Award

Teng Shiyong		Theme: Nature Category: Hanging painting Elements: Trees, eagles	Huigong Award Gold
Chu Tiewi		Theme: Nature Category: Hanging painting Elements: Reeds and rooster	Silver Award of Anhui Arts and Crafts Exhibition
Chu Liwen		Theme: Nature Category: Hanging Painting Element: Bamboo	Huigong Award Bronze Award
Nie Chuanchun		Theme: Auspicious meaning Category: Hanging painting Elements: Pine tree, plum blossom and bamboo	Huigong Award Gold
Zhang Zhenggui		Theme: Auspicious meaning Category: Ornaments Element: Gourd	Huigong Award Silver Award

Note: Made by researchers 2024

The representative works of different iron painting craftsmen presented in the table above are all made of iron and completed through iron painting techniques. The elements mainly express common animals, plants and people in life, and most of them are traditional hanging paintings, expressing auspicious culture and natural themes. These works are mainly based on Chinese paintings, mostly realistic expressions, requiring superb production techniques, emphasizing the artistic expression of the works and the production technology, lacking modern design sense and practicality of the products. Transforming Chinese iron paintings into cultural and creative products is a potential opportunity to enhance its market competitiveness and a possible direction for inheritance and development.



Figure 75 Investigating the Feilong Iron Painting Sales Exhibition Hall
Note. Photographed by Ding Yuanjun 2023



Figure 76 Investigation of Huiyifang Iron Painting
Note. Photographed by researcher 2023

4.2.4 Market analysis and existing problems of Chinese iron painting products

1) Market analysis of iron painting products

Since 2002, Chinese iron painting has gradually moved towards marketization and become a popular arts and crafts product, forming five categories of iron painting hangings, iron painting screens, iron painting ornaments, iron painting lamps and iron painting pendants, involving hundreds of product series such as artworks, decorative paintings, commemorative gifts and cultural and creative products.

The consumer groups of Chinese iron painting are mainly government and corporate business reception gifts; tourists buy souvenirs; corporate opening, housewarming, anniversary celebrations and special gifts; home and office space decorations; conference commemorative gifts in Anhui Province, student promotion, overseas study and foreign exchange gifts, as well as government, enterprises, institutions and individual customization. According to the market sales demand, the ranking is government and corporate business reception customized gifts, gifts and souvenirs for specific meetings and celebrations, home decorations, tourist souvenirs, student promotion, overseas study and personal foreign exchange gifts, as well as government, enterprises, institutions and individual customization.

From the above, we can see that Chinese iron paintings are mainly used as gifts, home decorations and souvenirs, and are mainly purchased by governments, enterprises, institutions and groups. The purpose of purchase is mainly to use them as gifts, and there is a lack of demand for home decoration. How to meet modern aesthetic and life needs and improve the purchasing behavior of individuals and families is the key to the fusion and sustainable development of Chinese iron painting design.

At present, the main products on the Chinese iron painting market are still traditional Chinese iron paintings. The innovatively designed Chinese iron painting products are mainly changed from traditional Chinese iron paintings, such as changing the size, mounting form, and using them in screens, porcelain plates, and lamps. There is a lack of original innovative design works. Chinese iron paintings are facing the confusion of the positioning of supply entities and product elements, small, scattered and weak market supply, backward and aging products, mainly imitation, and lack of cultural characteristics, which can not stimulate market vitality and lead to weak demand (Yang, 2020). Chinese iron paintings need to break the shackles of thinking that handicrafts only have "technology" but no "art" (Song, 2023). The art here refers to modern design thinking and methods.

From the perspective of market analysis, the market performance and development trend of Chinese iron painting products are gradually shifting towards the demand for cultural and creative products, and its product characteristics are suitable for a variety of purposes. Sales mainly include online and offline markets. The online market refers to sales on e-commerce platforms, and the offline market refers to sales channels such as physical stores and exhibitions. According to the results of field investigations in China, the sales volume and market share of Chinese iron painting products have been gradually shrinking in recent years. The main reason is that no products suitable for the needs of modern society have been designed, and modern design is missing in Chinese iron painting.

The products with better market sales in Chinese iron painting are traditional Chinese iron painting hangings, Chinese iron painting ornaments, and Chinese iron painting screens. The reason is that these products have many different forms and themes, rich products, diverse sizes and mounting forms, and consumers have more choices. Other categories of products have large differences in sales due to fewer types and specifications, lack of aesthetics and practicality, etc. Modern design is seriously missing in China's innovative iron painting products. Consumers' demand for Chinese iron painting products mainly includes three aspects: first, the product design should be creative and distinctive; second, the product quality should be excellent, handmade, and have cultural implications; third, the size should not be too large, and small works should be the main focus. In summary, through the market analysis of Chinese iron painting products, the market demand potential of Chinese iron painting after adding practical functions is obvious. It is necessary to focus on the product design of Chinese iron painting to make it meet the aesthetic and life needs of today's society.

2) Problems with iron painting

Chinese iron painting products are highly homogenized and do not meet market demand. The Chinese iron painting market is mainly traditional hanging paintings, as well as ornaments that change the mounting form through hanging paintings.

Although the forms have been expanded, such as porcelain plate iron painting, colored iron painting and gilded iron painting, the content and form of the expression are based on traditional Chinese painting, which is still landscape, horse, and flowers. The homogeneity is serious and there is a lack of innovative expression of the original content. There are not many new products that meet market demand and meet the preferences of young people. It is difficult for iron painting companies to achieve dislocation management and complementary advantages, which hinders the large-scale development of China's iron painting industry.

Chinese iron painting is based on lines, lacking the application and functionality of line and surface combination. After hundreds of years of development, Chinese iron painting is still dominated by line modeling, which is the modeling feature of traditional Chinese painting. With the development of Chinese painting, modern Chinese painting emphasizes the use of ink and wash, and abstraction and texture have become the modeling features of modern Chinese painting. Chinese iron painting lacks the modeling application of line and surface combination. The thin lines make it unable to form a strong visual impact and have practical functions. The lack of practical functions makes it far away from the life needs of ordinary consumers.

The industry has the phenomenon of focusing on technology and relying on government support. Chinese iron painting craftsmen have a low cultural level, basically below the junior high school level, and are older, with weak art foundation, unable to create drawings independently, and generally lack innovation awareness and creative ability. The production methods, work forms, tools and equipment have not changed for many years. They emphasize the production technology of their works, and rarely consider design innovation and practical works. They copy the ancient Chinese paintings from the Internet or books for production, and remain indifferent to product innovation. Under the situation that there are not many orders in the current iron painting market, the enthusiasm of craftsmen to pass on their skills is not high, and there is no active absorption of young talents, resulting in a lack of young practitioners in the Chinese iron painting industry. The ideas of practitioners in the Chinese iron painting industry are too backward, and they rely too much on government policies and financial support. The state has given a series of policies and financial support to Chinese iron painting, but the results are not ideal. The vested interests have not applied the policies and funds to the innovative development of Chinese iron painting, and have not changed their own inadequate capabilities and product innovation problems. Relying on the government without solving the industry's own problems and changing ideas, and simply relying on a single traditional category, it is impossible to achieve a benign environment for the long-term development of Chinese iron painting.

Enterprises and craftsmen are independent individuals and lack designers. The business model of Chinese iron painting is relatively special. Enterprises and craftsmen are independent individuals. There is no employment and labor relationship. The main role of enterprises is to purchase semi-finished products from Chinese iron painting craftsmen, and sell them at high prices in display stores through later framing. Craftsmen are responsible for production and materials, and the benefits are limited. Before the Wuhu Arts and Crafts Factory went bankrupt, the production of Chinese iron paintings was the responsibility of the government, and the craftsmen had

national status and were only responsible for production. With the bankruptcy, it lost its comprehensive advantages such as venues, equipment, funds, and design. At present, Chinese iron painting craftsmen are basically individuals who produce and make iron paintings, lacking funds, design, and good tools and equipment. At present, no Chinese iron painting enterprise has a dedicated designer, and only occasionally commissions painters to create drawings, resulting in Chinese iron painting products always being in the category of decorative paintings, and modern design is seriously lacking in Chinese iron painting. Enterprises do not recruit craftsmen, and some enterprises provide craftsmen with venues for making iron paintings. Tools, electricity bills, and materials are the responsibility of the craftsmen. Enterprises give orders to craftsmen to make them, and pay wages according to the number of pieces made. Craftsmen have no pricing power, and the remuneration they receive is small and unstable, and they lack enthusiasm for work. On the whole, enterprises do not attach importance to the design of Chinese iron paintings, and do not provide Chinese iron painting craftsmen with good tools and equipment and stable economic rewards, resulting in Chinese iron painting craftsmen not being active in innovation.



Figure 77 Survey of China Iron Painting Creative Park
 Note. Photographed by researchers 2023



Figure 78A photo taken with Chinese iron painting craftsman Yang Yong during the investigation
 Note. Photographed by Ding Yuanjun 2023

4.3 Results and analysis of expert interviews

Through interviews with 10 relevant experts with professional capabilities, in-depth discussions and analysis were conducted on the issues. The three aspects

involved were personal information, cognition and problems of Chinese iron painting, and design fusion of Chinese iron painting. The final decision is a necessary condition for conducting this study. It will promote the inheritance and innovative development of Chinese iron painting through fusion with design, which will have a far-reaching impact on the revitalization of Chinese traditional crafts.

4.3.1 Expert interview results

Table 22 *Summary of Expert Interviews*

Field of study	Expert Name	Summary
Expert in intangible cultural heritage and traditional crafts research	Professor Wan Fubin	<ol style="list-style-type: none"> 1) The biggest feature is that it is based on Chinese painting, and the representative themes include welcoming pine, galloping horses, bamboo, etc. 2) The overall product does not meet the needs of modern consumers, and is not much different from the products of the 1970s and 1980s. 3) The products are mainly traditional hanging paintings, which are contrary to the diverse aesthetic needs of modern people. 4) There is a need to improve the product form, function and material. 5) Fusion with design can solve the problem of product innovation and enhance the vitality of culture. The negative side is that it affects the traditional themes of Chinese iron painting. 6) Every product has the participation of design, and there is no good product without design. 7) Design fusion should expand new elements or transform existing elements, and the theme should have cultural significance and reflect the inheritance of culture. 8) Design fusion with products for daily use is a good direction. 9) Design fusion products should have craftsmanship, culturality and practicality. 10) Maintain the craftsmanship and cultural characteristics of iron painting, keep the authenticity and then innovate.
	Dr. Li Jianhua, Professor	<ol style="list-style-type: none"> 1) Unique production technology, black and white colors; representative themes include welcoming pine, traditional landscape, plum blossom, etc. 2) The product does not meet consumer demand and lacks practicality. 3) The product form is single and the price is high. 4) The product form needs to be improved, and daily necessities should be designed and produced. 5) Design fusion has positive significance, promoting product sales and increasing economic income.

Expert in Chinese iron painting culture research	Associate	<p>6) Design has always existed in our artistic creation, never absent, and plays an irreplaceable role.</p> <p>7) The content is natural landscape, and the theme should have auspicious and symbolic meaning.</p> <p>8) Lamps, ornaments and tourist souvenirs.</p> <p>9) It is novel, practical and emotional, showing craftsmanship and cultural connotations.</p> <p>10) Practice and try more while maintaining the core of craftsmanship, and it can be combined with lamp design.</p>
	Professor Yao Mingqi	<p>1) Emphasize the thickness of lines, black and white, virtual and real contrast, and absorb the composition of traditional Chinese paintings; representative themes include landscapes, welcoming pine, plum, orchid, bamboo and chrysanthemum.</p> <p>2) A small part of the products meet the needs of consumers, mainly those who love Chinese paintings.</p> <p>3) The product forms are not rich, and there is a lack of innovative works with a sense of design.</p> <p>4) Improvement of artistic aesthetic paradigms, innovation of new material fusion and interaction, innovation of digital application of iron paintings, and innovation of cultural connotation and expression of iron paintings.</p> <p>5) Positive significance promotes product innovation and expands the thinking and vision of craftsmen.</p> <p>6) Design is becoming more and more important for modern craft practice, and past imitation has caused aesthetic fatigue.</p> <p>7) Innovative design of representative content of landscapes, trees, plum, orchid, bamboo and chrysanthemum. The expression theme has auspicious meaning.</p> <p>8) With public art landscape design, cultural and creative product design, rail transit space, indoor exhibition space.</p> <p>9) It is innovative, practical, craftsmanship and emotional.</p> <p>10) Maintain its own characteristics and pay attention to the inheritance of skills.</p>

Associate Professor Xing Ping	1) Based on traditional culture, the combination of lines and surfaces has changed the traditional line-based modeling method. It is handmade, has the charm of Chinese painting, and has a strong sense of three-dimensionality. The representative themes are mainly landscapes, flowers and birds, and figures. 2) The product does not meet the needs of consumers. 3) There is a lack of products needed for modern social life. 4) There is a need to improve the product form, function, culturality and emotionality. 5) It is mainly a positive impact, which helps to increase the industry's reputation and increase product sales. 6) Without design, production cannot be carried out. 7) Explore Hui culture and absorb the content of Hui brick carving and wood carving; the theme is positive, love and fighting spirit. 8) Integrate into life and public art fields such as home, lamps, and landscape sculptures. 9) It is functional, practical, and cultural. 10) Through the intervention of modern digital technology, such as 3D modeling, laser engraving and AR/VR technology, improve the efficiency and accuracy of iron painting production
Product design expert	Professor Liu Binhui 1) The production process is unique, the work has a certain three-dimensional sense, and the representative themes include welcoming pine, traditional landscape, bamboo, and calligraphy iron characters. 2) The product does not meet the needs of consumers. 3) It is not practical and is only used as a decorative painting. 4) The form needs to change, the function needs to be improved, the modeling language needs to be changed, and the product's fun needs to be improved. 5) Positive significance Change the pattern of Chinese iron painting as a decorative painting, enrich the subject matter and category. 6) Design and craftsmanship are equally important and determine the form of the product. 7) Innovatively design bamboo and expand the range of elements; express nature and decorate abstract themes. 8) Combine with cultural and creative products such as lamps, tea sets, and incense sets. 9) The form is novel, has practical functions, highlights culture and fun, conveys emotions, and is easy to move and carry. 10) Handle the relationship between craftsmanship and design well, and craftsmanship must be able to achieve design.

Dr. Wei Xuefei, Professor	<p>1) It has a unique shape and aesthetic language, is a national intangible cultural heritage, and has rich cultural connotations. Representative themes include traditional landscapes, pine trees, plum, orchid, bamboo and chrysanthemum.</p> <p>2) The product basically does not meet consumer demand.</p> <p>3) The form is too traditional and lacks practicality, which is inconsistent with the modern home design style and people's life aesthetics.</p> <p>4) It needs to be three-dimensional, break out of the limitations of the original painting, and improve the color and emotional communication.</p> <p>5) Increase sales, bring economic profits, and promote cultural inheritance.</p> <p>6) Design determines whether the product meets the aesthetic and functional needs of consumers.</p> <p>7) The content is mainly common things in life, such as flowers, insects and fish, with certain cultural connotations and auspicious meanings.</p> <p>8) Combined with home decoration ornaments, murals, and lamps.</p> <p>9) It has interesting and fine production technology, variable sizes, suitable for different spaces, and easy to carry and install.</p> <p>10) Block-like abstract three-dimensional ornaments emphasize shape and texture, and can be more modern in color. Choosing patterns that are generally popular with the public will be very attractive to consumers.</p>
Industry associations and business operators	<p>Secretary -General Shen Tao, Senior Arts and Crafts Artist</p> <p>1) Unique craftsmanship, the charm of Chinese painting, line modeling, intangible cultural heritage; representative themes include welcoming pine, horse, eagle, lotus, and calligraphy.</p> <p>2) It does not meet the needs of young consumers.</p> <p>3) It mainly lacks practicality and design sense, the product form is not rich, and homogeneity is serious.</p> <p>4) Enrich the form, expand the subject matter, and introduce new tools and equipment.</p> <p>5) It has a driving effect on the development of the entire industry, bringing economic benefits while enhancing the self-confidence of practitioners.</p> <p>6) Design for iron painting is mainly a draft, which determines the artistry of the work.</p> <p>7) Innovative transformation of landscapes and flowers, the theme expresses auspicious meanings.</p> <p>8) Combined with daily necessities and home products, such as lamps, ornaments, tea sets, etc.</p> <p>9) Improve aesthetics and design sense to make young people like it.</p>

<p>Gao Wenqing, General Manager, Professor-level Arts and Crafts Artist</p>	<p>10) Affirm the social status of the inheritors. The government and industry associations should protect innovative works, stimulate the creative enthusiasm of craftsmen, and establish effective cooperation with painters and designers; combine porcelain plates and iron paintings with ceramics, and ornaments with fan leaves.</p> <p>1) The characteristics are unique craftsmanship and materials, handmade, and rich cultural heritage. Representative themes include landscapes, flowers, calligraphy, and animals.</p> <p>2) There is no fixed consumer group, which basically does not meet the consumption needs of the general public.</p> <p>3) It is mainly decorative paintings and lacks practical functions.</p> <p>4) Enhance practical functions while improving design sense and artistry.</p> <p>5) It is definitely a positive meaning, enriching product forms and increasing sales.</p> <p>6) Design is very important for iron paintings. We look for manuscripts of famous painters everywhere for copying and production.</p> <p>7) There is no limit on the subject matter, and it is best to highlight the regional culture and convey emotions and spirit.</p> <p>8) Fusion with lamps, ornaments, and cultural and creative products.</p> <p>9) The craftsmanship is moderately difficult, small in size, easy to carry, and has cultural and commemorative significance.</p> <p>10) Products that can be mass-produced, with decorative and abstract characteristics, emphasize the beauty of artistic conception, and are suitable for the consumption needs of ordinary citizens and foreign tourists.</p>
<p>Representative inheritor of Chinese iron painting</p>	<p>Chu Jinxia, Chinese Arts and Crafts Master</p> <p>1) Hot forging is the biggest feature of Chinese iron painting, followed by the expression of Chinese painting-based content, and the aesthetic form pursues rhythm. Representative themes include landscapes, trees, horses, and dragons.</p> <p>2) Iron painting basically does not meet social needs, and is more often purchased by individuals as gifts or companies as event souvenirs.</p> <p>3) There is no practical function, the works are highly homogenized, and most of them are imitative productions, without artistry and personal emotions.</p> <p>4) Improve in function, form, subject matter and craftsmanship.</p> <p>5) Make the form of works more abundant, increase</p>

	innovative works, and promote product sales.
	6) Design determines the artistry of the work, and it is necessary to understand the design draft or drawing before making it.
	7) Explore regional cultural elements or make new designs for existing elements, and express the theme with auspicious meanings.
	8) Integrate with modern life products, screens, home products.
	9) Products with artistry and practicality.
	10) Innovation in craftsmanship, new welding tools, highlighting formal aesthetics, and continuously enriching the connotation of Chinese iron painting itself on the basis of studying the art of Chinese painting.
Ling Xiaohua, Anhui Arts and Crafts Master	1) The main features are craftsmanship and materials, modeling and aesthetics. Representative themes include welcoming pine, horses, landscapes, and flowers.
	2) Some of them meet consumer demand, and there is market demand for traditional landscapes.
	3) Products are highly homogenized, and elements and themes are reused, causing aesthetic fatigue.
	4) There are many areas for improvement, such as production technology, themes, colors, and mounting forms.
	5) It is mainly a positive influence, attracting consumers to buy, increasing visibility, and contributing to the inheritance and promotion of Chinese iron paintings.
	6) Design is more difficult and more important than production.
	7) The subject matter does not matter, the main thing is novel form, practical functions and auspicious meanings.
	8) Cultural and creative products, ornaments, decorative lamps, screens
	9) It is both cultural, practical and interesting, and can show unique taste.
	10) It can be combined with comprehensive materials for innovation. It is best to separate production and design, and leave special things to professionals.

Note. Produced by researchers 2024

4.3.2 Analysis of expert interview results

Based on the results of different expert interviews, through descriptive, inductive and subjective analysis, the researchers came to a conclusion that design is an implicit element of Chinese iron painting manual practice and an indispensable component. It provides guidance for the subsequent design of Chinese iron painting design fusion works. The conclusions are as follows:

1) The characteristics of Chinese iron painting are unique craftsmanship and materials, and the aesthetics of Chinese painting, with line modeling, has a strong

cultural nature. Representative themes include landscapes, welcoming pine, horses, plum, orchid, bamboo, chrysanthemum, calligraphy and iron characters.

2) At present, Chinese iron painting as a whole does not meet the market demand of consumers, especially the consumption needs of young people.

3) Chinese iron painting products are facing serious homogeneity, lack of practical functions, and no artistry and design sense.

4) Chinese iron painting needs to be improved in product modeling, functionality, subject matter, materials and mounting forms.

5) Design fusion is mainly positive, promoting the inheritance and popularity of Chinese iron painting, enriching subject matter and product form, promoting sales, and increasing economic benefits.

6) Design is very important for the market development of Chinese iron painting. It is the basis and reference for craftsmen to make it. Chinese iron painting needs the intervention of design under the diversified consumer demand.

7) The subject matter of Chinese iron painting design fusion is recommended to be landscape, plants and flowers, and the theme has auspicious meaning or symbolic meaning.

8) It is recommended to integrate with lamps, ornaments, screens, public art, cultural and creative and home products.

9) Chinese iron painting design fusion products have artistry, design sense, craftsmanship, practicality, culture and fun, as well as emotionality and size specifications, easy to carry and convenient to use.

10) Regarding the fusion of Chinese iron painting and design, it is necessary to maintain its own craftsmanship and aesthetic characteristics, mainly to enhance practicality, combine with other materials, three-dimensional and block, such as fusion with lamps, and make it three-dimensional and abstract through new welding technology. Establish a close cooperative relationship between artists and craftsmen, stimulate the enthusiasm of craftsmen, explore regional cultural elements, and protect original intellectual property rights.

At present, Chinese iron painting attaches importance to the imitation of Chinese painting, emphasizes the artistry and aesthetics of iron painting works, and ignores the expansion of practical functional products. Practitioners have not changed their thinking to inherit and innovate Chinese iron painting from the perspective of design, and design is missing in Chinese iron painting. In the future, in the fusion of Chinese iron painting design, craftsmanship, traditional creation concepts and modern design concepts are inseparable. Unique craftsmanship and aesthetics are the core of the fusion of Chinese iron painting design, and also the core of ensuring the sustainability of Chinese iron painting.



Figure 79 Photo taken with Professor Wan Fubin during the interview
 Note. Photographed by researcher 2023



Figure 80 Demonstration of iron painting production during an interview with
 Chinese iron painting master Ling Xiaohua
 Note. Photographed by Xia Shuaiguo 2023



Figure 81 Interview with Shen Tao, Secretary General of China Iron Painting
 Association, and Yao Mingqi, Director of Arts and Crafts Department of Anhui
 University of Technology
 Note. Photographed by Xia Shuaiguo, 2023



Figure 82 Interview with Chu Jinxia, a national-level master of Chinese iron painting and national-level master of arts and crafts

Note. Photographed by Xia Huimei 2023

4.4 Case Study Results and Analysis

At present, there are few cases of creative design fusion of Chinese iron painting. Most of them are realized through cooperation with designers and painters. Chinese iron painting is integrated into modern design concepts and integrated with other art categories. The practicality and appreciation of the products have been improved to a certain extent. Among these design fusion cases, there are architectural space applications and public art, and more are iron painting cultural and creative products. The following will analyze them one by one.

4.4.1 Cases of Fusion of Chinese Iron Painting and Architectural Space Design

Case 1: Fusion of Iron Painting and Architectural Space.

This design case is to apply Chinese iron painting to the decoration of architectural space partitions. The building is the West Lake State Guesthouse in Hangzhou, China (the venue for the 2016 G20 Summit, where President Xi Jinping and President Obama met). The designer extracted and simplified the elements of Chinese landscape iron painting into 30 works, which were integrated into the architectural space. The partitions are hollow three-dimensional with lights installed inside. When the lights are on, the unique oriental aesthetics of Chinese iron painting are more evident. The landscape and decorative nature of Chinese iron painting carrier forms create architectural space, enhance its practical functions and cultural significance, deepen the information exchange between iron painting and people, and bring people closer to Chinese iron painting.



Figure 83 *The design fusion of Chinese iron painting and architectural space (Hangzhou G20 Summit Reception Hotel)*

Note. Provided by Li Ling 2023

Case 2: Fusion of iron painting and building interior entrance.

By combining iron paintings with the interior entrance, the contrast between different materials and colors is highlighted. At the same time, the hollow shielding effect conforms to the traditional aesthetic of the Chinese people and enhances the cultural nature of the home space.



Figure 84 *Chinese iron painting bamboo is used in indoor porch*

Note. Provided by Li Ling 2023

4.4.2 Case study of the fusion of Chinese iron painting and public art design

Case 1: Fusion of iron painting and bus stop design

This design case integrates Chinese iron painting with public road sign design. The designer applied orchids from Chinese iron painting to public road signs, making the public road sign stand ornamental and cultural, highlighting the durability of iron materials, and at the same time bringing iron painting into the public space of the city, highlighting the aesthetics of the city, and bringing people closer to Chinese iron painting. Chinese iron painting can be used as a landscape to open up new carriers and become a work with local characteristics (Zhu, 2022). This direct appropriation of

traditional Chinese iron painting themes only changes the picture frame into a road sign and moves Chinese iron painting from indoors to outdoors. It does not highlight the changes in the design to Chinese iron painting itself, and is insufficient in functionality.



Figure 85 *Fusion of Chinese iron painting and urban public road sign design*
Note. Provided by He Jun 2023

Case 2: Fusion of iron painting and sculpture design "Character Character-Pine"

This design case is a design fusion of Chinese iron painting and contemporary sculpture, which anthropomorphizes objects and vividly expresses the character of characters, giving new connotations to the natural object pine. By combining the three-dimensional production of pine trees in Chinese iron paintings with sculptural figures, the lines of Chinese iron paintings and the decent combination of sculptures express the beauty of nature and the iron spirit of pine, which is extremely oriental aesthetic and recognizable. It enables Chinese iron painting to enter the field of contemporary sculpture, from folk art to modern art, and expands the form and dissemination of Chinese iron painting, but lacks practical functions.



Figure 86 Fusion of Chinese iron painting and sculpture design
Note. provided by Li Wei 2023

Case 3: Fusion of iron painting and park sculpture design "Happy Family"

This Chinese iron painting design fusion work is a collaborative work of designers, artists, and Chinese iron painting craftsmen. Huizhou architecture is used as the spatial carrier of "home"; the shape and texture of the tree are made with the forging skills of Chinese iron painting; and the jubilant magpies nesting on the branches create vitality. The regular architectural space form is integrated with naturally grown trees, reflecting the "Happy Family" where natural ecology, home feelings and people coexist harmoniously. The work has a modern feel and cultural significance, and is a successful example of the fusion of Chinese iron painting design and public art, but the size and volume are too large, and the production cost is high, which is not suitable for general consumers.



Figure 87 Chinese iron painting public art "Happy Family"
Note. Provided by Yang Yong 2023

4.4.3 Cases of the fusion of Chinese iron painting and cultural and creative product design

Case 1: Iron painting cultural and creative product "Pendant"

This design fusion case is a pendant, which designs the elements of Chinese Hui style architecture to form a symbolic visual image and is completed through iron

painting technology. The pendant product is suitable for hanging cars, doors, windows and refrigerators. The designed iron painting visual image is more concise and abstract, which not only reduces the production time, but also improves the aesthetics and functionality, and is more in line with the purchasing needs of young consumers. The feasibility of combining Chinese iron painting with cultural and creative products is very high, which can not only promote the inheritance and development of Chinese iron painting art, but also inject new creativity and vitality into the cultural and creative market (Tao, 2024). Through design fusion, the form and function of iron painting pendants can be enriched, and they can be used for curtain hooks, fan pendants, car pendants, door and window decorations, etc.



Figure 88 *Fusion of Chinese iron painting and cultural and creative product pendant design*

Note provided by Ren Weijian 2023

Case 2: Iron painting cultural and creative product "Pen Holder"

This design case applies Chinese iron painting to the design of decorative table screens and pen holders, which is decorative, artistic and practical. This design case won the gold medal in the China Tourism Cultural and Creative Product Design Competition. The dragon head table screen incorporates three-dimensional Chinese iron painting bamboo and Taihu stone, which not only conveys rich cultural connotations, but also has a unique visual beauty. The pen holder uses traditional landscapes and calligraphy in Chinese iron paintings, highlighting practicality and culture. This design can be extended to lamp design. Table screens and pen holders are items that Chinese literati like. Integrating the 350-year-old Chinese iron painting into them makes the cultural and aesthetic characteristics of the table screens and pen holders more vivid, while highlighting the unique taste of the user.



Figure 89 Chinese iron painting tourism cultural and creative products table screen and pen holder

Note. Provided by Gao Wenqing 2023

Case 3: Iron painting cultural and creative product ornaments "A Safe Journey"

This design case is to apply Chinese iron painting to home decoration ornaments. The animals in Chinese iron painting are made into three-dimensional ornaments and integrated into the decorative ornaments. The texture of iron and wood conveys a modern aesthetic. The application of Chinese iron painting in the home needs to learn from traditional Chinese iron painting and use modern design composition techniques, which is the main direction of exploration and experimentation (Dong & Lu, 2011). The fusion of Chinese iron painting and home cultural and creative design needs to break through the limitations of traditional decorative paintings, and use Chinese iron painting partially by changing the form to reduce production time and production costs. This method will help Chinese iron painting enter the decoration of home and office space.



Figure 90 Fusion of Chinese iron painting and home cultural and creative ornaments
Note. Provided by Gao Wenqing 2023

Case 4: Iron painting cultural and creative product ornament "Cold Plum"

This Chinese iron painting ornament combines the plum blossom in Chinese iron painting with ceramic geometric bodies, and uses iron glaze to present it. It won the silver award in the 2024 "Wuhu Youli" cultural and creative product design

competition. The vigorous branches of the plum blossom are heated and forged with iron materials, presenting the traditional Chinese doctrine of moderation with the iron bones of the plum blossom that is not afraid of the severe cold and the fragrance of the plum blossom. The combination of iron and ceramics in the work presents a metallic texture with a modern design sense, which is suitable for the display of home life and office space. The size and specifications are suitable, and it can be displayed alone or in multiple combinations, which is easy to carry and use.



Figure 91 Cultural and creative product ornaments combining Chinese iron painting and ceramics

Note. Provided by Xing Houfan 2024

Case 5: Iron painting cultural and creative product lamp "Plum, Orchid, Bamboo and Chrysanthemum"

This Chinese iron painting lamp was designed by Associate Professor Qian Tao of Anhui University of Technology and won the gold medal in the 2023 Yangtze River Delta Creative Product Design Competition. The plum, orchid, bamboo and chrysanthemum in Chinese iron painting are integrated with lamps to achieve a three-dimensional presentation of Chinese iron painting. It is both a lamp and a decoration, full of the simple characteristics of Chinese aesthetics, and realizes the unity of function and art. This design application is only a three-dimensional presentation of the original Chinese iron painting works, lacking innovative design of the object of expression, and is a redesign of an updated form of expression.



Figure 92 *Design fusion of Chinese iron painting and home decoration lamps*
 Note. provided by Qian Tao 2023

This series of lamp cultural and creative design cases applies Chinese iron painting to home lighting, so that the lamps not only have the function of lighting at night, but also increase the artistry, decorativeness and functionality. The three-dimensional presentation of Chinese iron painting is one of its innovative directions. It can be integrated with various forms of lamp design, such as chandeliers, wall lamps, downlights, table lamps, etc., giving it a sense of fashion, artistry and culture. Such a design can promote Chinese iron painting into the lives of the general public and make the consumer group of Chinese iron painting more diverse and huge.

Case 6: Iron painting cultural and creative product ornament "Flower Vase"



Figure 93 *Flower vase combining iron painting and ceramics*
 Note. Provided by Chu Jinxia 2023

The above picture is the iron painting of flower vessels. A is a combination of iron painting orchid and ceramics, B is a combination of iron painting landscape and ceramics, C is a combination of iron painting chrysanthemum and ceramics, and D is a combination of iron painting plum blossom and ceramics. The four iron paintings are combined with white ceramics to form a new shape. The black and white of the

material gives the iron painting a new aesthetic connotation and also has practical functions (large picture in Appendix 1).

This cultural and creative product combines the three-dimensional presentation of iron painting with ceramics. The black of iron painting and the white of ceramics form a sharp contrast, breaking through the original semi-three-dimensional form of iron painting, and the shape is refreshing. This series of works can not only be appreciated but also have the practicality of flower arrangement.

The design of Chinese iron painting integrates product design cases with diverse cultural and artistic characteristics, highlighting the importance and application value of traditional cultural elements in modern product design. At the same time, it also introduces new concepts and methods for the inheritance and promotion of Chinese iron painting. The fusion of Chinese iron painting and architectural space design requires the joint efforts of architects, iron painting craftsmen and consumers. Good design determines the beauty and artistry of the fusion of Chinese iron painting and architectural space. This fusion is not only the refinement of Chinese iron painting art symbols, but also the extension and inheritance of local traditional art spirit. The wide range of architectural space design provides a broad design idea for the application of Chinese iron painting in architecture, breaking through the limitations of the flatness of Chinese iron painting to the greatest extent, and giving it a new and unique vitality. Because the use of architectural space needs to consider the cultural level and economic ability of consumers, there is no universal market demand.

Chinese iron painting is integrated with public art. Chinese iron painting has a strong visual impact due to its unique material texture and color. The characteristics of the material make it not afraid of strong light and rain. The hard characteristics can increase functionality in environmental facilities, such as landscape lamps. It not only protects the bulbs well, but also increases the decorative aesthetics because of its artistic nature. Incorporating Chinese iron painting into urban parks, road green belts, road signs, etc. can strengthen citizens' cognition of Chinese iron painting and attract the attention of outsiders to Chinese iron painting. Chinese iron painting uses Chinese painting as a blueprint to express iron. In the past, due to the limitations of welding equipment and technology, there were few three-dimensional products. Now, with the use of electric welders and high-power spot welders, Chinese iron painting can produce large-scale three-dimensional works, making it possible to integrate with contemporary sculptures. In modern Chinese society, people have certain cognitive limitations on contemporary art, and public artworks are generally large in size and expensive, so there is no broad market demand.

Chinese iron painting is integrated with cultural and creative design. Chinese iron painting has both delicate and rough aesthetic characteristics, and the characteristics of hand-made production give cultural and creative products more humanistic care. On the one hand, it is necessary to transform the form, break through the limitations of traditional decorative paintings, and try to develop some daily products that are small in size, easy to carry, and close to people's lives. On the other hand, simplify and update the production process, save production time and technical difficulty, introduce machines for production in appropriate links, reduce costs and meet the production needs of products under commodity economy conditions. Chinese iron painting has inherent advantages. Because it is a painting, it can be hung in the room for decoration, but this simple use can no longer meet people's aesthetic

requirements. It is necessary to change its form to make it more modern and suitable for home decoration in modern architectural decoration. It is also necessary to consider practical, functional, cultural and emotional expressions in order to be recognized by people. Home cultural and creative products have become indispensable items for every family. To develop products suitable for modern home decoration, it is necessary to comply with the design principles of "culture, artistry, decoration, practicality, commemoration, and portability". Cultural and creative products are developing rapidly in China. Because of their small size, beautiful appearance, and easy to carry, they have certain practicality and strong market demand and universality.

In summary, the fusion of Chinese iron painting with architectural space design, public art design, and cultural and creative product design can refine and absorb the elements and forms of expression of Chinese iron painting art, making it richer and more specific, forming a series of design concepts such as stylization, three-dimensionalization, and spatialization, which meet the market demand. Chinese iron painting should not simply struggle in traditional craft paintings, but needs to combine the aesthetics of the times and people's life needs, and rely on design for innovation. The above design cases mainly use elements such as plants, flowers, animals, and architecture, and appropriately add certain practical functions. The future demand for cultural and creative product design in China is the most common and urgent, which meets the aesthetic and consumption needs of today's young consumers, can promote the productive protection and inheritance of Chinese iron painting, and should be the main direction of the fusion and innovation of Chinese iron painting design.

Phase II: Design Practice 1

4.5 Iron Painting Inheritance and Innovation Design Workshop

4.5.1 Workshop Process

Based on the results of research data analysis, on the basis of cultural level theory and emotional level theory, the innovative design of Chinese iron painting is carried out through the "Contemporary Inheritance and Innovation Design Workshop of Iron Painting" to achieve the design goal centered on user needs. The following is the design process:

1) Sharing of iron painting related knowledge and works

The researcher informed the volunteers of the purpose and requirements of the workshop, shared the data results of the previous survey and research on Chinese iron painting and the collected Chinese iron painting cases with the volunteers in the form of ppt, and asked the volunteers to design innovative iron painting products based on the knowledge they learned about iron painting and their personal interests and hobbies.

2) Design expression and production of innovative iron painting products.

After sharing the knowledge about Chinese iron painting, the volunteers were taught the skills of Chinese iron painting production, and were required to master the use of spot welding machines, learn how to use tools such as hammers and pliers, and complete the production according to their own designs. During this period, the researcher provided design guidance and production assistance.



Figure 94 Workshop scene
Note. Photographed by Xu Kaiyin 2024



Figure 95 Volunteer design and practice scene
Note. Photographed by Xu Kaiyin 2024

4.5.2 Workshop results

1) Volunteers' gains

The participating volunteers have a deeper understanding of Chinese iron painting, mastered the basic production methods of Chinese iron painting, learned how to use scissors, chisels, spot welders, pliers and hammers, and learned how to weld iron wires to assemble complete works. The volunteers realized the importance of tools for handicraft production, deeply felt the wisdom of their ancestors, and strengthened their love for traditional culture. Some volunteers' works won awards in the competition. Among them, 3 students chose Chinese iron painting as the topic of their graduation design and completed their works to obtain graduation qualifications.

Through the workshop, more young college students have enhanced their understanding of Chinese iron painting and promoted the inheritance and dissemination of Chinese iron painting in the contemporary era. They are like seeds that have been planted and I believe they will bear fruit in the near future.

2) Design practice results

Through the design and practice of the volunteers' workshops, 38 pieces or groups of works were completed. These works are based on personal understanding and preference of Chinese iron paintings, combined with modern design to make an attempt to innovate and inherit. Some works continue the form of traditional iron paintings.

Table 23 *Design Practice 1: Workshop Works*

Category and name	Picture	Contents
Traditional hanging painting: Welcoming Pine		Pine tree and rock elements
Traditional hanging painting: boating in the mountains and rivers		Landscape elements
Traditional hanging painting: Golden Crow chasing the sun		Landscape and bird elements
Traditional hanging paintings: Happy events come one after another		Persimmon and Magpie
Traditional hanging painting: Dancing Phoenix		Bird elements
Traditional hanging painting: auspicious lion		Animal elements
Traditional hanging painting: Fish every year		Fish and lotus elements

Decorative painting: the fragrance of flowers



Flower and fan elements

Traditional hanging painting: Golden dragon delivering treasures



Cartoon dragon element

Traditional hanging paintings: Thinking



Landscape, pagoda and human figures

Traditional hanging painting: Bamboo Rhythm



Bamboo and Architecture

Traditional hanging painting: Drum music



Bronze drum elements

Hanging painting: Harmony and beauty



Lotus element

Lighting: Landscape woven light



Architectural and landscape elements, combined with weaving techniques, are practical.

Lighting: Fairy Tale World



Plant and animal elements,
practical

Ornaments: Natural
Harmony



Natural plant elements

Decoration:
Chrysanthemum



Floral Elements

Decoration: Bamboo



Floral Elements

Ornament: Orchid



Floral Elements

Ornament: Plum blossom



Floral Elements

Decoration: Beautiful
Guangxi



Landscape, snail rice
noodle, auspicious cloud
elements

Ornament: Ambition of
Pine and Cypress



Plant pine trees and rock
elements

Decoration: Dragon Dance



Folk dragon dance elements

Decoration: Guangxi's
beautiful scenery is like
wine



Natural landscape and
mountains

Ornaments: Bamboo














Plant bamboo

Decoration: Mountain
Shadow



Landscape elements

Decoration: Impression of Guangxi		Folk hydrangea, terraced fields, landscape elements
Decoration: Fan		Daily necessities fan
Ornaments: Natural Growth		Plant elements grass
Decoration: Dong Village		Architectural elements
Ornaments: Tribute to the Artist		Character elements
Ornament: Butterfly		Butterfly and floral elements
Decoration: Fortune		Plant leaves and animal deer elements

Decoration: Hydrangea		Folk culture and landscape elements
Decoration: Residential House		Architectural elements
Daily necessities: Flowers bloom and have fragrance		Floral elements, combined with weaving techniques, are practical
Daily necessities: landscape flower vase		The flower vase, which combines landscape elements with weaving techniques, is practical.

Note. Produced by researchers 2024

The design practice results in the table above mainly include traditional hanging paintings, ornaments, lamps and daily utensils. Among them, ornaments are the majority. Volunteers prefer three-dimensional iron paintings, and some combine weaving crafts for cross-border innovation. In terms of themes and elements, most of them are natural landscapes, flowers, birds, animals and architecture, etc. Some focus on the practicality and richness of colors of the works, and the colors are mainly black. Large pictures of the above workshop iron paintings are in Attachment 2.

4.5.3 Workshop Achievement Exhibition

1) Exhibition poster and invitation letter

The exhibition will be held from June 25 to 27, 2024 at Yulin Normal University, Yulin City, Guangxi.



Figure 96 Exhibition poster
Note. Qin Wei Design 2024



Figure 97 Exhibition hall main poster
Note. Qinwei Design 2024



Figure 98 Exhibition invitation and exhibition preface
Note. Qin Wei Design 2024

1) Exhibition site

The exhibition opened at 9:00 am on June 25, 2024, and experts from different fields were invited to hold a seminar to evaluate and give suggestions on the works.



Figure 99 Exhibition site
Photographed by Pang Guobin 2024



Figure 100 News report from Yulin Normal University website
Note. <https://www.ylu.edu.cn/info/1042/51055.htm> 2024

4.5.4 Expert evaluation

1) Academic seminar

Expert evaluation is conducted through seminars where each speaker makes comments one by one, followed by collation, analysis and summary, and finally forming evaluation results and recommendations.



Figure 101 *Academic seminar on contemporary inheritance and innovation of iron painting craft*

Note. Photographed by Pang Guobin 2024



Figure 102 *Experts speaking at the seminar*
Note. Photographed by Pang Guobin 2024

Table 24 *Summary of Expert Comments from the Semina*

field of study	Expert's name and title	Summary
Research on Intangible Cultural Heritage and Traditional Culture	Dr. Xinyuan Cheng, Professor	Through the workshop, young college students learned about Chinese iron painting and mastered the basic production process. They know how to design and make, and can better inherit the traditional craftsmanship and express the preferences of young people. The works include traditional landscapes, animals, flowers and birds, and folk life. In terms of expression, they are not just hanging paintings, but more of ornaments, and some are daily utensils. How to make traditional crafts enter life is the core of effective inheritance. I hope to increase the practicality of the works and meet people's real life needs. I personally like the works that combine lines and surfaces and abstract works in the exhibition, such as bamboo rhyme, natural harmony, mountain shadows, etc.
Chinese iron painting production	Yu Yang, master of iron painting	The works are refreshing to see. The works that young college students like and design are different from traditional Chinese iron paintings. Most of these works are three-dimensional, no longer in a flat state. The introduction of traditional crafts into colleges and



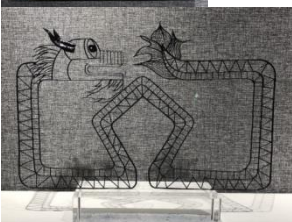
	<p>universities is a good way to pass on, especially to express what you like through works. I personally prefer the four three-dimensional works of plum, orchid, bamboo and chrysanthemum, as well as dragon dance and thinking, which express traditional culture in a new form through the fusion of design. The lack of art and design among practitioners in the iron painting industry as a whole has led to fewer innovative design products. It is recommended that the works maintain the characteristic elements on the basis of maintaining the iron painting production skills.</p>
<p>Cultural and creative product design</p>	<p>Professor Zhang Zhong</p> <p>From the perspective of cultural and creative products, most of the exhibition works are cultural and creative, such as Bamboo Rhythm, Dragon Dance, Pine and Cypress Ambition, Mountain Shadow, etc. Some works are too large in size and are not suitable for young consumers. The traditional hanging painting form does not meet the aesthetic needs of modern life. Therefore, ornaments, lamps and utensils are potential directions for innovation in Chinese iron paintings.</p>
<p>Traditional craft art design</p>	<p>Lin Benyao, inheritor of fabric painting</p> <p>The exhibition presents the traditional and modern aspects of Chinese iron painting. The traditional iron painting works have better subject matter, such as phoenix, lion, magpie, etc. Although they are traditional, they also have certain innovations. I personally like the innovative works such as the fairy tale world, which designs mushroom shapes as lamps, and also has characters and animals in it, telling a story. The exhibition presents the aesthetic preferences of young college students. It would be better if it can increase practicality, promote product sales, and increase the economic income of arts and crafts practitioners.</p>
<p>Interior Home Product Design</p>	<p>Dr. Wei Xuefei, Professor</p> <p>Modern home furnishing products are very rich in materials and forms, and consumers choose products that are unique, cultural, and emotional. The exhibition works present a new expression of traditional culture, making the commonly seen hydrangeas, dragon dances, and landscapes unique through iron paintings. As a cultural and creative home furnishing product, it is necessary to control prices and ensure production efficiency. The design simplifies the form of the object, and by combining other materials, it gives iron a hard and soft texture. Products that combine iron paintings with other materials should be the direction of development, and</p>




it is necessary to appropriately increase the decorative aesthetics and practical functions of iron paintings.

Note. produced by researchers 2024

Analysis and suggestions of expert evaluation results. The works in the exhibition of contemporary inheritance and innovative design achievements of Chinese iron paintings include both traditional and modern forms. The works are rich and diverse, giving people a refreshing feeling. The disadvantages are that they are mainly used as decorative aesthetics, lack practicality, and are not combined with modern technology. Experts suggest increasing practicality and strengthening the characteristic elements of Chinese iron paintings, and designing and producing iron painting products with appropriate size specifications to meet the aesthetic and life needs of modern people. Landscape elements are the consensus formed by experts. For Chinese people, they have emotional and cultural recognition. The rich landscape shapes can meet the preferences of different consumers. At the same time, landscape elements are also one of the most important objects of expression of Chinese iron paintings. Through the fusion of modern design, adding practical functions, and using Chinese iron painting craftsmanship, it should be the most ideal cultural and creative product.

Table 25 Works with high recognition from experts and can be used as references for further design

Category of Works	Title of Work	Works Pictures
Ornaments	Natural Harmony	
Hanging paintings	Bamboo Rhythm	
Ornaments	Dragon Dance	

Lighting	Fairy Tale World	
Ornaments	Ambition of Pine and Cypress	
Artifacts	Flowers bloom and smell good	
Hanging paintings	Think	
Ornaments	Plum, Orchid, Bamboo and Chrysanthemum	

Note. Produced by researchers 2024 (The larger image is in Appendix 2)

Phase 3: Design Practice 2

According to the results of research data analysis, Design Practice 1 and expert evaluation opinions, Design Practice 2 is carried out. Design Practice 2 uses the

representative "mountains and waters" in Chinese iron paintings as elements for design and production, emphasizing cultural, emotional, artistic and functional characteristics.

4.6 Design of a series of lamps in the modeling language of Chinese landscape painting

4.6.1 Analysis and design practice on mountains

1) The cultural significance of mountains

In traditional Chinese philosophy, first of all, mountains are a symbol of sacredness and destiny, the cosmic axis connecting heaven and earth, and a symbol of eternal life and fairyland. Secondly, mountains are the lofty realm of morality and spirit. Confucianism advocates that benevolent people enjoy mountains, Taoism pursues the natural inaction of mountains, and Zen Buddhism uses mountains to metaphorically understand the insight into the essence in the process of enlightenment. Seeing mountains is mountains, seeing mountains is not mountains, and seeing mountains is still mountains. Thirdly, mountains are the cultural image of seclusion and detachment, the source of art and aesthetics, and the spiritual core of landscape painting. Fourth, in Chinese Feng Shui, mountains are regarded as the backbone of the "dragon vein", which controls the luck of a place and embodies the wisdom of living in harmony with nature. Fifth, as a metaphor for political power, "river and mountain" refers to the regime. The Chinese people use "having a backer" to metaphorically represent the support of power behind them. This is derived from the stable pattern of "backing the mountain and facing the water" in Feng Shui, which means gathering power and fortune in real life. Finally, mountains embody environmental awareness, and the concept of "green water and green mountains are gold and silver mountains" transforms mountains from traditional images into symbols of ecological civilization.

In short, mountains are not only a natural geographical entity in Chinese culture, but also a profound spiritual symbol, carrying multiple connotations such as philosophy, religion, politics, and art. Its symbolic meaning runs through all levels of Chinese civilization and has become an important carrier of the national spirit. It connects heaven and man, secularity and transcendence, reality and ideals, and finally condenses into the ultimate pursuit of eternity, harmony and transcendence in Chinese civilization. This cultural gene still profoundly affects the spiritual world and value identity of the Chinese people.

2) Reference works and elements



Figure 103 *Reference elements*

Note. Collected by researchers 2024

The above picture is the inspiration source and reference work of Design Practice 2. It contains three works of Design Practice 1, traditional Chinese painting, contemporary fiber art, A Thousand Miles of Rivers and Mountains, and Guangxi Landscape. "A Thousand Miles of Rivers and Mountains" is a representative work in the history of Chinese landscape painting. It is a work of Song Dynasty painter Wang Ximeng more than 1,000 years ago and is now collected in the Palace Museum in Beijing. Guangxi landscape in China is known as the most beautiful landscape. Each mountain peak is independent and suitable for individual or combined expression.

3) Design sketch



Figure 104 *Iron painting lamp shade design sketch combination*

Note. Drawn by the researcher 2024



Figure 105 *Iron painting lamp shade design sketch*

Note. Drawn by the researcher 2024



Figure 106 Hand-painted effect of iron painting lamps

Note. Drawn by researchers 2024 (The larger image is in Appendix 3)

1) Production practice

The lampshade of the iron painting lamp was made by Zhang Zhenggui, a representative inheritor of Chinese iron painting. Through communication with iron painting craftsmen, the design draft was optimized and modified to make it conform to the production method of Chinese iron painting. During the production, each line of the mountain was made by traditional iron painting techniques, and the welding part was welded by modern welding equipment argon arc welding.



Figure 107 Revised diagram of the design draft

Note. Photographed by researcher 2025



Figure 108 *Iron painting craftsman Zhang Zhenggui is making iron paintings*
Note. Photographed by Ren Weijian 2025



Figure 109 *Communicating with iron painting craftsmen about their works*
Note. Photographed by Ren Weijian 2025



Figure 110 *Iron painting combination effect of the lampshade*
Note. Photographed by researcher 2025

Production of lamps.

There are two main ways to produce lamps. The color rotating lamps are purchased in the market, and the ordinary lamps are customized. The ordinary lamps are made of white acrylic, and the bulbs are LED lamp beads, which are energy-saving and durable. The shape of the lamp base is drawn by the actual object, and then drawn by COREDRAW software and input into the computer. The shape is cut out by the engraving machine, and then 5 cm high iron sheet is used for edging. The following pictures show the craftsmen who make lamps draw the shape according to the actual object and cut it by machine.



Figure 111 *The process of craftsmen making lamp bases*

Note. Photographed by researchers 2025

The lighting effect of ordinary lamps. The picture contains ten works, seven of which are real works for exhibition, and the other three are color experiments of gold, silver and green. Consumers can refer to the colors when ordering products.

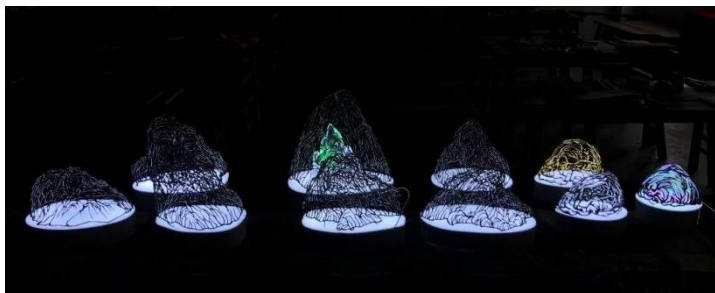
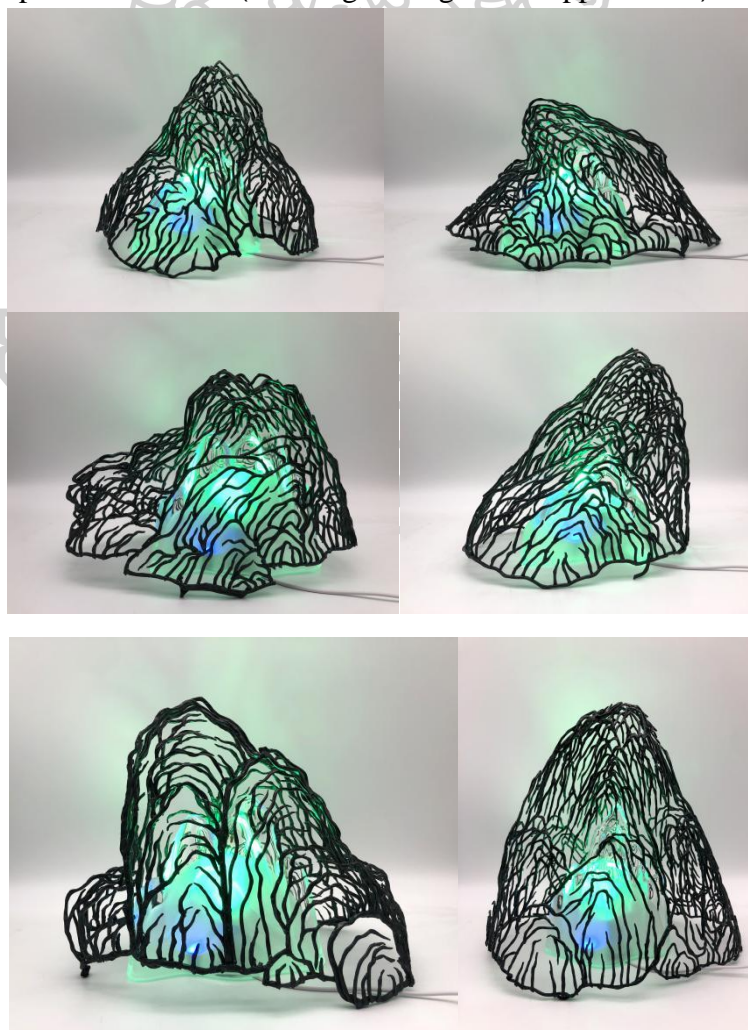


Figure 112 *The lighting effect of the iron painting landscape lamp*
Note. Photographed by researcher 2025

4.6.2 Design results

1) Lamps without base (The larger image is in Appendix 4) .



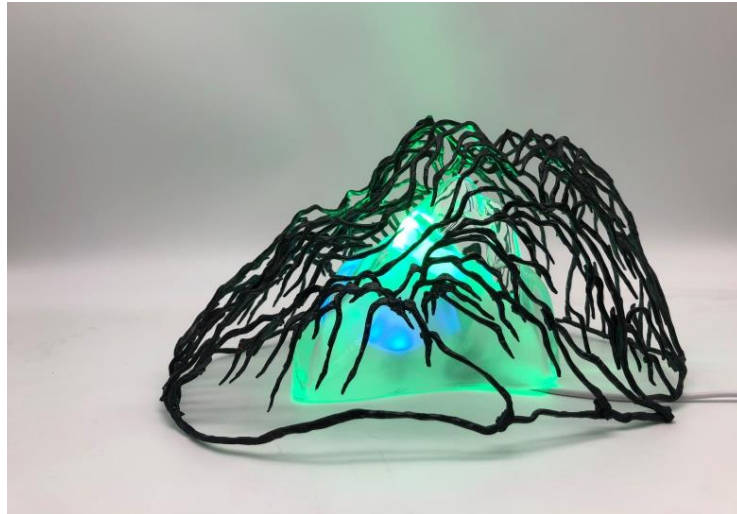


Figure 113 Green light effect without base
 Note. Photographed by researchers 2025

3) Conventional lamps (The larger image is in Appendix 5) .
 Conventional lamps mainly consist of two parts: lampshade and base.

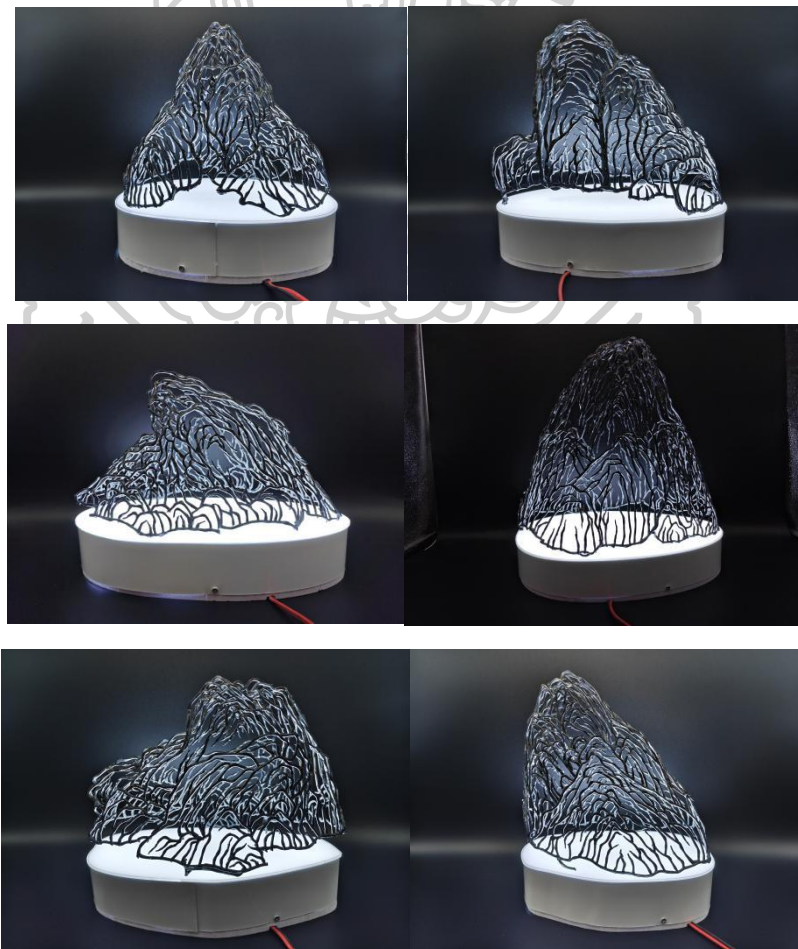




Figure 114 *Real shot of ordinary lamps lighting up*
 Note. Photographed by researchers 2025

1) Rotating color-changing model (The larger image is in Appendix 6) .

Remote control LED rotating lamp, 360-degree viewing. This series of lamps has five colors, can be controlled by remote control, can adjust the speed, can adjust the brightness, can adjust the light color, and can be charged or plugged in.



Figure 115 *Actual shot of the rotating and color-changing lamp*
 Note. Photographed by researchers 2025

4.6.3 Achievement Exhibition

1) Exhibition poster, preface, design and production instructions



Figure 116 Exhibition poster and preface
Note. Produced by researchers 2025

2) Exhibition site



Figure 117 Visitors experience at the exhibition site
Note. Photographed by Li Kezhan 2025



Figure 118 Researchers take a group photo in front of the exhibition works
Note. Photographed by Li Kezhan 2025

2) Media attention reports

Yulin Daily highly praised the exhibition works with the theme of "Chinese and Thai universities hold a joint exhibition of iron painting lamps to show the beauty of Guangxi's mountains and rivers".



中泰高校举行铁画灯具作品联展 铁画工艺展现广西山水之美

本报讯(记者 党雪梅)近日,由玉林师范学院美术与设计学院携手泰国艺术大学装饰艺术学院联合主办的“铁笔绘山水·灯影话千秋——铁画灯具创新设计作品展”在安徽工程大学开展。

据策展人玉林师范学院教师丁远亮介绍,展览的作品由玉林师范学院美术与设计学院师生设计,泰国艺术大学 Watanapun Knutasoen 博士、副教授指导,作品以广西奇山文化为灵感,以“铁”为骨、“山水”为魂,诠释了“刚柔并济、生生不息”的广西精神。同时,今年是中泰建交 50 周年,中国与泰国设计师立足不同文化和设计理念的合作,展现了中泰文化的交融与共鸣。

近年来,玉林师范学院美术与设计学院依托广西传统工艺工作站,深入挖掘传统工艺资源,推动其创造性转化。

Figure 119 Picture published in Yulin Daily on March 10, 2025
Note. Photographed by researchers 2025

4.6.4 Expert evaluation

1) Experts viewing and experiencing the works



Figure 120 Experts viewing the exhibition and experiencing the products
Note. Photographed by Li Kezhan 2025




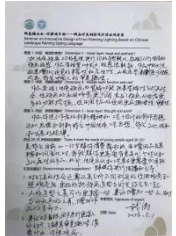
2) Workshop and its results



Figure 121 Scene from the expert seminar
Note. Photographed by Ren Weijian 2025

The picture above is an expert seminar hosted by Associate Professor Yao Mingqi. Each expert evaluated the works from five aspects. After the evaluation, a group discussion was held. Finally, each expert wrote his or her opinions in the form of text on the expert evaluation document and signed for confirmation.

Table 26 Summary of expert workshop assessment perspectives

Expert's name and title	Expert Photos	Expert opinion summary	Expert opinion text version
<p>Yao Mingqi, Associate Professor</p>		<ol style="list-style-type: none"> 1. Visual and aesthetic: The form is aesthetically groundbreaking, and the combination of lighting increases practicality and visual beauty. The softness of the iron lines and the hard texture of iron give people a unique aesthetic feeling. 2. Function and use: It has decorative and practical functions, and the color of the lamp can be adjusted, which is more suitable for home interior use. It can be combined with the culture of burning incense, and it has a certain fun to use it alone or in combination. 3. Thought and spirit: Landscape is the core of the Chinese spirit. Landscape lamps bring poetry to the lives of urban people, causing people to pay attention to ecology and pay attention to high-quality life. 4. Group needs: It meets the needs of young people aged 20-35, and the age group can be expanded to 45 years old. Middle-aged people prefer products that combine tradition and modernity. 5. Suggestion: There is only mountain without water, and the element of water is appropriately added. Water represents wealth, and mountain represents power and momentum. 	
<p>Qian Tao, Associate Professor</p>		<ol style="list-style-type: none"> 1. Vision and aesthetics: The two-dimensional iron painting is transformed into three-dimensional, breaking the traditional iron painting vision and novel in form; the lighting increases the richness and layering of the vision, and the shape of the mountain comes from traditional painting, which conforms to the aesthetic pursuit of the Chinese people 2. Function and use: It breaks through the limitations of the decorative function of iron painting, and combines with lamps to expand the application 	

scenarios of iron painting, inspiring iron painting practitioners to explore more functions of iron painting. The use of iron painting daily lamps is more interesting.

3. Thought and spirit: It embodies the idea of the fusion of craftsmanship and design. This idea is also the idea of Chinese traditional craft creation, which conforms to the law of cultural inheritance and development.

4. Group needs: It meets the needs of the 20-35-year-old group. Young groups like differentiated, personalized and cultural products.

5. Suggestions: It is necessary to analyze the use scenarios and lighting brightness of different lamps; the shape of the mountain can be richer, and the elements of landscape painting such as trees and clouds can be appropriately added; a deeper analysis of the aesthetics and consumption concepts of young consumer groups.

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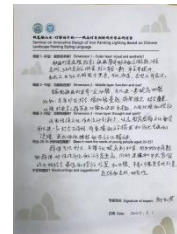
1. Visual and aesthetic: Iron painting lamps have changed the form of traditional iron painting planes, are unique, can be appreciated 360 degrees, and enhance aesthetics. A variety of color choices are better.

2. Function and use: The practical function of iron painting has been improved, and it can be combined with minerals and aromatherapy. The function meets the needs of more people, while increasing fun and use in different environments.

3. Thought and spirit: Using traditional culture as a design innovation point reflects cultural confidence and reflects the spirit of oriental culture.

4. Group needs: The age can be raised to 60 years old, and the elderly group has a higher degree of recognition of traditional culture.

5.Suggestion: It can be combined with Zhongshan furniture. Young people



Gao Wenqing,
professor-level
arts and crafts
artist



prefer creativeness with a strong sense of innovation.

1. Visual and aesthetic: It has the visual impact of thousands of miles of rivers and mountains. In terms of form, it breaks through the traditional iron painting plane and semi-relief form and enters the expression of three-dimensional space landscape. It integrates traditional culture into modern aesthetics, organically integrates materials, craftsmanship and design, and has a breakthrough iron painting aesthetic.

2. Function and use: It can be used in cultural and creative spaces and folk wall lamps, and is decorative and storytelling. Combination use is interesting.

3. Thought and spirit: It enhances people's thinking about life and spiritual pursuit, breaks the original spiritual paradigm of iron painting, and reconstructs traditional classic culture.

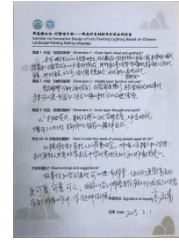
4. Group needs: It is more in line with the consumption concept of young people today. Contemporary young people pay attention to the experience of excellent traditional culture and traditional crafts.

5. Suggestions: The storytelling and spatiality can be further expanded to make people feel cute, and the original design inspires the iron painting industry to learn the beauty of design.

1. Visual and aesthetics: The design concept is correct, the visual aesthetics is good, and it meets the needs of modern life. The craftsmanship, design and color can be improved.

2. Function and use: The usability of iron painting is the key, and the function and use of the series of landscape lamps are positively affirmed.

3. Thought and spirit: Iron bones and mountains and rivers are the ideological core of the work, and mountains and



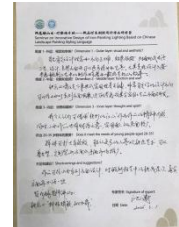
Shen Tao,
Senior Arts and
Crafts Artist



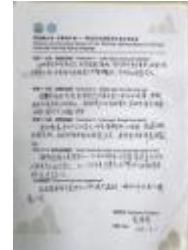
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3. Thought and spirit: Iron bones and mountains and rivers are the ideological core of the work, and mountains and



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rivers also mean wealth, and the cultural symbolism is profound.

4. Consumer group: The age positioning of the consumer group should be expanded, starting from mass products and customization.

5. Suggestions: Process the density and virtuality of the lines of the landscape.

1. Visual and aesthetic: Chinese iron painting lamps designed with landscape elements and lamps have good visual aesthetics and conform to modern aesthetics.

2. Function and use: It has both decorative and practical functions. The change of light color, single or combined use, provides consumers with a variety of choices and increases the fun of use

3. Thought and spirit: It embodies the traditional creation thought, feels the core of landscape thought, and has the symbol of wealth and eternity.

4. Consumer group: It should be expanded, and it is more appropriate to target 30-50 years old. This group likes the symbolic meaning and personal taste of the object lock.

5.Suggestion: Choose a representative mountain for performance, which can increase emotional identification.

Note. Researcher produced 2025

The above table is the evaluation opinions of experts from different research fields on the works. First, the evaluation is based on the three levels involved in the cultural level theory and the emotional level theory, including the outer visual and aesthetic, the middle-level function and use experience, and the inner-level thoughts and spirit. The second is from the market demand, whether it meets the needs of the 20-35-year-old group, and finally the shortcomings and suggestions. The experts' point of view is that the product has achieved innovation, and the outer visual and aesthetic, the middle-level function and use experience, and the inner-level thoughts and spirit have been recognized by experts, and positive evaluations have been given, and suggestions for improvement have been put forward, such as combining with the burning incense of the incense culture to create a cloud-filled effect. Experts believe that the series of Chinese iron painting lamps meet the consumption needs of the 20-35-year-old group, and at the same time suggest that the age limit of the consumer group should be expanded. The middle-aged and elderly groups love traditional

culture more, and they like products with characteristics and symbolic meanings. Experts also suggest that the shape of the mountain should be richer, adding elements such as trees, water, houses and clouds to increase the vitality of the product, and at the same time adjust the brightness of the light according to the usage scenario.



Figure 122 Researchers and experts take a group photo
Note. Photographed by Li Kezhan, 2025

4.6.5 Consumer Questionnaire Evaluation

The evaluation questionnaire is a unique tool designed to evaluate and analyze multiple key elements of a specific product or service. Visitors can scan the QR code of the form with their mobile phones, fill in the online form, and collect the form data. Five levels are set according to the Likert scale, including the consumer's gender, age, educational background, and occupation. Consumer satisfaction analysis is conducted from four aspects: aesthetics, function, culture, purchase and overall satisfaction of cultural and creative products.

Table 27 User information for filling out the questionnaire

Category	Options	Frequency	Percentage
Gender	Male	121	32.79
	Female	248	67.21
Age	Under 20 years old	151	40.92
	20-35 years old	204	55.28
	36-45 years old	2	0.54
	Over 46 years old	12	3.26
Education	Junior high school	4	1.08
	High school	23	6.23
	Associate or Bachelor's degree	293	79.4
	Graduate students and above	49	13.28
Profession	Enterprise personnel	21	5.69
	Freelancer	26	7.05
	Public institutions and civil servants	35	9.49

Student	285	77.24
Retirees	2	0.54

Note. The researcher prepared it based on the questionnaire statistics 2025

As can be seen from Table 19, from the above table: From the perspective of gender distribution, the samples are mostly "female", with a total of 248.0, accounting for 67.21%. The proportion of male samples is 32.79%, and the proportion of "20-35 years old" is 55.28%; in terms of education, the proportion of "junior college or undergraduate" is the highest, at 79.4%; in terms of occupation, "student" accounts for the highest proportion, at 77.24%, mainly because the exhibition is held within the university, and the main visiting group is students.

Table 28 Results of User Satisfaction Analysis

Category	Questionnaire	Options	Frequency	Percentage	
Aesthetics	Creativity and uniqueness of Chinese iron painting lamps	Very dissatisfied	0	0%	
		Dissatisfied	22	5.96%	
		Generally satisfy	10	2.71%	
		Very satisfied	81	21.95%	
	Satisfaction with the material texture, craftsmanship and various colors of Chinese iron painting lamps	Very dissatisfied	0	0%	
		Dissatisfied	26	7.05%	
		Generally satisfy	13	3.52%	
		Very satisfied	102	27.64%	
	Satisfaction with the performance of traditional landscape theme elements in the Chinese Series lamps	Very dissatisfied	263	71.27%	
		Dissatisfied	1	0.27%	
		Generally satisfy	16	4.34%	
		Very satisfied	11	2.98%	
	Function	Satisfaction with the functions of China Iron Painting Series lamps	Very dissatisfied	75	20.33%
			Dissatisfied	266	72.09%
Generally satisfy			1	0.27%	
Very satisfied			15	4.07%	
The light and shadow feeling and fun satisfaction of the Chinese Iron Painting series lamps		Very dissatisfied	14	3.79%	
		Dissatisfied	77	20.87%	
		Generally satisfy	262	71%	
		Very satisfied	0	0%	
Chinese iron painting series lamps can be used alone or in combination or dynamically in a variety of ways to satisfy your needs		Very dissatisfied	16	4.34%	
		Dissatisfied	11	2.98%	
		Generally satisfy	75	20.33%	
		Very satisfied	267	72.36%	
		Very dissatisfied	0	0%	
		Dissatisfied	6	1.63%	
	Generally satisfy	15	4.07%		
	Very satisfied	78	21.14%		
		Very satisfied	270	73.17%	

Culture	The auspicious culture and symbolic meaning of the Chinese iron painting series lamps are satisfying.	Very dissatisfied	0	0%
		Dissatisfied	5	1.36%
		Generally satisfy	15	4.07%
		Satisfy	75	20.33%
		Very satisfied	274	74.25%
	The Chinese Iron Painting Series of Lamps Provokes Users to Think about Traditional Culture	Very dissatisfied	0	0%
		Dissatisfied	14	3.79%
		Generally satisfy	9	2.44%
		Satisfy	71	19.24%
		Very satisfied	275	74.53%
	Chinese iron painting design combines the idea of creation and traditional philosophical concepts	Very dissatisfied	0	0%
		Dissatisfied	8	3.79%
		Generally satisfy	14	2.17%
		Satisfy	81	21.95%
		Very satisfied	266	72.09%
Purchase and overall satisfaction	Regardless of economic factors, how satisfied are you with the purchase of this product?	Very dissatisfied	13	3.53%
		Dissatisfied	4	1.09%
		Generally satisfy	16	4.35%
		Satisfy	78	21.2%
		Very satisfied	257	69.84%
	Your overall satisfaction with the series of iron painting lamps	Very dissatisfied	2	0.54%
		Dissatisfied	14	3.8%
		Generally satisfy	13	3.53%
		Satisfy	76	20.65%
		Very satisfied	263	71.47%

Note. The researcher prepared it based on the questionnaire statistics 2025

The study found that based on the satisfaction survey data of the above target groups on the prototype works of Chinese iron painting design fusion, the following conclusions were drawn:

1) From the data of each group, the satisfaction of the tested users was high, and the "very satisfied" index reached more than 69.84%.

2) Among them, the overall satisfaction with the Chinese landscape modeling language series of iron painting lamps reached more than 71.47%; it proved that the research method and product model design process achieved the expected goals and completed the satisfaction test.

4.6.6 On-site reservation results

1) Product reservation rate

The on-site display lasted for 3 days, and it was expected that there would be 300 visitors (benchmark number Z). From the number of on-site sales reservations, a total of 46 valid reservations were received (valid reservation registration X), of which 32 were on-site reservations and 14 were reserved through WeChat. The product reservation rate (Y) was 15.3%. Since the exhibition location was on the university campus, it was mainly for students, and the restrictions on the economy and use environment led to a small number of reservations. According to the current market conversion rate of Chinese iron painting products provided by China Iron Painting

Secretary-General Shen Tao and Feilong Iron Painting Chairman Gao Wenqing, which ranges from 5% to 10%, the 15.3% conversion rate of this product shows that the product has been recognized by consumers. The iron painting lamps based on the modeling language of Chinese landscape painting are successful, meet consumer needs, and have market competitiveness.

The product reservation rate calculation formula is:

$$\text{Reservation rate } Y\% = \text{Effective reservation registration } X / \text{Benchmark quantity } (Z) \times 100\%.$$



Figure 123 Consumer product pre-registration
Note. Photographed by Li Kezhan 2025

Table 29 Product reservation data

Total quantity	Model Order Quantity	Number of color options	Number of styles to choose
46 items	T1 is 14 pieces, T2 is 5 pieces, T3 is 9 pieces, T4 is 12 pieces, T5 is 2 pieces, T6 is 3 pieces, and T7 is 1 pieces.	10 original colors, 15 black, 8 gold, turquoise, silver	17 regular items, 29 rotating color changing items

Note: The researchers made this based on the statistics of the reservation results.

According to the product reservation analysis in the table above, the most popular products are T1, T4, T3, T2, T6, T5 and T7. The colors that are more popular with consumers are black, turquoise, primary color, and gold. The styles are mainly rotating color-changing styles.

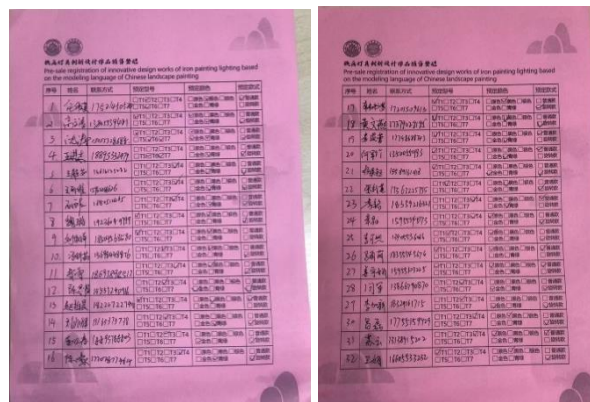


Figure 124 *product reservation registration information table*

Note. Photographed by researchers 2025

4.7 Summary

This chapter analyzes the data results of literature research, field surveys, expert interviews and case studies on the fusion of Chinese iron painting design.

The results of the literature research show that there is a lack of systematic theoretical and practical research on the fusion of Chinese iron painting with modern design. How to build a design fusion path based on the current situation of Chinese iron painting to enhance the contemporary aesthetics and practicality of products is a research gap. The potential opportunities in the future are mainly to increase the value of iron painting, enrich the form of products, strengthen product characteristics, attract young groups to join and promote long-term cooperation between craftsmen and designers through fusion with design.

The results of the field survey show that the classification of Chinese iron painting has limitations and should be multi-classified according to themes, content, forms and colors. The elements in Chinese iron painting are mainly animals, plants and people commonly seen in life, mostly traditional hanging paintings, expressing auspicious culture and natural themes. Chinese iron painting mainly refers to Chinese painting, mostly realistic expression, requiring superb production technology, emphasizing the artistic expression of the work and the technology of production, lacking modern design sense and product practicality. At present, enterprises generally do not attach importance to the design of Chinese iron paintings, and do not provide Chinese iron painting craftsmen with good tools and equipment and stable economic rewards, which leads to Chinese iron painting craftsmen not being active in innovation. The results of expert interviews show that Chinese iron paintings cannot meet the needs of consumers, especially the consumption needs of young people. Diversified consumer needs require the intervention of design, using elements such as landscapes, plants and flowers to express auspicious or symbolic themes. In the fusion of Chinese iron painting design, craftsmanship, traditional creation concepts and modern design concepts are inseparable. Unique craftsmanship and aesthetics are the core of the fusion of Chinese iron painting design and the core of ensuring the sustainability of Chinese iron painting.

The results of case studies show that the fusion of Chinese iron painting with architectural space design, public art design and cultural and creative product design can extract and absorb the elements and forms of Chinese iron painting art, making it richer and more specific, forming a series of design concepts such as stylization, three-dimensionalization and spatialization. Chinese iron painting needs to be innovatively designed in combination with the aesthetics of the times and people's life needs. At present, the demand for cultural and creative product design is the most common and urgent, which meets the aesthetic and consumption needs of today's young consumers, can promote the inheritance and development of Chinese iron painting, and is the main direction of innovation in the fusion of Chinese iron painting design.

Based on the above research data, we organized workshops. Through the design practice of the workshops, volunteers completed a batch of Chinese iron painting works, held the "Contemporary Inheritance and Innovative Design Achievements

Exhibition of Iron Painting Crafts", and held an academic seminar where experts commented on the works and gave suggestions. Based on the experts' suggestions, we carried out the "Series of Iron Painting Lamps Design Practices Based on the Language of Chinese Landscape Paintings", held exhibitions and expert seminars. Through expert evaluation, consumer questionnaire evaluation and on-site reservation results, it is shown that Chinese iron painting lamps have aesthetics, functions and culture, and meet market consumption needs.



CHAPTER5

RESEARCH RESULTS

This chapter introduces the conclusions, discussions and suggestions of the study. The objectives of this study are (1) to explore the core factors that promoted the development of Chinese iron painting in different historical periods. (2) to fusion Chinese iron painting with modern design and develop Chinese iron painting cultural and creative products that meet the needs of modern young consumer groups. (3) to explore the path of fusion of Chinese iron painting and design to promote cultural inheritance and protection. From the perspective of design fusion, the innovative design of Chinese iron painting is discussed. The research objectives are of great importance and application value to the contemporary inheritance and protection of Chinese iron painting. The creative transformation of traditional craftsmanship through design has attracted widespread attention from the society and has been recognized by scholars. For Chinese iron painting, some practitioners and entrepreneurs have realized the importance of design. However, due to the lack of effective implementation paths and financial support, the application of modern design in Chinese iron painting is still relatively small. The overall direction of Chinese iron painting is still to adhere to tradition and refer to the aesthetics and paradigms of Chinese painting for production. Some design practices have explored issues related to the innovative design of Chinese iron painting, but theoretical and systematic research on design fusion is still insufficient, which provides a basis for researchers' research. Through in-depth research on the fusion of Chinese iron painting design, this study has contributed to the innovative development and protection of Chinese traditional crafts, and hopes to provide valuable guidance for subsequent research and practical applications.

5.1 Conclusion

5.1.1 The core of the development of Chinese iron painting is the unity of art and skill

From the development history of Chinese iron painting and representative works, we can see that the fusion of craft practice and painting art is not only the reason for the formation of Chinese iron painting, but also the core factor that promotes its development in each period. Imitation of Chinese painting for re-creation is the biggest feature of Chinese iron painting. Painters provide drawings, and craftsmen use technology to turn drawings into iron paintings. This combination achieves the effect of one plus one greater than two in a certain period. With the development of the times, people's aesthetics have changed. The painting and flat iron paintings can no longer meet the needs of young consumer groups due to the monotony of form and lack of practical functions. For traditional exquisite iron painting products, painters are still needed to participate. While maintaining the inheritance of skills, their artistry is enhanced and positioned as high-end artworks.

The study found that the fusion of "skill" and "art" is the key factor in the development of Chinese iron painting. The development of Chinese iron painting in the new period requires the fusion of modern design. Now people's aesthetics are more diverse. Traditional iron paintings based on Chinese paintings can no longer

meet the needs of consumers. The addition of designers not only changes the form of Chinese iron painting, but also increases practical functions and fun to use. The case of innovative iron painting works shows that design has become very important in Chinese iron painting. Design can provide a source of innovation for Chinese iron painting, make it meet the needs of consumers, and realize productive protection and inheritance led by market demand.

Whether it is the participation of painters or designers, the unity of art and technology is the core of the development of Chinese iron painting. Without technology, it is impossible to realize the designed works, and without design, the performance of technology lacks value and meaning.

5.1.2 Design-fused iron painting landscape lamps meet the needs of young consumer groups

In Chinese iron painting landscape lamps, the most representative landscape elements in Chinese iron paintings are designed in a three-dimensional way. They are both decorative ornaments, public art and usable lamps. They can be combined into continuous mountain systems or used alone as independent mountains. The works are forged through the unique craftsmanship of Chinese iron paintings, realizing three-dimensional stereoscopic from two-dimensional level, and can be appreciated from multiple angles. Mountains have rich symbolic meanings and profound implications in Chinese culture. In ancient times, mountains were regarded as sacred beings. People believed that gods lived in the mountains and could bless people with peace and happiness. The height, majesty and stability of mountains symbolize people's noble character, lofty ambitions and firm will. For example, "high mountains are admired, and the beautiful scenery is admired" expresses people's admiration for noble character. In Feng Shui, mountains and water exist at the same time, symbolizing a solid backing and strong supporting force. They are also considered to be places where the positive energy of nature gathers, which can bring health, wealth, reputation and longevity to residents. The "backer" extended from the mountain is a symbol of auspicious culture and social status. In traditional culture, having a "backer" symbolizes the improvement of social status and increased chances of success. These cultural meanings not only reflect the importance of "mountains" in the selection of physical environments, but also reflect its supporting role in spirit and social status. They are an indispensable part of Chinese traditional culture, deeply rooted in Chinese culture and history, and affect people's thoughts, emotions and lifestyles.

Iron painting landscape lamps have changed the original form of Chinese iron paintings, and combined with lighting, they have given a richer visual aesthetic. The fusion practice of Chinese iron paintings and modern design provides a direction for solving the inheritance and innovation of Chinese iron paintings. The design realizes the re-examination and re-appreciation of the values contained in the craft production practice. Effective product design positioning will help to ensure the market demand for Chinese iron painting products. Designers identify and use the "landscape elements" in Chinese traditional culture to innovate and transform them with modern design concepts and methods. Through the production of Chinese iron painting crafts, the formal beauty, function and cultural value of iron painting crafts are enhanced, and while giving it artistic and practical functions, it conveys emotions and deep philosophical thoughts. After expert evaluation and consumer feedback, iron painting

landscape lamps have achieved innovation and meet the needs of young consumer groups.

5.1.3 The fusion of craftsmanship and design promotes the productive protection and inheritance of Chinese iron paintings

The Chinese iron painting design fusion involves two parts: craftsmanship and design. Only by combining the two can productive protection and inheritance be achieved. Craftsmanship is an essential skill for iron painting practitioners, and design is an ability they do not have or lack. Modern design can enhance the artistry and functionality of iron painting. As a visual aesthetic symbol, artistry can bring aesthetic experience to consumers and meet people's spiritual needs. Practicality is an important criterion for determining the quality of a product. Modern design emphasizes that products must have good functional uses. The market's popularity determines the future development of China's iron painting industry. Traditional Chinese iron painting pursues the artistic aesthetics of Chinese painting, ignoring people's practical needs, resulting in a decrease in people's willingness to buy. The organic fusion of "craftsmanship" and "design" can achieve economic benefits through consumers' purchasing experience while enhancing consumers' cultural identity, promoting the virtuous cycle of productive protection and inheritance of Chinese iron painting.

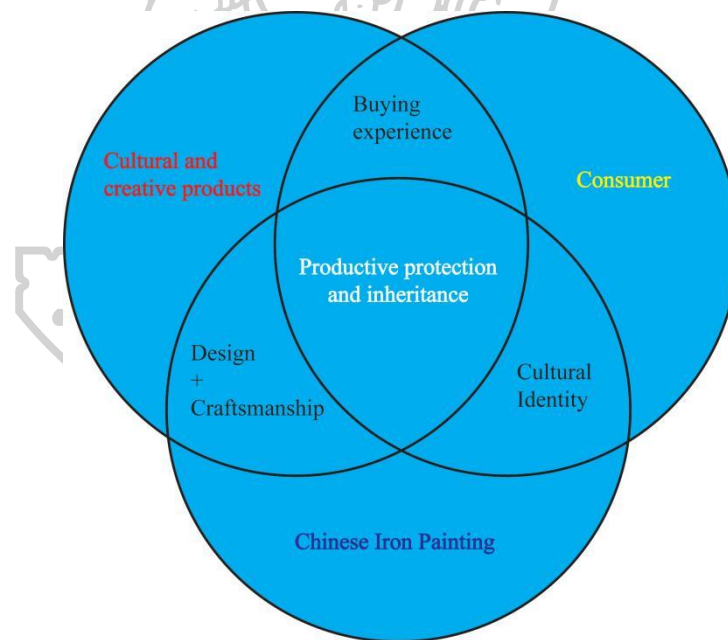


Figure 125 Chinese iron painting design integrates productive protection model
Note. Produced by researchers 2024

5.2 Discussion

5.2.1 Effect and significance of Chinese iron painting landscape lamps with design fusion

Through the fusion of design, first of all, Chinese iron painting has made a breakthrough in form, developing from a two-dimensional plane to a three-

dimensional space, presenting Chinese landscape painting in a new way, and combining it with lighting to give it a new visual beauty, which is more in line with modern aesthetics and consumer needs, and has been recognized by experts and consumers. Secondly, practical functions have been added. It is a decorative ornament during the day and a decorative lamp at night; it can be rotated, combined and adjusted in color, which increases the fun of use and emotional needs. Thirdly, in terms of cultural heritage and inner spirit, the traditional Chinese creation ideas have been inherited, such as the unity of man and nature, the use of creation, and the joy of beauty and goodness. The iron-forged texture conveys the spirit of iron bones and concerns about natural ecology. Finally, it brings new inspiration to the Chinese iron painting industry and practitioners, changing the decorative iron painting based on Chinese painting, and making the painting into a practical product through design fusion, which can meet the aesthetic pursuit of young people today, and bring new development vitality to the Chinese iron painting industry. However, how to effectively involve modern design in Chinese iron painting requires the government and enterprises to provide a platform for designers and craftsmen to achieve long-term and stable cooperation.

5.2.2 Difficulties in the fusion of iron painting landscape lamp design and technology

The design fusion of Chinese iron painting involves two aspects: designers and iron painting craftsmen, who are responsible for design and craftsmanship respectively.

1) Difficulty of design

Difficulty of design. How to draw a three-dimensional draft that can be made by iron painting craftsmen is difficult to meet, and can only be modified continuously during production. The researchers drew flat drafts and three-dimensional renderings, and the iron painting craftsmen made them based on their experience according to the three-dimensional renderings. Facts have proved that this method is not feasible. In the subsequent design, it is necessary to improve the design of iron painting landscape lamps, design and draw for different faces and distinguish them, so that viewers can feel the beauty of different mountain forms in different directions, and it is convenient for iron painting craftsmen to make them. Because of the difficulty of production, iron painting craftsmen are unwilling or unable to express what the designer wants. The best way is to make a model through clay sculpture, etc., and let the craftsmen make it according to the model. The existing design mainly considers the lampshade part of Chinese iron painting, ignoring the design of the lamp holder. The future design should consider the integration of the lampshade and the lamp holder, and make the lamp more flexible through the overall design.













Figure 126 *Planar and three-dimensional renderings of iron painting landscape lamps*

Note. Drawn by researchers 2024

2) Difficulty of the process

Difficulty of craftsmanship. Chinese iron paintings are suitable for making flat Chinese paintings with lines as the main feature. Spot welding machines for heating and welding iron paintings cannot be used to make three-dimensional works, and modern argon arc welding or electric welding is required for welding. After solving the tool problem, it is particularly important for iron painting craftsmen to understand the design draft. Many details are often ignored during production, resulting in poor presentation of design intent. As a product for the market, the best way is to design the drawings, use machines to cut materials, and then have craftsmen manually forge and weld and assemble them, which can improve production efficiency and reduce product prices while ensuring the quality.

Table 30 *Practical tools for making iron painting landscape lamps*

Tool	Hammer	Anvil	Pliers	Spot welding machine	Flamethrower
Picture					
Tool	Steel File	Upward chisel	Chisel	Scissors	TIG welding machine
Picture					

Note. Researcher produced 2025



Figure 127 *Production flow chart of iron painting landscape lamps*

Note. Researcher produced 2025

5.2.3 The design of iron painting landscape lamps is perfect

1) Production of lamp holders

At present, the base of iron painting landscape lamps is made of acrylic by workers who make advertising lamps. Since they are non-professional lamp makers, they cannot guarantee the fineness and have few choices in terms of lamp switches, bulbs and buckles. In the future, it is necessary to cooperate with professional lamp manufacturers to customize the lamps according to their size and shape, increase brightness, color and intelligent rotation control, etc., to make the lamps more delicate and beautiful.

2) Fixing of iron painting landscape lamps

Lamps are composed of lamp holders, bulbs, lampshades, switches, etc. There are three ways to fix the lamp holders and lampshades. The first is to use glue. After this fixation, it cannot be disassembled, which has problems in subsequent use and sanitation. The second is to use buckles, which is convenient for installation and disassembly. It is necessary to handle the relationship between the buckles and the lamp holders and lampshades to avoid affecting the overall appearance. The third method uses bolts. This method is relatively firm and requires special tools for installation and disassembly. Overall, buckle and bolt fixing are better. At present, there are many kinds of light bulbs to choose from. LED light bulbs are the best choice because of their strong brightness, small size and long life. You can choose light bulbs of different colors according to your personal preferences. The switch can be selected as rotary or remote control to adjust the color and intensity of the light.

3) The use of iron painting landscape lamps

The shape and symbolic meaning of the mountain in this lamp are more suitable for coffee shops, bars and office clubs. In comparison, the style without lamp holder is better. Consumers and experts suggest that it can be designed as a chandelier or wall lamp, and the group presents the momentum of a thousand miles of rivers and mountains. This iron painting landscape lamp can be used alone or in combination. It is recommended to use 2-3 in combination to create the visual beauty of moving mountains and phantoms, which reminds people of the Guilin landscape on the 20 yuan RMB in China. The current physical iron painting landscape lamps are not fixed in form and can be used in combination with burning incense and aromatherapy to create a fairyland effect of "Boshan furnace" surrounded by clouds and mist. Among the three types of lamps, the baseless lamp has the better effect. The internal lamp can be molded into the required shape using resin, and a color spotlight that can change color and adjust brightness can be installed at the bottom.

4) Size specifications

At present, the size specifications of lamps are medium and suitable for home use. Iron painting landscape lamps can be changed in size as needed, and can be large enough to become installation sculpture lamps or small enough to be used as night lights. From the actual effect, iron painting landscape is more suitable for medium and large public art lamps, which can highlight the uniqueness of the production process. When designing and making, it is necessary to consider the size ratio of the lamp base and the lampshade to make the overall more coordinated.

5.2.4 Emotional experience, color texture and sanitation of iron painting landscape lamps

1) Emotional experience

Chinese iron painting landscape lamps provide users with different emotional experiences in three aspects according to the emotional hierarchy theory. First, the visual emotional experience is conveyed through the appearance, texture, color and material of the lamps; second, the pleasure of use is conveyed through different forms of mountain combinations, dynamic rotation and color, and the production process can give users a life of hard work and encouragement; finally, the deep spiritual and symbolic meaning of the mountain has eternity, strength, wealth and power, highlighting the personal character of "the benevolent enjoy the mountains" and other ideological and moral qualities, which bring users a deep spiritual experience and cultural thinking.

2) Color texture

The color of iron painting landscape lamps can be selected in many ways. The current landscape lampshade provides the original color after iron forging, as well as five color options of black, cyan, gold and silver. For young Chinese people, black and cyan are the best choices. The craftsmanship of Chinese iron painting lies in hot forging. The texture presented after hot forging is a unique handmade trace of Chinese iron painting. This handmade texture has a special aesthetic and emotional temperature, and at the same time symbolizes the unyielding and tempered spiritual character.

3) Hygiene and cleaning

Chinese iron painting itself has the problem of rust and hygiene and cleaning, and similar problems also exist for iron painting landscape lamps. Iron painting landscape lamps are all sprayed with paint. High-temperature rust removal is carried out before spraying to ensure that the iron is isolated from air and water, and it will not rust for decades. The use of new material anti-rust paint can increase the service life of iron painting landscape lamps. This method is to spray anti-rust paint after high-temperature rust removal, and spray the required color paint on the anti-rust paint. In terms of hygiene and cleaning, the lampshade and lamp holder are separated. When cleaning, just remove it and rinse it with clean water or wipe it with a towel. It is simple and convenient.

5.2.5 Emotional expression of Chinese iron painting landscape lamps

Emotion is not only a subjective inner feeling, but also a cultural energy that can be created, mobilized and shared with the help of media, structure and symbolic language. Su Shi, a great poet of the Song Dynasty in China, proposed that "looking at the mountain will fill the mountain with emotion". Chinese iron painting landscape lamps use this mountain structure and light feeling to let emotions "hide in lines" and "reflect in light", continuing the tradition of "using objects to express emotions" in Chinese art.

1) Iron material and linear artistic conception

Chinese iron painting landscape lamps use iron wire materials, and construct three-dimensional linear mountains through manual hammering and welding, abandoning the depiction of blocks and entities, emphasizing "the breathing of lines" and "the tension of space". In the tradition of Chinese landscape painting, "outlining" is the refinement of the charm of the mountain. It is not about the shape, but the flow of qi and the meaning of spirit. Through modern industrial material iron wire, the mountain shape is written in space, simulating the trend and rhythm of the mountain, making the lines a symbol of the flow of time, and also the trace of "meaning" in

space. Iron is a material with connection, fixation and power. After being hammered, the lines can have strength and setbacks, softness and rhythm. Through different textures and the hardness and softness of the lines, the inner emotions of the maker are expressed, and at the same time, the psychological resonance and associative reaction of the viewer are triggered.

2) Light dynamics and emotional arousal

Modern intelligent technology can be added to Chinese iron painting landscape lamps, with a built-in six-color LED lighting system and a rotatable and light adjustment mechanism. The light not only exists as a lighting element, but is also regarded as a catalyst for concrete emotional language and spatial perception. Chinese iron painting lamps are equipped with a 360-degree rotatable base, simulating the Eastern philosophy of "watching the mountain without moving the mountain, rotating the habitat". Rotation not only breaks the single perspective of viewing, but also symbolizes the flow of emotions and the flow of time. At the same time, the system has a built-in intelligent sensing brightness adjustment function. The brightness during the daytime automatically decreases with the ambient light, making the mountain lines more transparent. At dusk and at night, the light is enhanced, echoing the natural rhythm, forming a poetic experience of "hiding during the day and showing at night". The dynamic combination of the six core light colors of red, yellow, blue, green, purple and white in Chinese iron painting landscape lamps constructs a multi-layered, perceptible and immersive dynamic "emotional landscape". The six colors of red, yellow, blue, white, purple and green are the medium and visual expression of the flow of emotions in the mountains. Each color corresponds to a basic emotional state (As shown in Table 31), inducing the psychological perception of the viewer through visual resonance.

Table 31 *Colors Correspond to Emotions and Meanings*

Color	Corresponding emotions	Design Implications
Red	Passion, strength, life	It symbolizes the surge of energy inside the mountain, like the heart of a volcano
Yellow	Hope, wisdom, warmth	Like sunshine falling on the mountain top, it brings enlightenment and awakening
Blue	Tranquility, contemplation, distance	Expressing the tranquil atmosphere of the misty mountains and rivers
White	Ethereal, pure, and ritualistic	The feeling of leaving blank space guides the projection of one's own emotions
Purple	Fantasy, loneliness, spirituality	Like a landscape in a dream, it triggers meditation and philosophical thinking
Green	Vitality, Nature, Healing	Return to the original environment of the mountains and forests to convey a sense of endless life

Note. Researcher produced 2025

3) Immersive experience, translation from object to state of mind

The Zhongtiegua Shanshui lamp is no longer a "lamp" in the traditional sense through the interactive system of "emotional color + spatial rotation + time-based dimming", but an immersive experience device that uses lamp as a medium, light as a language, and emotion as a field. It carries the spirituality of "landscape" as a cultural prototype, and also provides viewers with an emotional theater that can be entered, resonated, and contemplated through modern perception technology.

5.2.6 Design Fusion Future Sustainability

1) Balance and coordinate iron painting craftsmen and designers

The participation of designers will cause certain challenges and impacts on the independence of Chinese iron painting craftsmen in production. As the main body of iron painting production, Chinese iron painting craftsmen have strong confidence in craftsmanship and technology. There are challenges in whether the works designed by designers can be produced by craftsmen with existing skills and tools. In the production process, will the designer interfere with the craftsman's production, causing the craftsman to lose the judgment ability to produce according to the existing skills and lead to the deterioration of technology? At the same time, human skills are accompanied by emotions and historical experience. There are certain differences in the works made by each craftsman through the same craft. How to ensure that each design work has the same artistry and sophistication while maintaining manual production needs to be analyzed and solved in specific practice. Designers emphasize the rationality of function and structure, and pay attention to practicality, beauty and culture. Iron painting craftsmen emphasize manuality, technical feasibility and the authenticity of craftsmanship. How to balance the concepts and ideas of craftsmen and designers in the integration of Chinese iron painting design is a question to be considered.

2) Sustainability of future development

As a national intangible cultural heritage, Chinese iron painting has unique production technology and aesthetic characteristics, as well as rich cultural attributes and economic value. Design integration can promote cultural inheritance and bring economic benefits, but how to maintain the sustainability of this integration development is a problem that needs attention. It is not difficult to find from the development history of Chinese iron painting that relying on the personal cooperation of craftsmen, painters and designers is the most direct, fast and effective, but it is difficult to maintain for a long time, and has limited influence on the entire industry and cannot change the current development status of the industry. The cooperation between craftsmen, painters and designers led by government policies and funds is more effective and has a great influence, which can promote the inheritance and innovative development of Chinese iron painting, but once the government does not provide policy and financial support, this cooperation will immediately break down. As a public welfare organization, the main purpose of the industry association is cultural inheritance, academic exchange and communication and promotion. Due to the lack of funds and platforms, it is impossible to mobilize the enthusiasm and long-term cooperation between craftsmen and designers. As a market-oriented enterprise with the purpose of profit, it is most suitable to maintain the sustainability of design and craft integration, but the mobility of personnel and the increase in enterprise costs

have increased uncertainty. In the future, cultivating craftsmen who know technology, understand art and are good at design is the key to maintaining the sustainable integration of Chinese iron painting design, which will take some time.

Table 32 *Advantages and disadvantages of different forms of design fusion*

Category	Advantages	Disadvantages
Personal	Direct, fast and effective	Difficult to maintain, limited impact
Government	Obvious effect and great influence	Short-term policies and financial uncertainty
Association	Cultural inheritance, academic exchange and promotion	Without funds and platforms, it is impossible to maintain the enthusiasm and long-term nature of cooperation
Enterprise	Profit-making purpose, with funds and venues	High staff turnover and uncertainty in business development
Composite craftsman	Be technical, artistic, and design-savvy, and have craftsmanship and design capabilities	The cultivation time is long, the effect is slow, and it is uncontrollable

Note. Researcher produced 2025

5.3 Suggestions

5.3.1 The direction of further design and improvement of iron painting landscape lamps

"Iron painting landscape series lamps based on the modeling language of Chinese landscape painting" realizes the integration and innovation of Chinese iron painting and modern design, meets the needs of young consumer groups, and meets market demand. Combined with expert suggestions, there is still a direction for further design and improvement.

1) Expand more forms and expand size specifications

First of all, Chinese iron painting landscapes designed as chandeliers or wall lamps have more formal beauty. The rough and mottled texture and texture of iron painting forging make it not delicate, and it needs to be appreciated from a certain distance, presenting the pursuit of traditional Chinese aesthetic artistic conception. Secondly, designing Chinese iron painting landscapes as car-mounted lamp ornaments has the meaning of safety as stable as Mount Tai on the one hand, and as a car-mounted decorative atmosphere lamp on the other hand, it increases rotation, brightness, color and rotation control, which is more interesting. Thirdly, the combination of iron painting landscape lamps with aromatherapy devices and parking number plates has more market value. Finally, the size needs to be considered when used indoors at home. The size of chandeliers and wall lamps should be increased, the size of table lamps should be medium, and the size of night lights should be the smallest. Choose the appropriate lamp holder and bulb according to the different sizes. This kind of iron painting landscape lamps expressed by hand are more suitable as large-scale decorative art lamps in public spaces. They can highlight the uniqueness, culture and artistry of the craftsmanship and have more visual impact. Add multiple elements of Chinese landscape painting.

2) Chinese iron painting landscape lamps need to add multiple elements of Chinese landscape painting.

First, combine the trees, houses, rivers, clouds, animals, characters, etc. in Chinese landscape paintings, while considering the beauty of the artistic conception of Chinese paintings, emphasizing the density and thickness of lines, so that iron painting landscape lamps are more spiritual and rhythmic. Secondly, the elements of Chinese landscape paintings are individually expressed independently. Three-dimensional trees, three-dimensional houses, three-dimensional animals and three-dimensional mountains of different shapes can be combined in various ways, and they can be moved and changed at will to become garden-style lamps, which increases the fun of use. Finally, the different types of landscape modeling languages in Chinese landscape paintings are summarized and analyzed, such as the painting methods of different mountain shapes, the mountain shapes in different regions, etc., and classified and summarized to guide the design and craftsmanship.

Solve the fineness of the lamp holder and make a production manual.

3) A good product requires overall beauty and refinement.

Chinese iron painting landscape lamps need to improve the refinement of the lamp holder and overall coordination. Improve the refinement of the lamp holder, add smart technology, and adjust the brightness and color of the light according to different natural light. These problems need to be solved through cooperation with professional lamp manufacturers. Take pictures or videos during the design and production process, and make production manuals, videos and pictures to guide enterprises to carry out standardized production, including the selection of material thickness, the combination of accessories, the size of the lamp, the method of painting, and the installation of the lamp holder. At the same time, calculate the cost based on the material and workers' wages to determine the market price after mass production, and give the lamp a name with cultural connotations and easy for people to accept.

5.3.2 Development trends of themes and elements, forms and functions of Chinese iron painting

1) Themes and Elements.

In the design fusion of Chinese iron paintings, it is recommended to express natural, auspicious and abstract decorative themes. The elements include landscapes, plants and flowers, and animals, fish and insects. Consumers who like such themes and elements are relatively broad and are not restricted by region and culture.

2) Form and Function.

The future development of Chinese iron paintings will exist in two forms: realistic and abstract. Realism is a traditional iron painting work with the aesthetic form of Chinese painting, emphasizing artistry and craftsmanship. It belongs to the niche high-end market and is conducive to the inheritance of the traditional culture of Chinese iron paintings. Abstract modern works adopt a combination of lines and surfaces and a three-dimensional space through the integration of design. The form is more diverse. At the same time, it is combined with modern intelligent technology to enrich the visual language and functional experience. It will be the main development direction in the future and promote the innovative development and cultural dissemination of Chinese iron paintings. The functions of Chinese iron painting

design fusion works need to be aesthetic and have certain practical functions, such as combining with lamps, tea sets, aromatherapy, car ornaments, etc.

3) Product positioning.

In the future, there may be three types of product positioning for Chinese iron painting, including traditional iron painting artworks, iron painting cultural and creative products, and iron painting daily necessities and souvenirs that combine machinery and handwork. Traditional iron painting artworks are mainly in the high-end market, focusing on the inheritance of culture and technology; iron painting cultural and creative products are mainly in the low-end market, targeting middle-aged and young groups, emphasizing the creativity, emotionality and cultural nature of the design, while increasing the fun of use and enhancing the youth group's love and recognition of traditional culture. Iron painting daily necessities and souvenirs that combine machinery and handwork are aimed at the daily life of ordinary people, highlighting practicality, such as decorative spoons, plates and flower vases, etc., through semi-mass and semi-manual production methods to reduce product prices and enter people's lives. In addition, Chinese iron painting has a good development prospect in public art works. Due to the lack of practicality and non-universal demand, it is not suitable for the future development of traditional crafts. It can be customized as a high-end iron painting artwork to meet the needs of different consumer markets and lead the development of Chinese iron painting.

4) Insufficient research.

The expert opinions and representative works in the study are only individual cases. Future research should expand the case analysis research of representative works, and continue to deepen and improve the design results to ensure more representative results. Regarding the protection and inheritance of Chinese iron painting crafts, researchers have proposed that the core is to protect and inherit production. However, production may lead to an overemphasis on product homogeneity, and whether it will form a production line-style division of labor and cooperation, leading to a one-sided and incomplete inheritance of technology, which is worth paying attention to. In the future, Chinese iron painting may cross the boundaries of materials and crafts. In the future integration of Chinese iron painting design, it is necessary to conduct more extensive and in-depth research on different materials and crafts.

5.3.3 Construct a design fusion model of multi-party cooperation.

In the process of realizing the revitalization of Chinese iron painting, it is necessary to build a multi-party cooperative design integration model to form a sustainable cooperative relationship between Chinese iron painting craftsmen and artists. The artists here include painters, designers, sculptors, etc. The demand for designers in Chinese iron painting far exceeds that of painters and sculptors. Painters and sculptors focus on artistic expression, while designers focus on the cultural heritage, artistic aesthetics and practical functions of products. They innovate and transform by drawing on the excellent genes in traditional crafts to serve people's diverse needs.

1) At the local government level, provide policies and build platforms. The government formulates relevant policies to enhance the market appeal of Chinese iron painting through design. On the one hand, relying on local colleges and universities and industry associations to cooperate to establish the China Iron Painting Innovation

Design Center, provide design drafts for the Chinese iron painting industry, and serve as a bridge between craftsmen and designers. On the other hand, the China Iron Painting Craftsman Design Capacity Training Center was established to train Chinese iron painting craftsmen in painting and design methods, and improve the aesthetic level, painting and design capabilities of Chinese iron painting craftsmen.

2) At the level of Chinese iron painting enterprises, attach importance to the role of designers and artists in the inheritance and innovation of Chinese iron painting. Establish a special design department within the enterprise, hire professional designers or artists to be responsible for the innovative design of Chinese iron painting products, establish a labor relationship with Chinese iron painting craftsmen, ensure the stability of the craftsmen's economic income, enhance their sense of identity, and encourage them to improve their skills and give full play to their technical expertise. This division of labor is in line with the development characteristics of modern society. Designers and craftsmen do what they are good at, which helps Chinese iron painting companies produce iron painting products that meet market demand, thereby promoting the revitalization of Chinese iron painting.

3) At the level of the China Iron Painting Industry Association, improve the recognition and management system of inheritors. The China Iron Painting Industry Association improves the recognition standards and procedures for the inheritors of the China Pavilion Iron Painting, and establishes a Chinese Iron Painting Craftsman Archive and Work Archive. Regularly carry out the evaluation and recording of Chinese iron painting inheritors, and carry out advanced selections such as "Chinese Iron Painting Craftsman of the Year". In response to the serious aging problem of Chinese iron painting craftsmen, actively attract young college students to join the Chinese iron painting industry, and provide financial support to young college students. Their joining will help the Chinese iron painting industry form talents who understand both technology and design. Provide exhibition and competition support for individuals engaged in the design and production of Chinese iron paintings, and give appropriate rewards to outstanding works.

4) At the level of the craftsman group, improve the aesthetic level and design ability. Craftsmen are the core of China's iron painting industry. They need to improve their personal production and design capabilities and enhance their cultural confidence and pride. On the one hand, the craftsmen group uses relevant training to improve their aesthetic level and design ability, such as participating in the government-organized public welfare projects "China Intangible Cultural Heritage Inheritor Training Program" and "China National Art Fund Talent Training Project". On the other hand, they take the initiative to contact painters and designers, and expand their thinking and vision through exchanges with painters and designers. Only when the Chinese iron painting craftsmen group has the technical and design capabilities can the sustainable integration of Chinese iron painting design be maintained.

5) At the university level, improve the training of Chinese iron painting technology and artistic talents. Relying on the advantages of disciplines and majors, local universities have established cooperation with local governments, iron painting industry associations, iron painting companies and iron painting craftsmen to open Chinese iron painting majors, combining traditional inheritance methods with modern education systems, combining traditional production skills with modern intelligent

scientific research, and constantly enriching iron paintings and expanding the Chinese iron painting craftsmen team, and improving the application of modern technology in iron paintings. Introduce Chinese iron painting into school aesthetic education, carry out the study of relevant knowledge of craft inheritance, deeply explore the cultural value and artistic value contained in Chinese iron painting, realize the common development of cultural education, cultural inheritance and craft innovation, change young people's original cognition of Chinese iron painting, promote cultural inheritance, and attract young people to join the Chinese iron painting industry.

Through the efforts of the above governments, enterprises, industry associations, craftsmen and universities in different directions, it is believed that the current situation of Chinese iron painting can be changed, it can be revitalized, and the integration and unity of the technical, artistic, sexual and functional characteristics of Chinese iron painting can be enhanced, so as to realize the revitalization of Chinese iron painting.



APPENDIX

1. Flower vases

A. Iron painting orchid vase



B. Iron Painting Landscape Flower Vase



C.Iron painted chrysanthemum vase



D. Iron painting plum blossom vase



2. Works with high recognition from experts and can be used as references for further design

A. Ornaments: Natural Harmony



B. Ornaments: Ambition of Pine and Cypress



C. Hanging paintings: Bamboo Rhythm

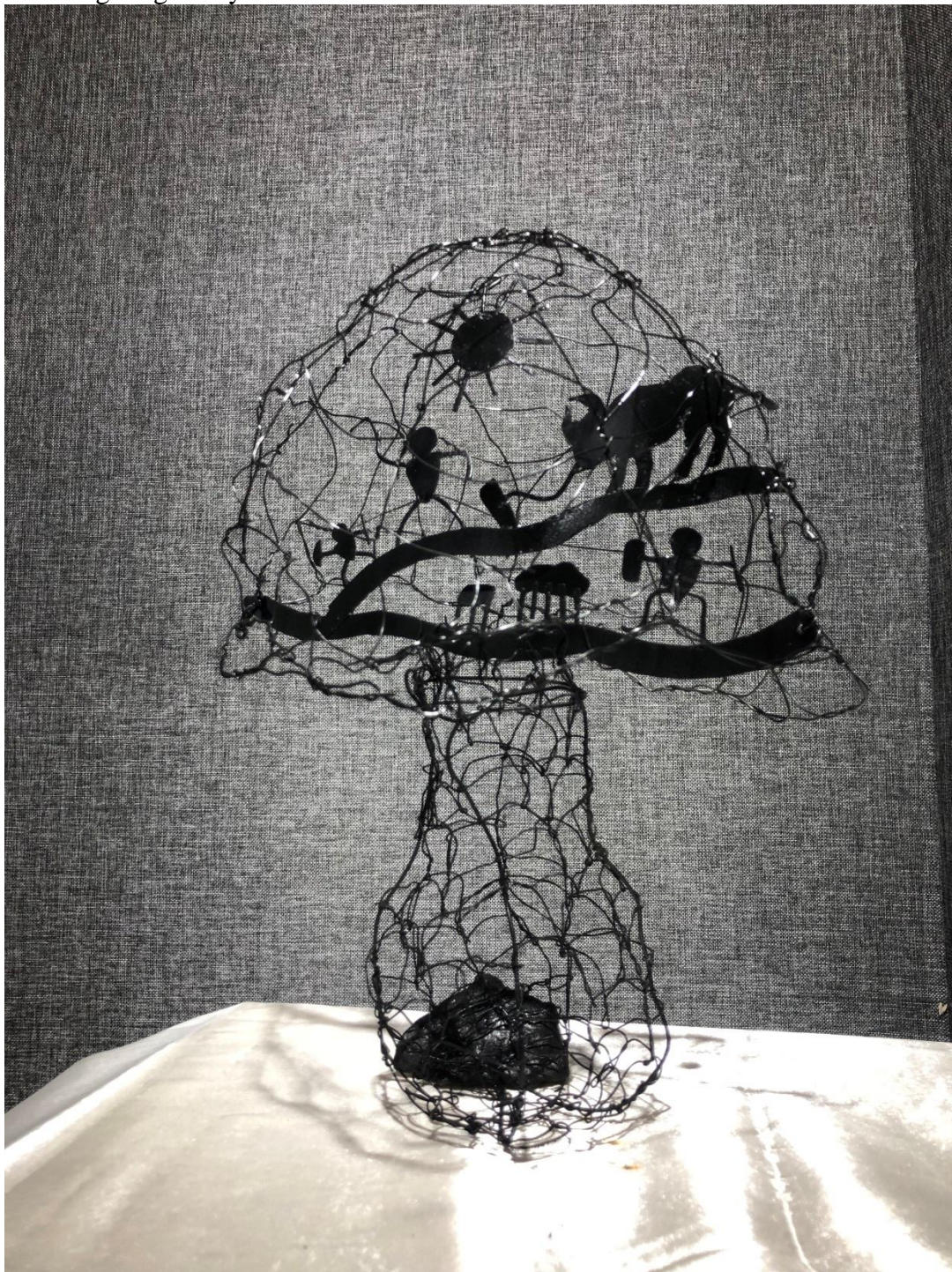


D. Hanging paintings: Think



วิทยาลัยศิลป

E. Lighting: Fairy Tale World



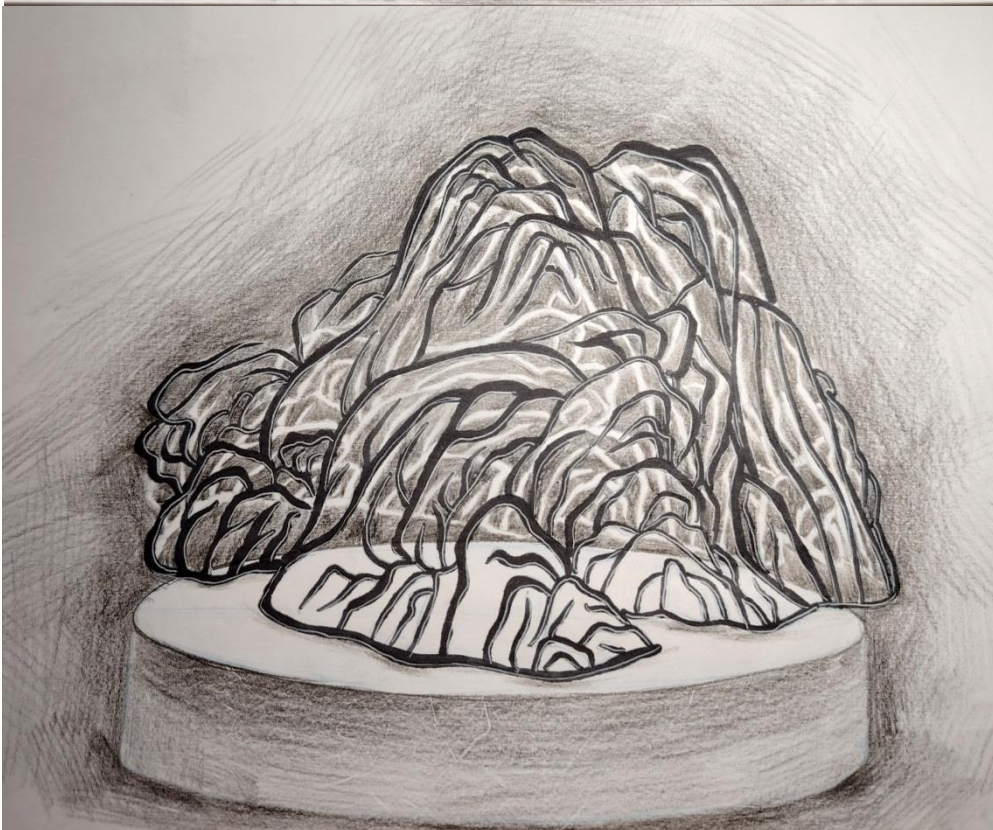
F.Ornaments:Plum, Orchid, Bamboo and Chrysanthemum

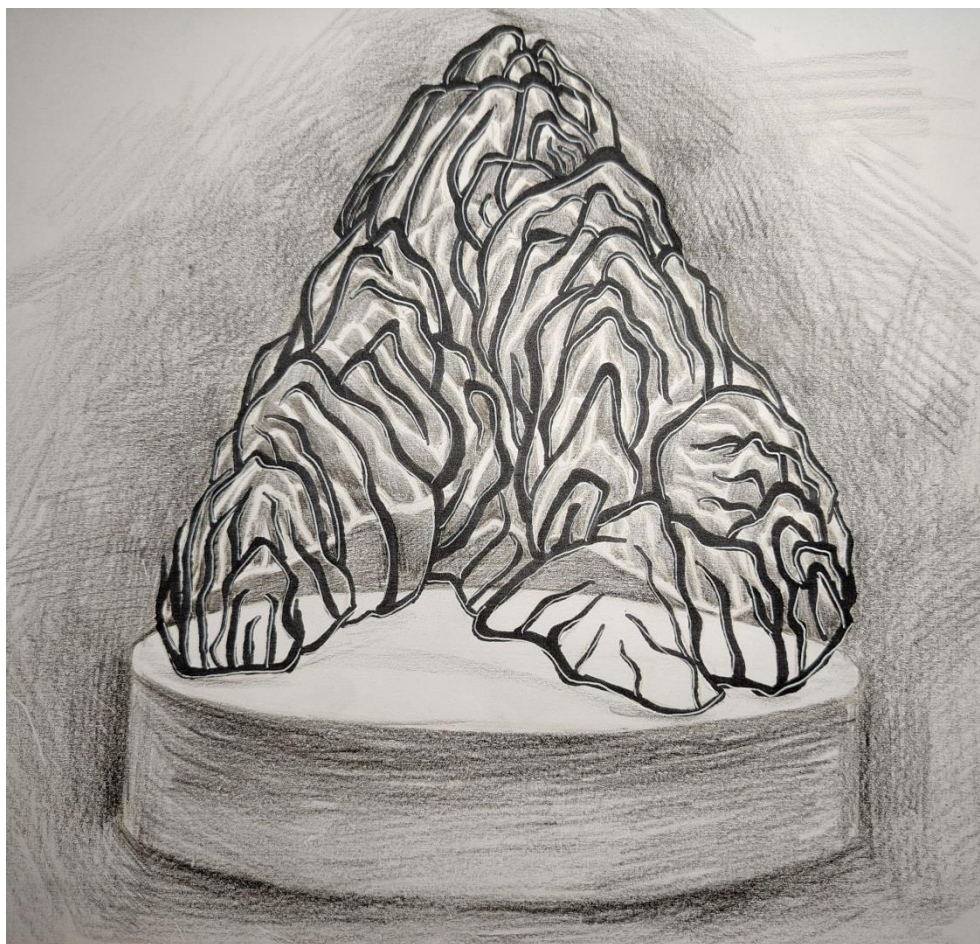


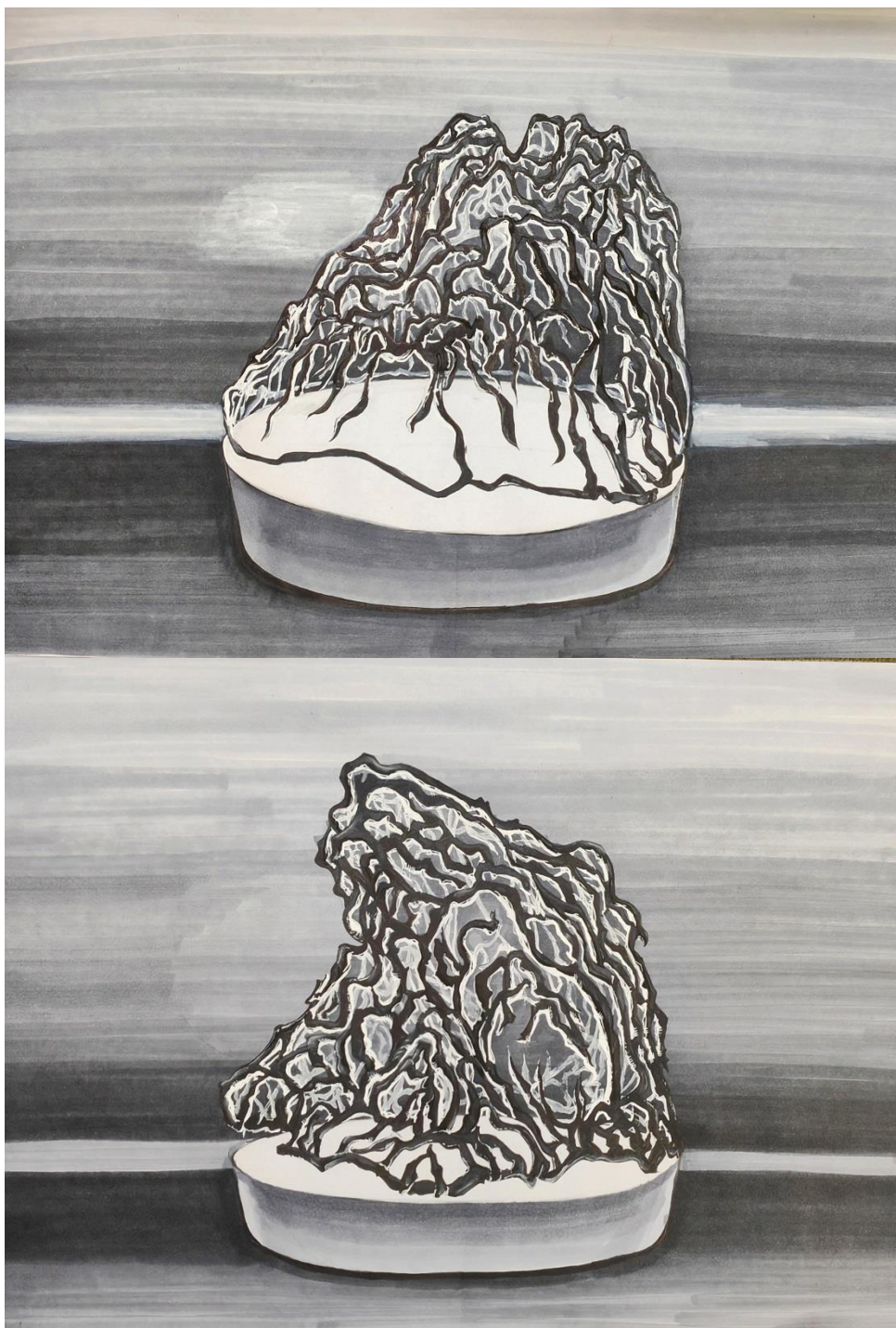
E.Artifacts: Flowers bloom and smell good

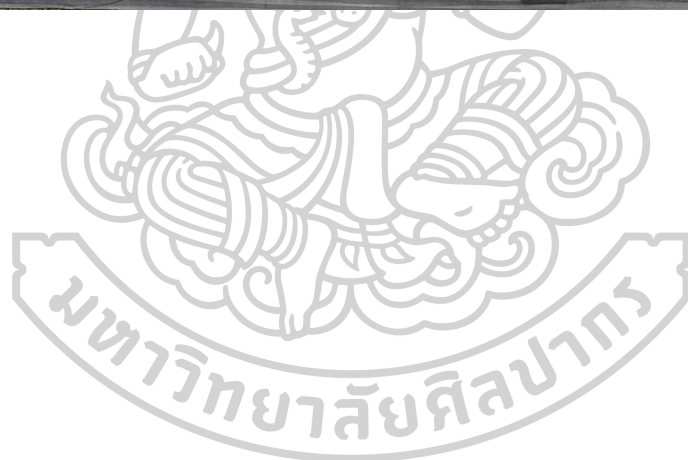


3. Design hand-painted renderings

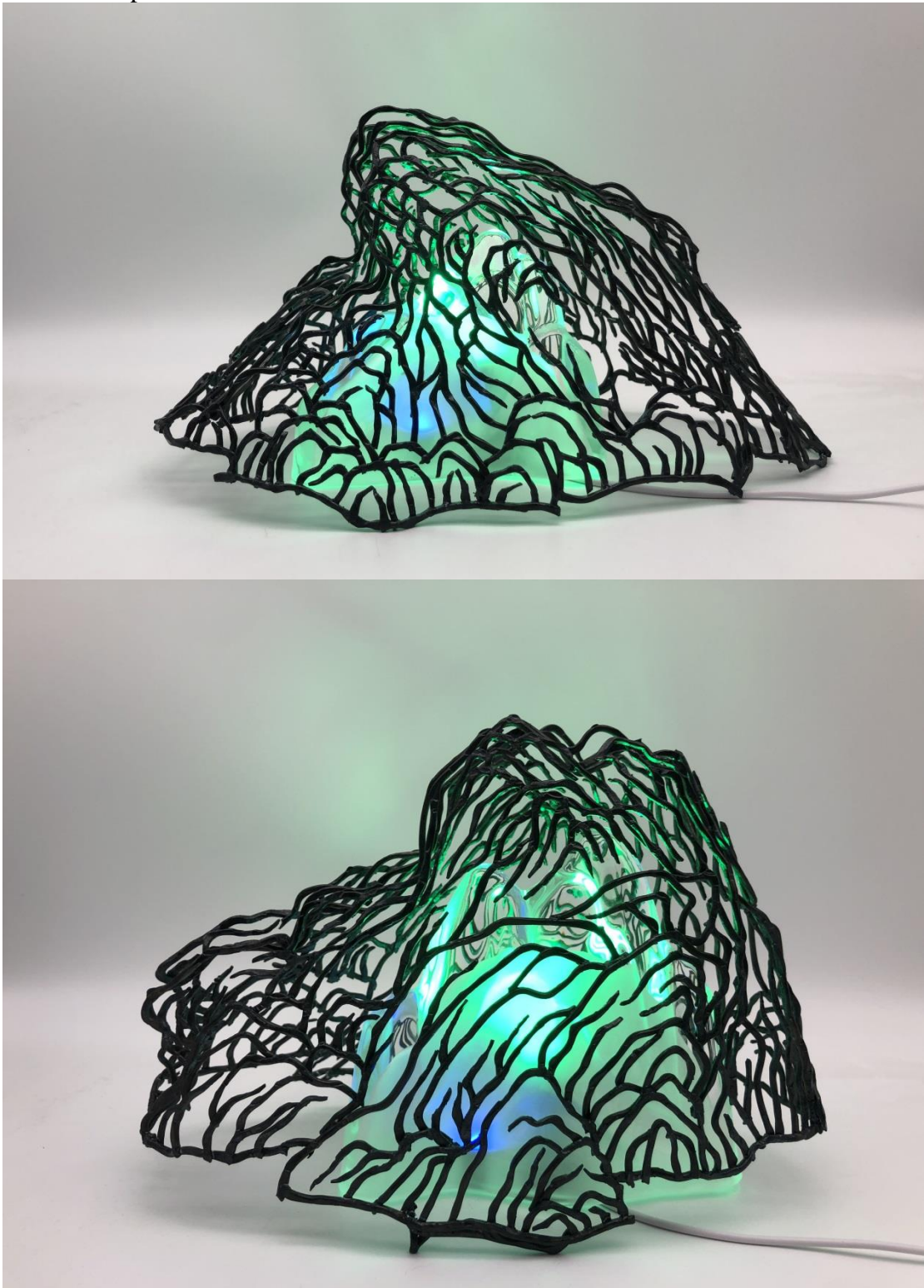


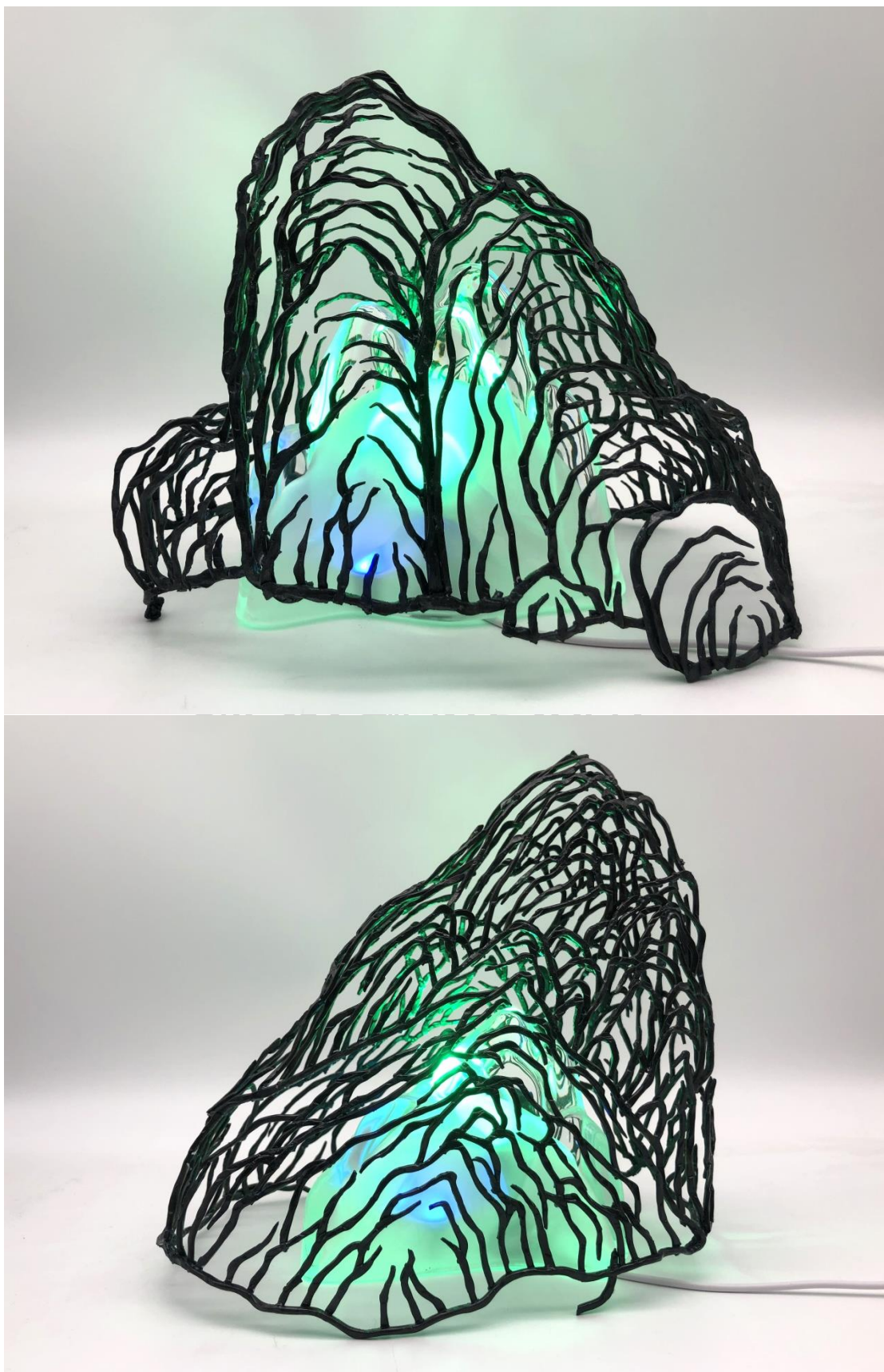


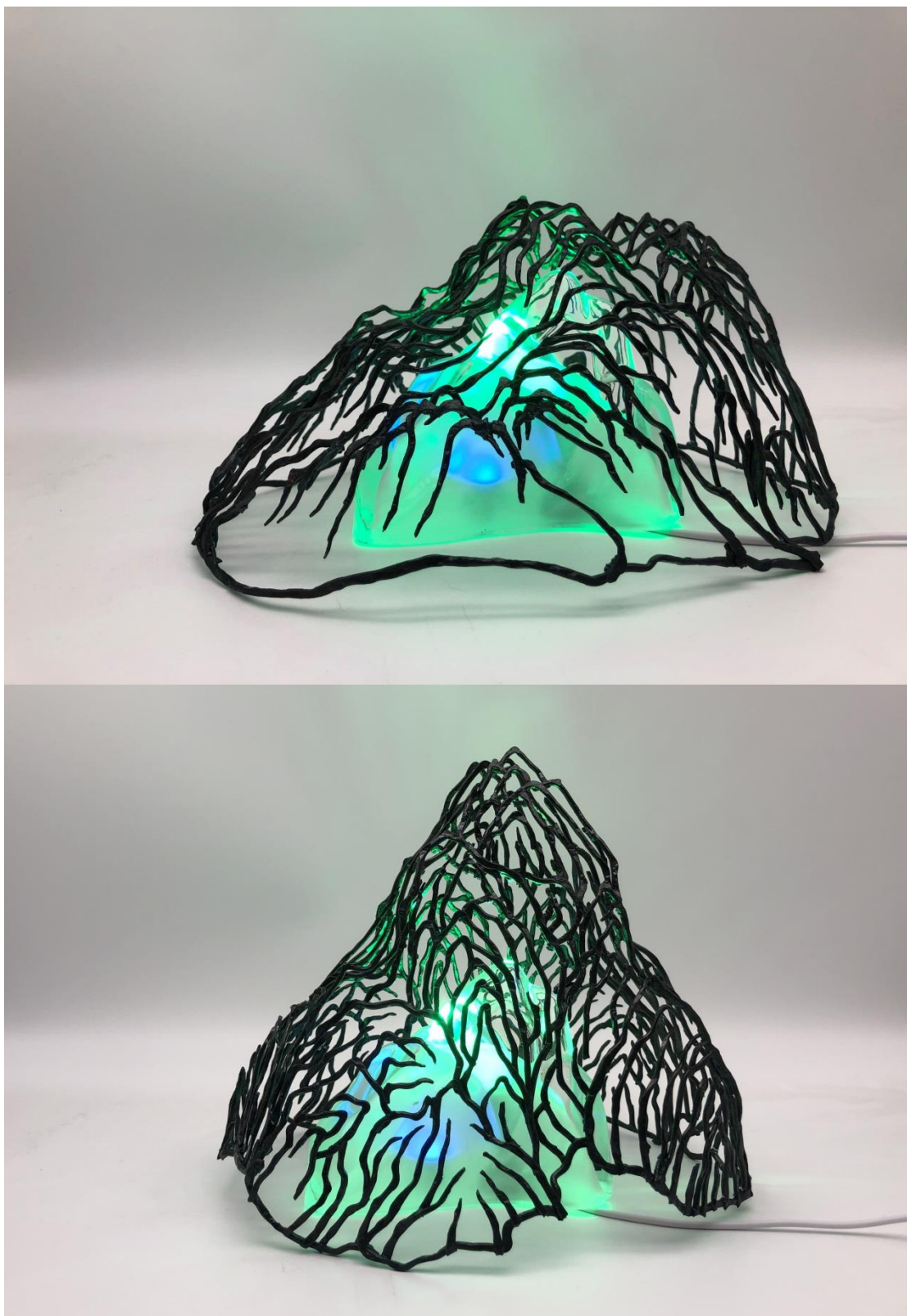


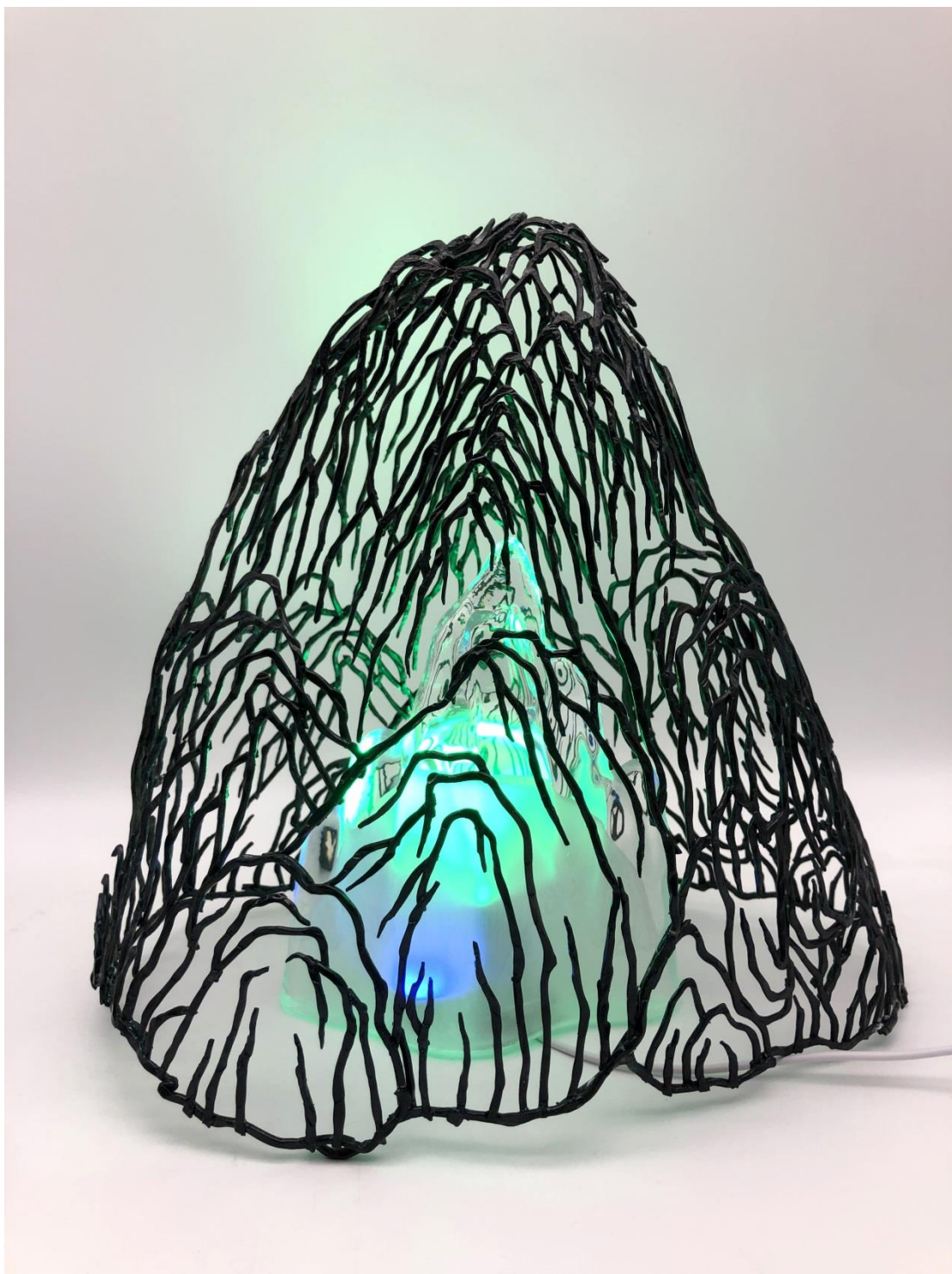


4.Design results
A.Lamps without base

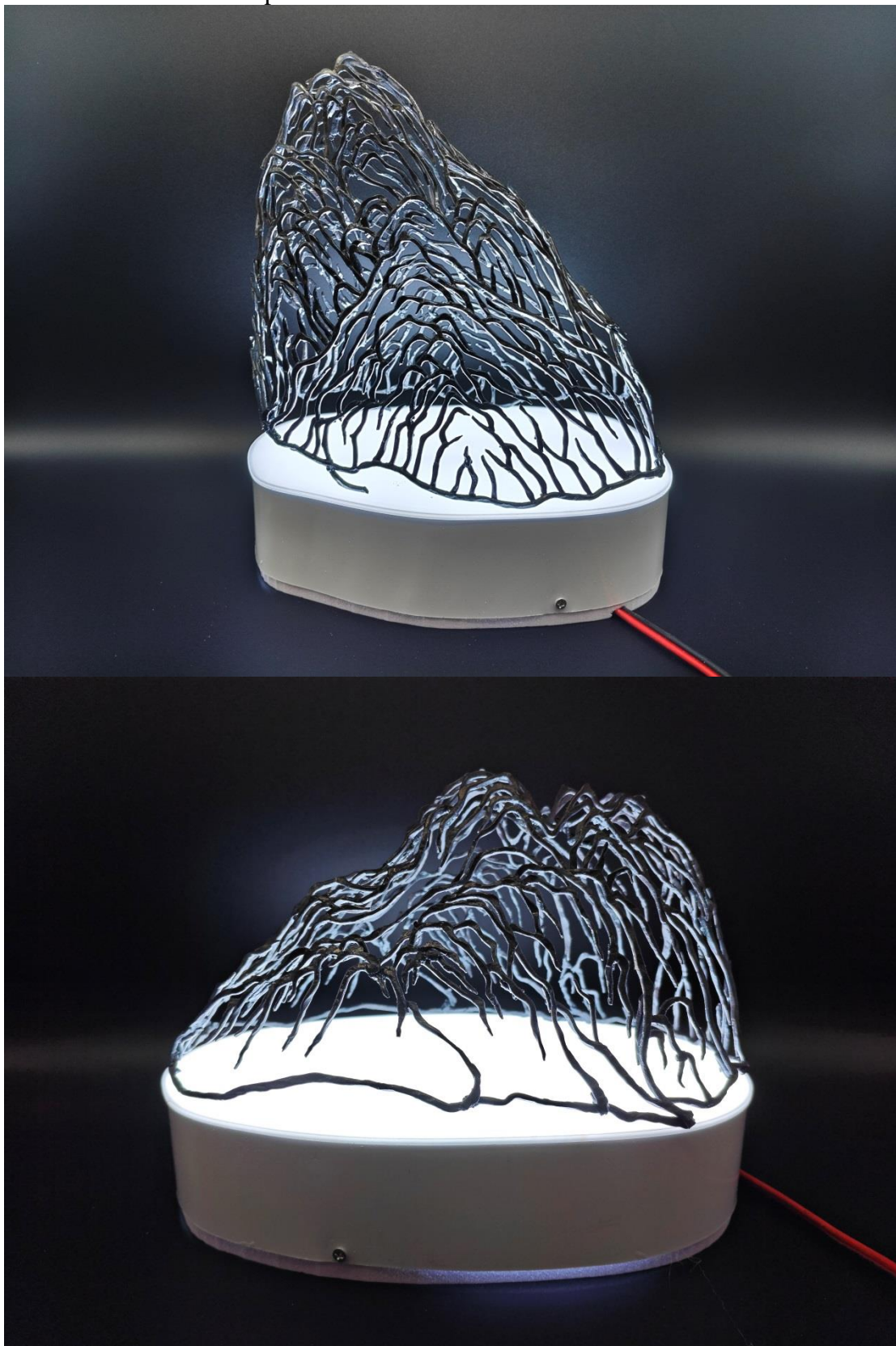


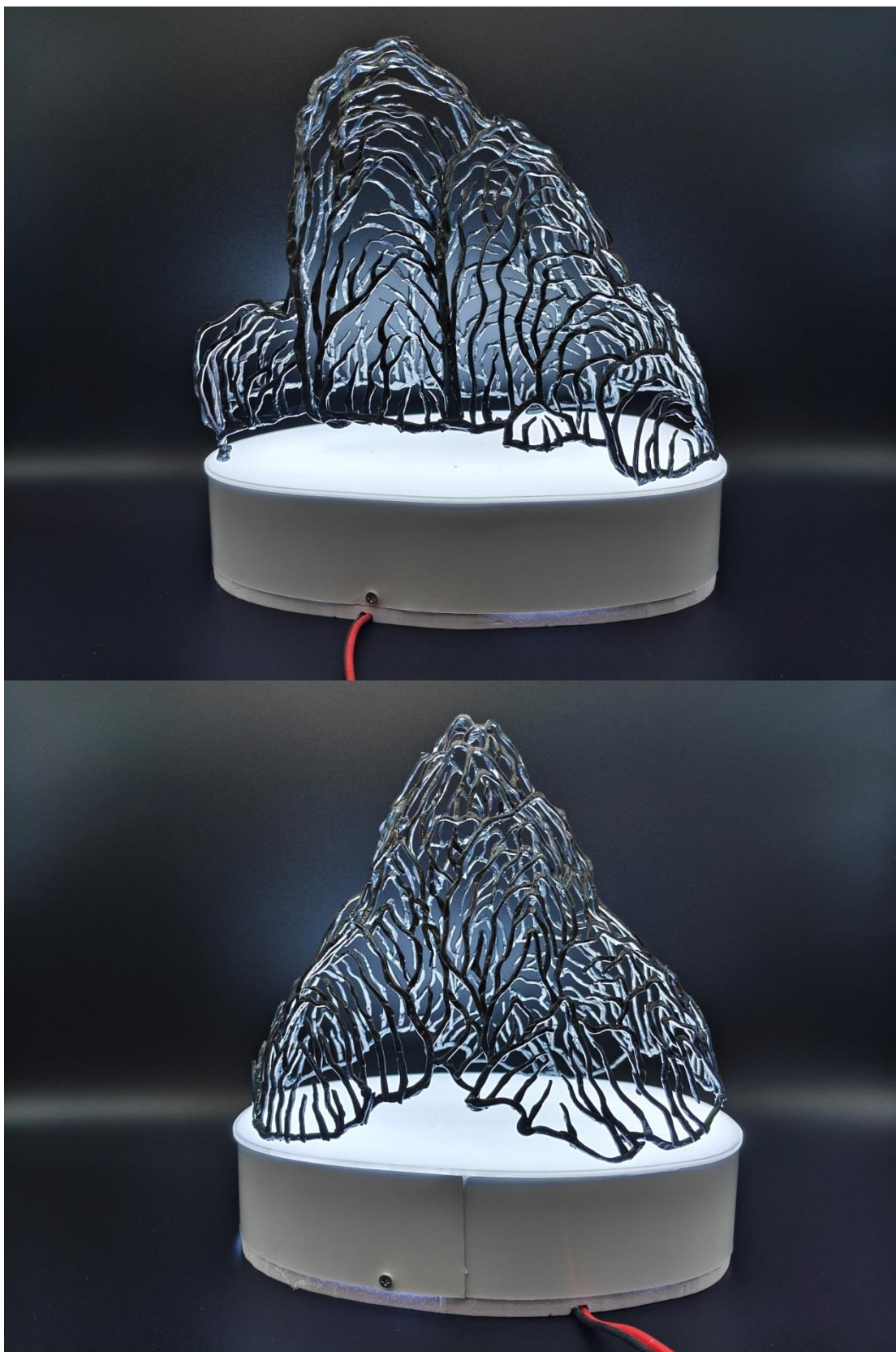




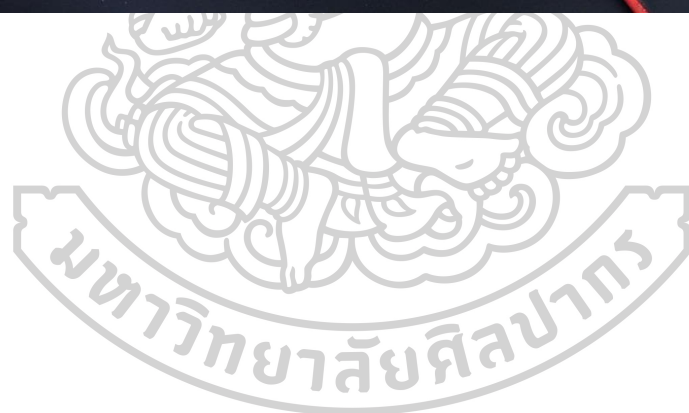


B. Conventional lamps









C. Rotating color-changing model
Red Light



Green light



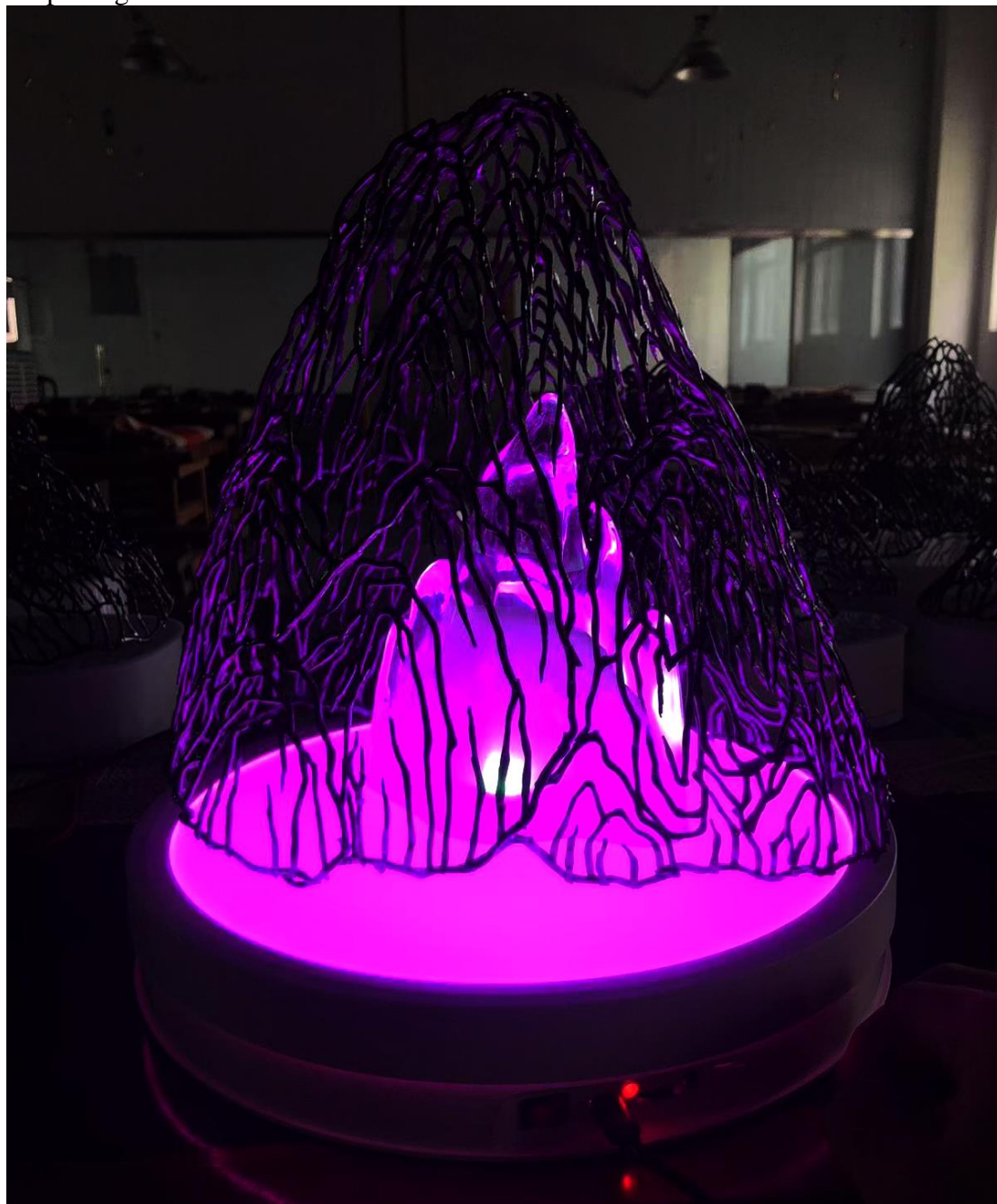
White Light



Blue Lights



Purple Light



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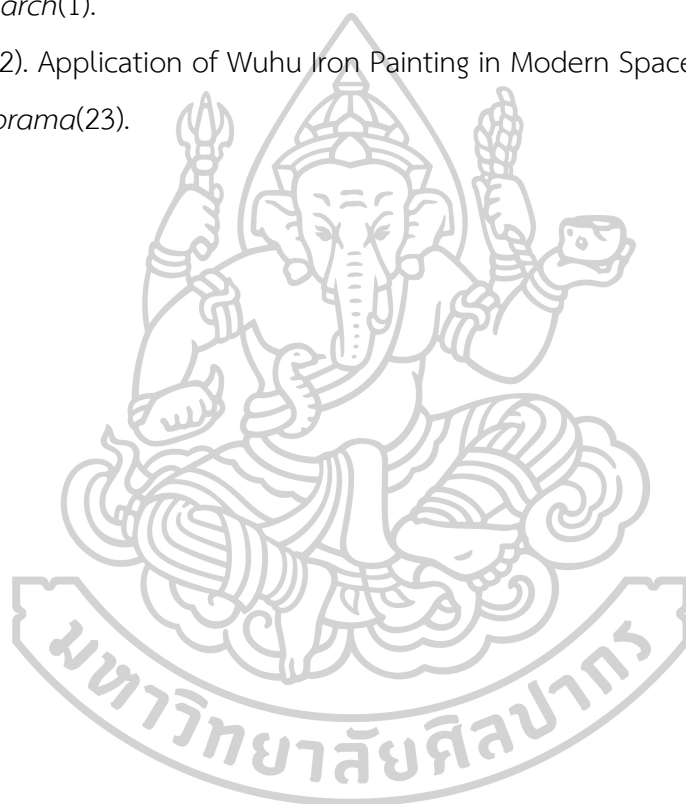
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PUBLICATION	1.D YUANLIANG, W KRUTASAEN, (2024). The Fusion of Chinses Iron Painting.Journal of Roi Kaensarn Academi.9(12),348-365. 2.D YUANLIANG, W KRUTASAEN,(2025).The Development and Evolution of Chinese Iron Painting Craftsmanship.ternational Journal of Sociologies and Anthropologies Science Reviews.5(03).
AWARD RECEIVED	1. The work "Bamboo Rhythm" won the silver medal of "Huigong Award" at the 13th Anhui Arts and Crafts Fair, February 2024. 2. The work "Natural Harmony" won the second prize of the 15th China (Dalian) Light Industry Commodity Fair Zhongqing Wanhua New Quality Consumer Product Innovation Competition, November 2024.

