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The Development and Evolution of Chinese Iron Painting Craftsmanship

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Abstract

Background and Aim: Chinese iron painting originated during the Kangxi period of the Qing Dynasty, representing the fusion of traditional iron-smelting techniques and Chinese painting, with a long-standing history and craftsmanship value. This paper systematically explores the development and evolution of Chinese iron painting techniques, analyzing the characteristics of craftsmanship, innovations in techniques, and changes in artistic expression across different historical periods.

Materials and Methods: By reviewing the literature, conducting field investigations, and interviewing experts, this paper traces the transformation of Chinese iron painting techniques from traditional handicrafts to modern innovative forms, revealing its evolution from a singular method to multiple crafting techniques within changing socio-cultural contexts.

Results: The results indicate that with the advancement of technology, Chinese iron painting has transitioned from rough manual labor to refined craftsmanship, and from collaborative production to individual craftsmanship, with significant emphasis on the update of tools and equipment.

Conclusion: The future development of Chinese iron painting heritage requires the introduction of new tools and equipment, combining machine and manual techniques to improve production efficiency, promoting high-quality development.

Keywords: Chinese Iron Painting; Production Techniques; Developmental Changes; Traditional Crafts; Craft Heritage

Introduction

Chinese iron painting is a traditional folk craft that originated in the early Qing Dynasty, boasting a history of more than 350 years. It is renowned for its unique craftsmanship and exquisite artistic expression. Chinese iron painting is a handcrafted art form based on traditional Chinese painting, using low-carbon steel as the material. It reflects the cultural values of Confucianism, Buddhism, and Taoism, embodying an aesthetic of simplicity, nature, and modesty (Huang & Luo, 2016). In 2006, Chinese iron painting was listed in the first batch of National Intangible Cultural Heritage, and in 2018, it was included in the first batch of the "China Traditional Craft Revitalization Plan." However, the honors and policies granted by the government have not significantly promoted the high-quality development of Chinese iron painting.

Since the development of Chinese iron painting, the production process and equipment have changed subtly, and the industry attaches importance to the improvement of the individual production technology of Chinese iron painting craftsmen, ignoring the use of new technologies and new tools. Chinese iron painting artisans generally believe that only pure handmade Chinese iron painting works are valuable, to the exclusion of new technology and new tools. At present, the production of Chinese iron painting mainly follows the methods of the 1960s and 1970s, and the technology and tools remain unchanged, which seriously affects the production efficiency and innovative development of Chinese iron painting. The number of practitioners is fewer than 100, with most over the age of 40, dispersed across various areas of the city. They seldom communicate or collaborate, making it challenging to pass on the craft skills. Due to a lack of young talent, the cultural level of Chinese iron painting practitioners remains limited, and new tools and technologies are rarely applied, leading to difficulties in product innovation. Against the backdrop of the Chinese government's "Traditional Craft Revitalization Plan," it is necessary to study the development and changes in Chinese iron painting techniques and representative works, providing rational suggestions to support their better development. This paper aims to study the development and changes in Chinese iron painting production technology, analyze the influential ways of making Chinese iron painting works, promote the application of modern technology and tools in Chinese iron painting production

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technology, promote the improvement and promotion of Chinese iron painting production technology, better improve production efficiency, reduce production time, and make the works more fine and beautiful.

Literature Review

As a nationally recognized intangible cultural heritage of China, Chinese iron painting has garnered significant scholarly attention, with primary focuses on its cultural value, aesthetic appeal, preservation, and innovative development. However, relatively few studies have explored its production techniques. Zhang Kaili examined the traditional techniques of Chinese iron painting, highlighting an unconventional artistic approach that utilizes the flexibility and resilience of iron to evoke the essence and charm of traditional Chinese paintings. This process involves refining low-carbon steel based on design drafts, followed by meticulous craftsmanship steps, such as smelting, forging, shaping, quenching, welding, inlaying, carving, and framing (Zhang, 2011). Qin Zongcai noted that the initial production processes of Chinese iron painting were unstandardized and relatively simple; however, a scientifically organized process has since been established, expanding creative themes and evolving the format from two-dimensional to semi-three-dimensional and fully three-dimensional forms (Qin, 2016). Li Xuchen pointed out that the techniques used in Chinese iron painting were adapted from traditional blacksmithing methods by incorporating brushstroke styles typical of Chinese painting. Blacksmiths in Wuhu, Anhui, have developed a distinctive set of techniques, hammering methods, and corresponding artistic features that embody Chinese painting aesthetics (Li, 2018). Hu Yanping emphasized that advancements in tools, particularly the use of modern spot welding machines, have refined the technique, enhancing precision and increasing production volume and thematic variety (Hu, 2020). According to Tan Feng, ensuring high-quality Chinese iron painting requires attention to the entire production process. Another critical aspect of Chinese iron painting lies in referencing traditional Chinese paintings. Song Yao's comparative analysis of traditional and modern techniques revealed that traditional iron painting demands high skill and patience in harsh work conditions, posing significant challenges for artisans. However, with modern tools like electric welding and blowers, the difficulty of production has eased, and safety has improved (Song, 2023).

These studies on the production techniques of Chinese iron painting indicate that advancements in technology and tool improvements have led to increased efficiency, precision, and safety, underscoring the significance of its craftsmanship as a traditional art form. The research perspectives of the above scholars provide a foundation and insight for this study. Nevertheless, these studies primarily focus on isolated aspects and perspectives, lacking a comprehensive longitudinal analysis of Chinese iron painting production techniques, especially concerning tool evolution and analyses of artworks from different historical periods. This study aims to summarize and analyze the production processes of Chinese iron painting across various historical periods, examining the impact of tool advancements and new technologies. It also compares representative works from each period to evaluate how changes in tools and techniques have influenced the artworks. This research could prompt Chinese iron painting practitioners to pursue innovations in craftsmanship, technology, and tool applications.

Objectives

1. To study the development and evolution of Chinese iron painting production technology.
2. To study the production process and tools of Chinese iron painting.
3. To study the representative works in the historical development of Chinese iron painting and their production techniques.

Methodology

This study primarily adopts qualitative research methods, combining literature review, field investigation, and expert interviews to gain a comprehensive and accurate understanding of the changes and characteristics in Chinese iron painting techniques, as well as the production methods of representative works.

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Literature review method. This paper collects and analyzes the academic monographs and research documents of relevant scholars on Chinese iron painting production techniques. Check out print and electronic books on Chinese iron painting from libraries and online bookstores in China, and borrow or buy related books. Through China's most comprehensive network of knowledge and Google Scholar, search-related research literature on the historical development of Chinese iron painting, production techniques, and tools, as well as representative figures and works, and classified and analyzed the data found.

Field investigation method. According to the research objectives and problems, three Chinese iron painting enterprises were selected as research objects in Wuhu, Anhui Province, China(This region is a hub for Chinese iron painting), and the investigation was carried out in two ways: the introduction of enterprise managers and the field visit to the production workshop. Through a detailed understanding of the production technology, machinery, and tools of three Chinese iron painting enterprises, the current production process of Chinese iron painting, the new technology and new tools used, and the representative Chinese iron painting works are obtained.

Expert interview method. 5 representative practitioners of Chinese iron painting were selected for interviews, including 1 master of Chinese arts and crafts and representative inheritors of the national intangible cultural heritage of Chinese iron painting, 2 master of arts and crafts of Anhui Province and inheritors of the provincial intangible cultural heritage of Chinese iron painting, and 2 leaders of Chinese iron painting enterprises. Interview to learn about the development history of Chinese iron painting production technology, Chinese iron painting production skills, Chinese iron painting representative figures, and the characteristics of their work. The advantage of expert interviews is that they can provide detailed personal experience and insights, which is conducive to an in-depth investigation of the development and evolution of production techniques and the production process of representative figures and works.

Conceptual Framework

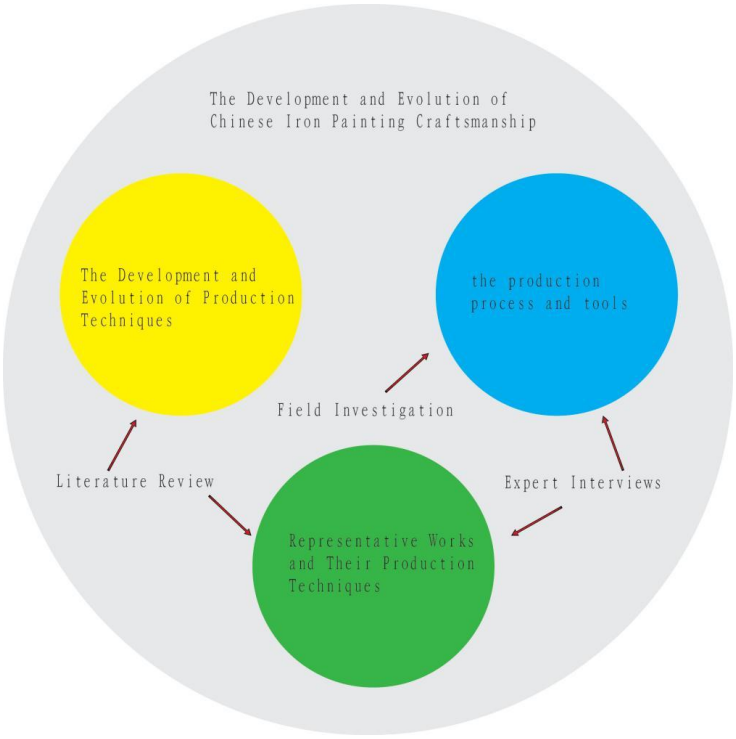

Figure 1 Conceptual framework
Note: Constructed by the researcher

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Results

1. Developmental Changes in Chinese Iron Painting Techniques:

Chinese iron painting has developed over 350 years since its inception during the Kangxi period of the Qing Dynasty, forming a complete production process and crafting technique. The traditional production technique involves using iron as raw material, heating in kilns, and then shaping through techniques such as forging, chiseling, lifting, welding, filing, and carving (Song， 2023). The production process evolved from coal-heated kilns to the use of electric machines for heating, enhancing the efficiency of iron painting craftsmanship and reducing the difficulty of the techniques. The change in heating methods led to safer, more environmentally friendly, time-saving, energy-efficient, and easier production processes, transforming labor-intensive work into refined manual crafting.

1.1 Production Process of Chinese Iron Painting.

The traditional production process of Chinese iron painting was developed over generations of iron painting artisans and includes ten steps: designing a draft, selecting materials, processing materials, hot forging, cold forging, welding, shaping, rust removal, varnishing, and framing, as shown in Table 1. With the diversification of material specifications and the modernization of machinery, the production process has been simplified to seven steps: designing a draft, selecting materials, hot and cold forging, welding assembly, rust removal and varnishing, and framing. Modern Chinese iron painting techniques mainly use wrought iron as the raw material, undergoing steps such as material selection, forging, quenching, varnishing, base application, and framing (Zhou, 2024).

Table 1 Traditional Chinese Iron Painting Production Process Diagram

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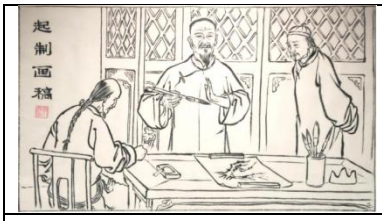
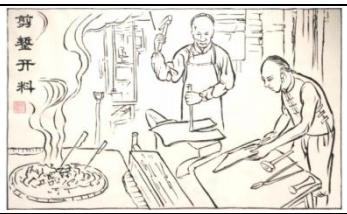
<tr><td>  </td><td>  </td><td>  </td></tr>
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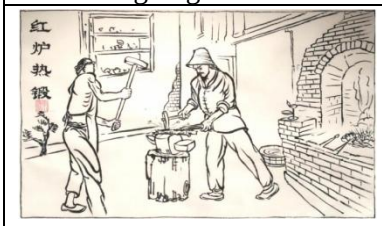
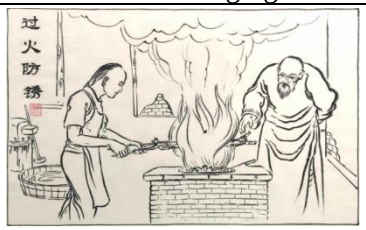
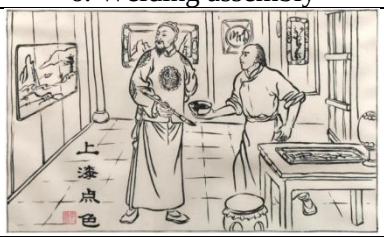
<tr><td>  </td><td>  </td><td>  </td></tr>
<tr><td>4. Hot forging</td><td>5. Cold Forging</td><td>6. Welding assembly</td></tr>
<tr><td>  </td><td>  </td><td>  </td></tr>
<tr><td>7. Shaping the draft</td><td>8. Flame cleaning to remove rust.</td><td>9. Painting</td></tr>
<tr><td colspan="3">  </td></tr>
<tr><td colspan="3">10. Framing and mounting</td></tr>
</table>

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Note: The image is from Ren Weijian, 2023.

1.2 Changes in Chinese Iron Painting Techniques Across Different Periods

For a long time, the production techniques of Chinese iron painting relied on heating iron materials using coal-fired kilns, followed by forging and welding assembly. This method remained unchanged until 1969, after the founding of the People's Republic of China. Chinese iron painting was formed through the integration of traditional blacksmithing techniques with Chinese painting. In the early stages, the tools used were mainly blacksmithing tools, including kilns, bellows, hand hammers, anvils, and sledgehammers, which were relatively rudimentary. The iron materials were heated using traditional open-air blacksmithing furnaces, which had poor insulation and slow heating rates. The bellows, a tool for blowing air, were manually operated to fan the fire, making the coal burn more vigorously.

In traditional Chinese iron painting production, three people typically collaborated: one operated the bellows, one used a small hammer for the main forging work, and the third person assisted with a sledgehammer. Due to the limitations of the heating method and the tools, the resulting artworks generally featured thick lines, simple structures, and a rough, minimalist style. Figure 2 illustrates a scene depicting the traditional production process of Chinese iron painting.

Figure 2 Scene of Traditional Chinese Iron Painting Production
Note: Photographed by researcher

Since 1969, with the widespread adoption of electric power in China, Chinese iron painting artisans developed an electric heating machine—the spot welding machine. This machine uses localized point-to-point heating of iron materials for production. This technological innovation reduced the difficulty of creating Chinese iron paintings, transforming the traditional three-person collaborative process into one that could be completed independently by a single artisan. It not only resolved the environmental pollution caused by coal but also significantly improved the efficiency and precision of the artworks. Additionally, the small size of the machine saves space, its light weight makes it easy to move, and it is safe and convenient to operate. This type of machine is suitable for people of different ages and enables individuals to complete the production process independently, thereby lowering the learning barrier for Chinese iron painting.

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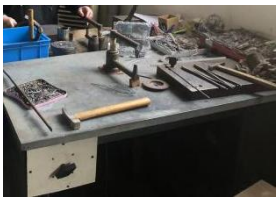
The spot welding machine is ideal for creating small to medium-sized works. When combined with updates and refinements to production tools, it can produce detailed and intricate Chinese iron paintings. However, it still presents certain challenges when producing large-scale works.

In the subsequent years, Chinese iron painting inheritors continuously improved the spot welding machine. After 2000, the machine was enhanced to allow for adjustable power settings, a greater tilt angle for the machine head, and a longer arm, making it suitable for producing medium to large-sized iron paintings. However, three-dimensional works still could not be completed using this machine alone and required assistance from an electric welding machine. Larger Chinese iron paintings continued to rely on coal-fired furnaces for heating, with bellows replaced by electric blowers, and two people working together to complete the production. The kilns themselves were scientifically improved, featuring sealed designs that allowed for faster heating and better insulation. The finer details of the works were created using the spot welding machine, which not only improved production efficiency but also compensated for the lack of precision inherent in kiln-based production.

Table 2 Three Different Heating Devices for Chinese Iron Painting

	Before 1969	**Since 1969**	**Since 2000**
Heating tools	Open-hearth furnace + bellows	Spot welder	Sealed furnace + blower
Picture			
Mode of heating	Coal + human below	Electricity	Coal + electric blower
Require labor	Three people	One people	Two people
Work presentation	Medium and large works, works are simple and rough	For small and medium-sized works, the works are elaborate and complex	Large works, details of the joint spot welding machine production
Production efficiency	Low	High	Medium
Safety aspect	Low security	High safety	Low security

2. Tools Used in Chinese Iron Painting Production:

Currently, the main production method in Chinese iron painting involves using electric-powered spot welding machines to heat iron materials, supplemented by coal-fired kilns and blowers. With the development of modern technology, the tools used in Chinese iron painting are also becoming more practical and refined.

2.1 Primary Production Tools:

The primary tools used in Chinese iron painting production include the spot welding machine, iron hammers, an anvil, and chiseling tools. With these four basic tools, the production of Chinese iron paintings can be carried out. The iron hammers come in two main types based on their uses: wide-mouthed hammers and narrow-mouthed hammers. Different hammers produce different shapes, and the choice of hammer depends on the characteristics of the work being created. The anvil serves as a base for forging the iron with the hammer. Typically, the anvil includes a raised rectangular iron block and a chiseling tool. The rectangular block facilitates the shaping and molding process, while the chiseling tool is used to cut off the forged sections (Figure 3).

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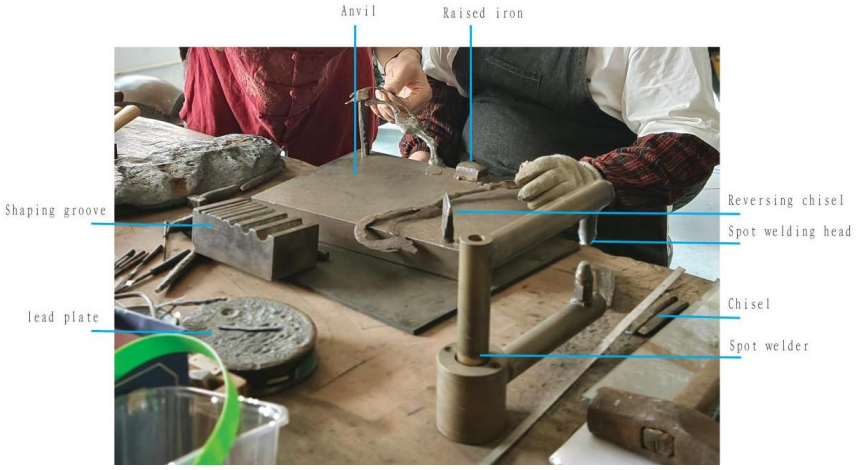

Figure 3 Illustrates the basic tools used in Chinese iron painting production.
Note: Photographed and constructed by the researcher

2.2 Primary Auxiliary Production Tools

The auxiliary tools used in Chinese iron painting production include iron tongs, iron shears, blowtorches, chisels, shaping grooves, sandpaper, files, and tin plates. Iron tongs are used to hold the iron materials in place, allowing for easier manipulation during production. Iron shears are primarily used for cutting and shaping iron. The blowtorch, connected to a liquefied gas source, is mainly used for large-scale heating and annealing, often applied during cold forging.

Chisels are tools used in cold forging for engraving patterns and creating reliefs. The shaping groove, originally a tool used in metal jewelry forging, has various slots of different widths and has since been incorporated into Chinese iron painting production as a cold forging tool for shaping and refining the artwork according to the specific needs of the design.

Sandpaper and files are used for precision polishing, while tin plates serve as a base for engraving with the chisel, similar to the use of wax plates in modern silverware production. The tin plate protects the chisel and facilitates engraving. The use of these auxiliary tools enables artisans to enhance the efficiency and precision of Chinese iron painting production.

Table 3 Primary Auxiliary Production Tools for Chinese Iron Painting

			
Iron tongs	Iron shears	Chisels	Tin plates
			
Blowtorches	Shaping groove	sandpaper	files

2.3 Modern Auxiliary Production Tools

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The main modern auxiliary tools include plasma cutting machines, machine molds, etching machines, polishing tools, spray painting equipment, and framing equipment.

The plasma cutting machine is primarily used for cutting and preparing parts for Chinese iron paintings, especially when working with thicker iron materials, which are commonly found in calligraphy pieces and larger artworks. Figure 4 illustrates a Chinese iron painting artisan using plasma equipment to cut iron materials.

These modern tools help streamline production, enabling more efficient processing of materials while maintaining the integrity and quality of the artwork.

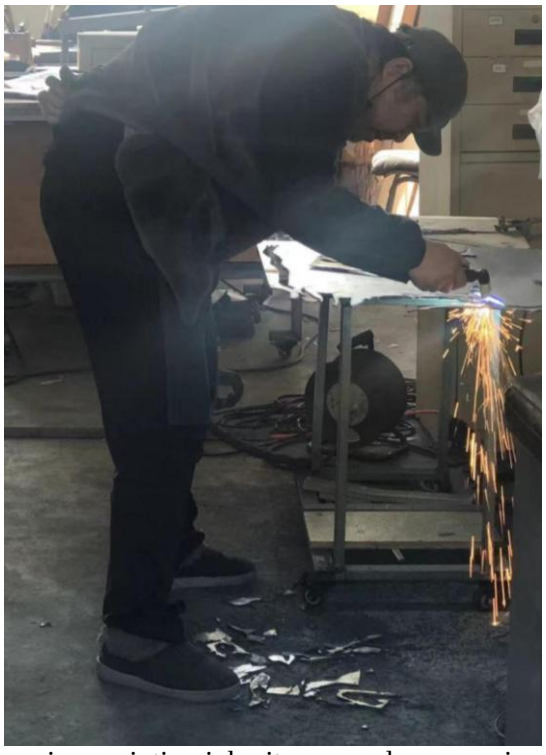

Figure 4 Chinese iron painting inheritors use plasma equipment to cut iron
Note: Photographed by researcher

Machine mold pressing is used to shape components of Chinese iron paintings by pressing them into molds. This technique is currently applied extensively in the production of elements like pine trees, bamboo leaves, plum blossoms, and animals. Figure 5 shows the machine press forming plum blossom petals and bamboo leaves of various sizes.

This method allows for greater consistency and precision in producing detailed components, contributing to the refinement and efficiency of the overall artwork production process.

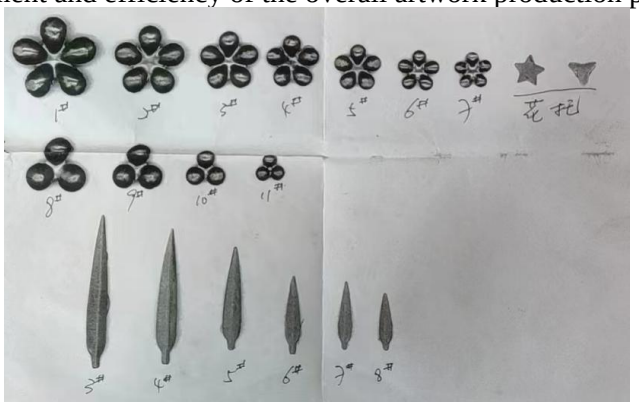

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Figure 5 Machine tool mold pressing plum blossom and bamboo leaves in Chinese iron painting.
Note: Photographed by researcher

Etching machines use chemical solutions to remove material, offering a relatively low-cost method for large-scale material removal. This process requires specific thicknesses of iron material and is suitable for producing small-sized iron paintings. Figure 6 shows a semi-finished product created by an etching machine and the final product after being refined by a Chinese iron painting artisan.

This technique allows for efficient and precise detailing, particularly in the production of intricate patterns on smaller works.

Figure 6 Semi-finished products etched by an etching machine and finished Chinese iron painting finished by hand processing.
Note: Photographed by researcher

Polishing tools, such as grinding wheels and hanging grinders, are used to replace traditional files and sandpaper for smoother and more efficient polishing.

Spray painting equipment is primarily used for medium to large Chinese iron paintings. Liquid paint is placed in a container and delivered to the spray gun nozzle through compressed air or a paint pump, creating a fine mist. This mist is then sprayed onto the surface of the artwork, forming a paint coating. After spraying, the piece undergoes natural drying to solidify the paint layer and achieve the desired performance characteristics.

Framing equipment is used to assemble frames and backing boards for Chinese iron paintings. Machines are employed to cut the materials, which are then assembled into frames. Since Chinese iron paintings are semi-three-dimensional and relatively heavy, three or more iron nails are welded to the backing board after the painting is completed for support. The backing board is typically made of wood and covered with white paper. Foam strips are placed between the backing board and the glass to maintain the necessary spacing, while strips of hard cardstock with specific widths and designs are cut and placed around the frame to conceal the foam strips and add decorative elements.

3. Representative Works of Chinese Iron Painting and Their Craftsmanship

Throughout its historical development, Chinese iron painting has garnered attention from both literati and national leaders, resulting in the creation of several influential works and notable iron painting artisans. This section analyzes famous artisans and their works from different historical periods of Chinese iron painting.

3.1 Tang Peng: Representative Works and Craftsmanship

Tang Peng, who lived during the late Ming and early Qing dynasties, is credited, alongside painter Xiao Yuncong, with co-creating Chinese iron painting (Chu, 2011), elevating the traditional blacksmithing craft into the realm of fine art. Early Chinese iron paintings were primarily small-scale works, often in the form of lamps or landscape paintings. Notable examples include *Xishan Smoke and Mist*, currently housed in the Zhenjiang Museum, *Four Seasons Flowers*, housed in the Palace Museum, and *Cursive Iron Calligraphy*, held by the Anhui Provincial Museum.

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Tang Peng's iron painting, *Xishan Smoke and Mist*, was created using a coal-fired kiln for heating, resulting in a work that is more rugged than refined. The upper part of the painting depicts mountains, with pavilions nestled among them. In the middle, at the foot of the mountains, a wide river stretches out, with small boats drifting across it. The lower section features willow trees, houses, and a stone bridge near the riverbank. The characters "Tang Peng" were inscribed in the upper left corner, and "Xishan Smoke and Mist" in the upper right corner. The composition is fresh and simple, with just a few strokes sketching the forms of people and landscapes. Large areas of blank space represent the river, creating a harmonious balance of density and openness in the layout. However, due to the kiln-heating process and the simplicity of the tools used, the lines are rather coarse, and the work lacks precision. The balance between dense and sparse areas is somewhat lacking. Early Chinese iron paintings were generally not mounted in wooden frames but instead presented in a square iron frame, which was welded in place. This piece retains its original framing style (Figure 7).

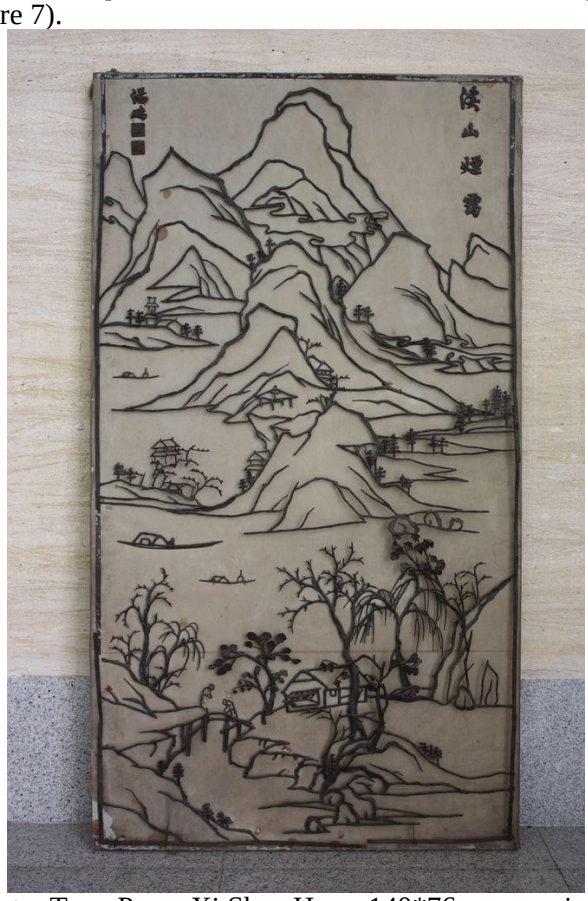

Figure 7 In the Qing Dynasty, Tang Peng, Xi Shan Haze, 140*76cm, now in Zhenjiang Museum, China
Note: Photographed by researcher

3.2 Representative Works of Chu Yanqing and Their Craftsmanship

Chu Yanqing, a native of Anqing, Anhui Province, was born in the 28th year of the Guangxu period in the Qing Dynasty (1902) and passed away in 1974. He is credited with reviving the nearly extinct craft of Chinese iron painting and trained a new generation of inheritors of the tradition. Chu played a significant role in elevating Chinese iron painting to national prominence, earning recognition and praise from prominent Chinese leaders such as Mao Zedong, Zhou Enlai, Zhu De, and Jiang Zemin. Some of his works are still preserved in the Great Hall of the People in Beijing and the Anhui Provincial Museum, with the most representative pieces being *Guest-Greeting Pine* and *Meishan Reservoir*, two large-scale iron paintings.

Chu Yanqing's iron painting *Guest-Greeting Pine* is notable for being the first large-scale iron painting created in the People's Republic of China. It was produced in celebration of the 10th anniversary of the founding of the PRC in 1959. The design was created by Professor Wang Shicen from Anhui Normal

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University, inspired by a pine tree found on Mount Huangshan, and Chu led his apprentices in its production. The pine tree in the painting stands upright and towering, symbolizing resilience and nobility. The nearby Jade Screen Peak is depicted in the foreground with cliffs, and in the background, the "Squirrel Leaps to Tiandu Peak" scenic spot is highlighted, with bold black lines outlining the magnificent main peak of Mount Huangshan. This artwork not only gained nationwide fame for Chinese iron painting but also made the scenic beauty of Mount Huangshan and the iconic Guest-Greeting Pine well-known across China (Figure 8).

This work required 200 kilograms of iron and was crafted using traditional coal-fueled kilns. A total of nine people worked for several months to complete it. Each pine needle on the tree was individually forged by hand, along with pine flowers and pinecones. The bark rings of the tree trunk were hammered hundreds of times, with each ring meticulously connected to the next in a lifelike pattern. The forging process demanded precise and swift hammer strikes, ensuring consistency and accuracy. The craftsmanship and tools used during this period had improved, and with the continuous input from artists modifying the piece, the final result exhibited a refined balance of density and elegance. Due to its large size, the lines of the work were relatively thick, making it suitable for kiln heating. This piece stands as a classic example of kiln-forged Chinese iron painting and a successful collaboration between painters and iron painting artisans.

Figure 8 1959, Chu Yanqing et al., Welcoming Pines, 4.5*2.5 m, now in the Great Hall of the People of China
Note: Photographed by researcher

3.3 Representative Works of Zhang Jiakang and Their Craftsmanship

Zhang Jiakang, born in 1949 in Wuhu, Anhui Province, the hometown of Chinese iron painting, became a disciple of Chu Yanqing in 1961. He is now recognized as a master of arts and crafts in Anhui Province and a national representative inheritor of intangible cultural heritage. Zhang began his training with foundational tasks such as operating the bellows, building kilns, and using a sledgehammer to forge iron paintings, developing a solid technical foundation. He also studied Chinese painting under professional artists, which honed his artistic literacy. The final effect of a Chinese iron painting heavily depends on the creator's technical skills and aesthetic judgment (Yang, 2020). Zhang Jiakang's works are known for their rich content, and he is particularly skilled in creating landscape-themed iron paintings. His most notable works include *Dwelling in the Fuchun Mountains* and *Announcing the Dawn*.

The Chinese iron painting *Dwelling in the Fuchun Mountains* is 10.9 meters long, featuring 572 forged iron characters and 18 different seals, and it took nearly two years to complete. The composition is grand in scale, combining the essence of traditional Chinese painting with the three-dimensional beauty of sculpture. The original *Dwelling in the Fuchun Mountains* was painted in 1350 by Yuan Dynasty artist

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Huang Gongwang and is one of China's top ten masterpieces of ancient art. Zhang Jiakang's iron painting is an exact one-to-one replica of the original, and it took him two years to finish. In this large scroll, the mountains rise and fall dramatically, the trees are lush and vibrant, and the composition is majestic, with a harmonious balance of strong and delicate lines. To mimic the varying shades and depths of the brushstrokes in the original painting, Zhang used iron plates of different thicknesses, forging them in layers. The lines and color blocks of the iron paint, shaped with the pliability of clay, create a rich sense of layering in the depiction of mountain ranges, rippling water, and overlapping trees (Figure 9).

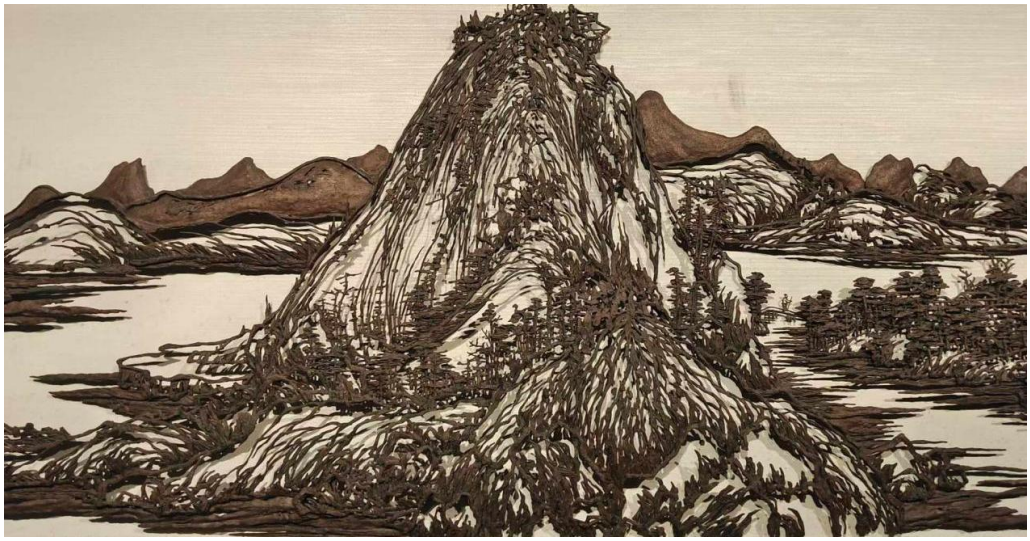

Figure 9 Part of the Chinese iron painting "Living in Fuchun Mountain"
Note: Photographed by researcher

In the creation of the *Dwelling in the Fuchun Mountains* iron painting, Zhang primarily used a spot welding machine for heating and forging, while incorporating cold forging techniques for finer details. The piece demonstrates both intricacy and complexity, with distinct layers of welding and a strong sense of three-dimensionality. The high artistic standard of the original painting is apparent, but the work also highlights Zhang Jiakang's exceptional ability to control the composition and skillfully handle fine details.

3.4 Representative Works of Ye He and Their Craftsmanship

Ye He, born in 1959, began learning the art of Chinese iron painting in 1977. He is recognized as a master of arts and crafts in Anhui Province and a provincial-level representative inheritor of intangible cultural heritage. After establishing a company in Shenzhen, Ye He expanded his horizons and demonstrated a talent for incorporating new techniques and technologies. He became proficient in working with metals such as gold, silver, copper, and iron. His representative works include *To Success* and *Eagle Spreading Its Wings*.

Ye He's Iron Painting To *Success* integrates the heavy-color meticulous painting style of traditional Chinese painting into the iron painting medium. The work primarily employs cold forging techniques, requiring the coordination of various engraving tools and flat-chisel anvils. Each forging stage must be followed by heating and annealing. After the individual parts are cold-forged, they are welded together one by one using a spot welding machine, and then the final piece is painted with acrylic and mounted in a frame. The piece showcases precise, intricate, and meticulous chiseling techniques to create an expressive and lifelike scene, breaking from the traditional iron painting method of using solely "lines" to shape the artwork and moving beyond the limitations of a monochromatic black palette. This innovation has added a heightened artistic quality to the work and broadened the forms of Chinese iron painting. However, within the iron painting community, such works are generally not recognized as true examples of Chinese iron painting, resulting in fewer artists adopting this style (Figure 10).

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Figure 10 2013, Ye He, One Road Lianke, 60*60cm, now in Wuhu Museum, China
Note: Photographed by researcher

Discussion

This paper has achieved the research goal and completed the relevant research on the historical evolution of Chinese iron painting production skills, Chinese iron painting production techniques and tools, representative figures, and works of Chinese iron painting. On the surface of the research results, first of all, Chinese iron painting production skills have been changing with The Times, from teamwork to individual independence, and have realized the transformation from coal furnaces to electric heating. Secondly, the Chinese iron painting production process adopts new technology and new tools, which are more convenient to use, save time, and improve production efficiency. Finally, the representative figures of Chinese iron painting contributed to the development of Chinese iron painting. Because of the different times, the tools used, and the production methods, the Chinese iron painting works created have their own characteristics. Excluding personal artistic accomplishment and personal skill level, the main factors affecting the modern development of Chinese iron painting are the insufficient use of new technologies and new tools, and the low efficiency of traditional production methods, which require a long time to complete a work, raising the production cost of Chinese iron painting. At present, most of the inheritors in the Chinese iron painting industry reject the use of modern machines and tools, which is not conducive to the development of Chinese iron painting to The Times. It is necessary to change this concept and use modern technology and tools to maintain the core production skills of Chinese iron painting.

Conclusion

Through the above research, we first get the production process and development changes of the Chinese iron painting production process, from the traditional blacksmithing method to the iron painting production process, and then from the coal furnace heating method to the electric power spot welding machine, which changes the production method of Chinese iron painting must be teamwork, and at the same time, the coal kiln has been improved to be more thermal insulation and scientific. Secondly, the Chinese iron painting production tools and the use of new technologies and new tools, from the basic coal kiln, anvil, scissors, and iron pliers to electric power point welding, grinding machines, and other parting cutting machines and machine mold pressing direction. Finally, the representative works of representative figures and their works produced in different periods are obtained, and the works produced by different techniques are different in aesthetics. Traditional coal kiln production works can not be fine, suitable for the production of large works, such as large iron painting work "Welcome pine" is very exquisite; Spot

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welding machine is suitable for the production of small and medium-sized works, especially the line based Chinese painting, through the spot welding mechanism can present complex, exquisite and verve; Cold forging works are suitable for face-based works, and the production is fine, neat and realistic. After hundreds of years of development, Chinese iron painting production skills are constantly updated and improved with the progress of science and technology, which not only improves the production efficiency but also becomes more environmentally friendly and safe, promoting the innovative development of Chinese iron painting.

Recommendation

Chinese iron painting is the product of the combination of technology and art, which changes the identity of practitioners from rough laborers and blacksmiths to artistic iron painting inheritors. They pay more attention to the technical level of individual production, ignoring the importance of modern technology and tools to individuals and the Chinese iron painting industry. The ancestors of the Chinese people have an old saying, "If a worker wants to do a good job, he must first sharpen his tools." Only good tools and equipment, combined with personal skills, can produce good work. Chinese iron painting practitioners need to pay attention to the application of new technologies, new tools, and new machines. There are no scholars involved in the research in this area, and the relevant application research of modern technology, tools, and equipment of Chinese iron painting should be the focus in the future. In the Chinese iron painting spot welding machine, more research and experiments should be carried out, The current spot welding machine has been unable to meet the three-dimensional Chinese iron painting assembly welding, to a certain extent, limiting the innovation of Chinese iron painting.

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