Sculpture skills – exploring the combination of traditional craftsmanship and modern technology

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Abstract. This paper explores the combination of traditional sculpture techniques and modern technology. As a cultural heritage, traditional sculpture techniques have profound historical and artistic value, while modern technology has brought new creative tools and expressions to sculpture. Through a comparative analysis of the application of traditional sculpture techniques and modern technology in the field of sculpture, this paper aims to reveal the complementary relationship between the two and explore their future development trends. It also explores the possibility and practical application of the combination of traditional sculpture techniques and modern technology and analyzes the impact of the combination of different materials, processes, and technologies on sculpture creation. Through the analysis of specific cases, the innovation path and development prospects of traditional techniques and modern technology in the field of sculpture are revealed. As an art form with a long history, sculpture has rich forms and techniques in different cultures. With the advancement of science and technology, modern technology has played an increasingly important role in sculpture creation. How to combine traditional crafts with modern technology has become an important topic for the innovation of contemporary sculpture art.

1 Introduction

Sculpture, as an art form, has a history of thousands of years. From ancient stone carvings and wood carvings to modern metal, glass, and mixed material sculptures. Technological progress will also promote the innovation of sculpture production methods, new reforms, and the continuous evolution of sculpture skills. The development of modern technology, such as digital design, 3D printing, laser cutting, and computer-aided design (CAD), has provided sculpture artists with new tools and methods, making sculpture creation more diverse and precise. At the same time, the exploration of social issues and cultural identity may become an important direction of creation, and it can also be promoted in the opposite direction, reflecting the social changes and cultural cognition of contemporary China.

In future development, Chinese sculpture art will continue to integrate traditional and modern elements, learn from international art trends, and focus on personalized creation and

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expression. As an ancient art form, sculpture has experienced thousands of years of development and has continuously innovated in materials, techniques, and artistic styles. With the advancement of modern science and technology, sculpture skills have ushered in new development opportunities. The combination of traditional craftsmanship and modern technology not only brings new possibilities for sculpture creation but also provides new ways for the inheritance and innovation of traditional skills. Exploring the modern application of traditional sculpture technology will help protect and inherit the excellent traditional culture of the Chinese nation. Analyzing the application of modern technology in sculpture will promote the innovation and development of traditional skills. Revealing the artistic value of the combination of tradition and modernity will promote the diversified development of sculpture art. Combining traditional skills with modern technology can create more novel works, expand artistic expression methods, and enhance the artistic appreciation and attractiveness of works. By integrating modern technology, sculpture artists can develop new creative methods and possibilities to achieve a wider range of imagination and creative expression [1].

This study uses a combination of literature analysis, case studies, and comparative study. Through a systematic literature review and specific case analysis, it deeply explores the combination of traditional sculpture craftsmanship and modern technology. Then, through research and study of sculpture skills, technology, and traditional techniques are integrated to enhance sculpture efficiency. Computer-aided design software is used for sculpture design, and modern manufacturing technologies such as 3D printing and CNC machine tools are used for production. Sensors, projections, virtual reality, and other technologies are applied to sculpture works to achieve interactivity and digital display of the works. By introducing new materials such as composite materials and laser engraving technology, traditional sculpture craftsmanship is improved, production efficiency is improved, and more expressive works are created.

2 Literature review

China has been famous for its ceramics since ancient times. "Ceramics" has long been synonymous with China in the international community. Ceramic sculptures from different periods not only reflect the production process of ceramic sculptures but also reflect the humanistic life under the social background of the time. Compared with traditional sculpture art, modern ceramic sculpture art not only satisfies people's visual enjoyment but also pays more attention to the cultural content exuded and carried by the sculptures, as well as modern people's understanding and yearning for beauty. This article will uphold the love of modern ceramic sculptures and conduct an in-depth analysis and exploration of their expression techniques [1].

The 20th century was not only the most revolutionary in Chinese history, but also the period when Chinese sculpture developed from its inception, and transformation to prosperity. As sculpture art matured, a group of outstanding artists emerged. In the creation of sculpture art, they adhered to the principle of "art comes from life" and actively explored the essence of Chinese traditional culture from their roots. They further innovated the spirit of Chinese traditional culture and created sculptures belonging to Chinese culture, making important contributions to the development of modern sculpture art in country. This article analyzes the rise and development trend of Chinese sculpture art in the 20th century from the perspective of development through a simple review of the protection, inheritance, and innovation of sculpture art [2].

This paper discusses the application of modern technology in ceramic sculpture and its impact on traditional skills. This paper introduces the history and traditional skills of ceramic sculpture and the application of modern technology in the field of art and analyzes the impact

of modern technology on ceramic sculpture. Subsequently, the application of modern technology in ceramic sculpture is elaborated in detail, including digital design and manufacturing technology, optoelectronic technology, and other modern technologies. At the same time, the impact of modern technology on traditional skills, including changes and challenges, is discussed. Finally, thoughts on protecting and developing traditional skills and combining innovative exploration with modern technology are proposed. This paper aims to provide reference and inspiration for practitioners and related researchers in the field of ceramic sculpture [3].

With the continuous development of the times and people's constant pursuit of beauty, ice, and snow have long been transformed from the traditional passive acceptance for survival to the current magnificent ice and snow sculptures, which have become a major tourist feature of winter tourism in the northern country and are enthusiastically sought after by tourists at home and abroad. For this reason, the existence and development of ice and snow sculpture art has its historical inevitability, and its value is immeasurable. Therefore, this article starts with the causes of the continuous development of ice and snow sculpture art conducts a superficial discussion and expounds on the value of ice and snow sculpture art, to further promote the rapid development of ice and snow activities in the country [4].

As sculpture has developed to this day, some people are pessimistic about its future. There are two reasons for this: first, the masters of all generations have made various achievements in exploration over thousands of years, and all forms and styles have been exhausted. It is difficult for people today to create something new. Second, the effect and shock of installation art created by using comprehensive materials and various means in the environment, as well as its public nature, are much higher than that of sculpture. In this case, it seems natural that sculpture should give way to "installation" using comprehensive materials. These two reasons are untenable. Because the reason why sculpture art came into being is the need of human beings to convey information and express thoughts and feelings [5].

Technological innovation can always bring convenience to practical activities and improve the efficiency and success rate of practice. The introduction of 3D printing technology has made the effects of sculpture art creation more predictable, enriched the means and materials of sculpture art creation, made the sculpture art creation process simpler, and especially ensured the accurate realization of the sculptor's creative intention [6].

Under the influence of traditional Chinese culture, stone carving art has gradually formed a carving system rich in national cultural characteristics. Stone carving art emphasizes the grasp and understanding of "form and spirit", "virtuality and reality", "artistic conception", and "reason", all of which convey China's long-standing cultural information. Studying the artistic achievements of traditional stone carving, developing and inheriting this art form, and applying it to urban planning and landscape design to achieve an organic integration of history and modernity is an effective way to create China's unique modern garden landscape [7].

Woodcarving art is a treasure in the treasure house of Chinese culture and art and is one of the representative forms of traditional Chinese folk art. It has created a rich variety of themes with a unique creative method, spanning the 5,000-year history of the Chinese nation and becoming a symbol of the traditional cultural spirit. As one of the important artistic means of inheriting Chinese traditional culture, it promotes and inherits the thoughts and culture of the Chinese nation with works that have a sense of the times and rich and substantial connotations [8].

The development of art has always been inseparable from science and technology. In a sense, art can reflect the level of science and technology from one aspect [9].

Since the 20th century, modern artists have held two opposed attitudes toward industry and scientific civilization. One attitude believes that the development of science, industry,

and technology will hinder the prosperity of art, and art should go its separate ways from technology, advocating pure and independent art; the other attitude believes that art cannot be separated from industry and technology, and art should combine and reflect modern industry and technological civilization. This can also be said to be the two major artistic schools of thought regarding modern technological civilization. Mr. Cai Wenying undoubtedly belongs to the enthusiastic science and technology school, and he belongs to the science and technology school that has made contributions to artistic creation [10].

His contribution lies in the use of new scientific media and new technological means, and in endowing these media and means with new artistic images. These images have the connotation and meaning of Chinese national culture and are full of natural interest and human emotions. Mr. Cai Wenying used scientific principles and engineering technology to create the vibrating rod [11].

3 Classification of traditional sculpture techniques

3.1 Stone carving

Stone carving is one of the oldest forms of sculpture, with a long history and cultural background. Stone carving techniques require sculptors to have superb manual skills and profound artistic accomplishment. Use various tools and techniques to create works of art on stone. This form can be traced back to prehistoric times and has developed into a superb skill over time. Representative works include Dunhuang Grottoes, Leshan Giant Buddha, etc. Common stone materials include marble, granite, sandstone, etc. Artists use chisels, hammers, and other tools to carve stones to create works of various forms and themes, covering different fields such as religion, history, characters, animals, etc. The process includes material selection, design, chiseling, polishing, coloring, etc. Traditional stone carving works usually have fine textures and carved details, showing the artist's skills and creativity.

3.2 Wood carving

Wood carving is a traditional sculpture technique that plays an important role in many cultures, especially in China, Japan, and Southeast Asia. Wood carving is known for its delicate texture and flexible expression, which can produce complex patterns and images. Among the representative works: Dongyang wood carving, Longquan wood carving, etc. Wood carving creates various forms of sculptures through cutting, carving, polishing, and other processes on wood. This technique can be traced back to ancient times and is widely used in religion, culture, folklore, and other fields. Wood carvings often display exquisite craftsmanship and rich artistic expression and have a long history and unique style all over the world.

3.3 Jade carving

Jade carving is one of the traditional Chinese sculpture techniques, which uses jade for carving creation. Known for its warm and delicate texture and rich colors, it is suitable for making exquisite crafts. Jade is delicate in quality, beautiful in color, and has a long history. It is often used to make various arts and crafts. Such as Hotan jade carving, jade carving, etc. The process includes material selection, design, carving, polishing, inlay, etc. Jade carvings play an important role in Chinese culture and are commonly found in utensils, jade pendants, statues, etc.

3.4 Traditional metal sculpture

Traditional metal sculptures include materials such as bronze, iron, and copper. Artists can create metal sculptures through forging, casting, welding, cutting, and other processes, which require complex production processes and delicate manual operations. Metal sculptures have the characteristics of hardness and luster, which are suitable for monumental sculptures and decorations. They can be displayed indoors or outdoors and are commonly seen in places such as public art, garden landscapes, and museums. Metal sculptures have strong durability and stability, and can show a variety of forms and styles, from abstract to realistic.

3.5 Ceramic sculpture

Ceramic sculpture is a traditional sculpture technique that uses clay to make sculptures, which are completed through molding, drying, firing, and other process steps. Representative works include Jingdezhen ceramic sculptures, Longquan celadon, etc. Ceramic sculptures usually have high artistic value and decorativeness. Ceramic sculptures have the characteristics of delicate texture and rich colors. They are suitable for decorations and daily necessities. They are common in ancient civilizations and have been widely inherited and developed.

4 Application of modern technology in sculpture

4.1 Application of modern technology

Digital modeling is the process of creating three-dimensional models using computer software (such as Maya, ZBrush, Blender, etc.). Artists can design and modify in a virtual environment until the ideal effect is achieved, which greatly improves the efficiency and accuracy of design. 3D printing technology uses digital models to create physical objects by stacking materials layer by layer. 3D printing can produce complex sculpture models, including plastics, metals, ceramics, etc., which are suitable for prototyping and the creation of final works.

Laser cutting technology can accurately cut a variety of materials, such as metal, wood, and plastic, making the details of sculptures more refined. Laser cutting and engraving technology can achieve high-precision production of complex patterns and details, greatly improving the fineness and artistic expression of sculptures. It can achieve complex patterns and fine detail processing and is widely used in sculpture creation.

CAD software provides powerful tools for sculpture design, which can perform complex three-dimensional modeling, simulation, and analysis, and improve the accuracy and efficiency of design. At the same time, CAD is also an indispensable part of modeling now, and it is also a way to improve accuracy. CNC engraving technology controls the movement of the tool through the computer to achieve high-precision processing of materials. This technology is suitable for a variety of materials such as wood, metal, stone, etc., making sculpture creation more efficient and accurate.

4.2 Virtual reality and augmented reality

Virtual reality (VR) and augmented reality (AR) technologies provide new means of expression for sculpture creation, enhancing the audience's sense of participation and interactivity through virtual display and interactive experience. Artists can use VR for immersive creation, observing and modifying their works in real time; AR technology allows

the audience to interact with virtual sculptures through mobile devices, enhancing the viewing experience.

4.3 Development of new materials

The development of modern science and technology has brought about the development and application of new materials, such as composite materials and smart materials, which provide more options for sculpture creation and enrich the form and expressiveness of the works. Composite materials (such as glass fiber and carbon fiber) combine the advantages of multiple materials and have characteristics such as light weight, high strength and corrosion resistance. They provide more options for sculpture creation and are particularly suitable for large and outdoor sculptures. Smart materials (such as shape memory alloys and photochromic materials) can respond to changes in the external environment and change their shape or color. Such materials bring dynamic and interactive characteristics to sculpture creation, making the works more vital and technological. With the enhancement of environmental awareness, sustainable materials (such as recycled plastics and bamboo fibers) are increasingly used in sculpture creation. These materials are not only environmentally friendly but also have unique aesthetics and touch, bringing new possibilities to sculpture art.

5 Combination of tradition and modernity

5.1 Inheritance and innovation of skills

Modern technology has injected new vitality into traditional sculpture skills, allowing traditional skills to be better inherited and developed. For example, 3D scanning technology can record and save detailed information on traditional sculpture works, providing valuable data for subsequent research and reproduction.

Ancient Greek sculptures and modern restoration technology, through 3D scanning and printing technology, researchers have successfully restored many ancient Greek sculptures to reproduce their historical appearance.

Combining traditional sculpture techniques with digital modeling technology, one has created works that retain the essence of traditional craftsmanship and have a modern style, exploring the dialogue and integration of tradition and modernity.

5.2 Integration of materials and craftsmanship

Through the application of new materials, explore the expressiveness and possibilities of traditional craftsmanship under new materials, and create innovative sculptures. Modern materials such as resins and composite materials are combined with traditional materials such as stone and wood to create sculptures with unique textures and visual effects.

5.3 Interdisciplinary cooperation

The development of modern science and technology has made sculpture creation no longer limited to a single art field, but closely integrated with multiple disciplines such as engineering and materials science, forming an interdisciplinary cooperation platform.

Traditional Chinese woodcarving and modern laser technology: In China, many traditional woodcarving artists use laser cutting technology to improve the accuracy and efficiency of carving, while retaining the artistic value of hand-carved carving. At the same time, virtual reality and augmented reality technology can also be used to create a digital

display platform to enhance the audience's interactive experience and sense of participation and expand the display space of traditional sculptures.

6 Suggestions

Strengthen the cooperation between art and science and technology, materials science and other disciplines, promote interdisciplinary innovation, and open up new areas of sculpture creation. Even traditional crafts need to keep pace with the times, cooperate with each other, and improve the efficiency of finished products. The application of modern technology requires the mastery of new technologies, which increases the threshold for creation.

Strengthen technical training and education, cultivate compound talents who understand both traditional crafts and modern technology and promote the inheritance and innovation of sculpture skills. It is no longer limited to physical hands-on ability, but also improves the further discovery of science and technology, and learning is more extensive. Respect tradition in the process of innovation, deeply understand and inherit cultural connotations.

Through market application and promotion, expand the influence of sculptures that combine tradition and modernity, attract more investment and attention, and promote industrial development. Through interdisciplinary cooperation and market promotion, reduce costs and improve economic benefits. With the improvement of market competitiveness, people's needs are gradually increasing. The Internet and offline entities can be used for publicity so that more people can learn and develop craft art.

Pay attention to environmental protection and sustainable development in the process of material selection and production and explore new paths for green sculpture creation. The improvement of technology, 3D printing, and digital assistance can reduce the failure rate while obtaining more environmental protection.

7 Conclusion

The combination of traditional sculpture skills and modern technology not only retains the essence of traditional crafts but also introduces the innovation of modern technology. In the future, with the further development of science and technology, sculpture art will usher in more possibilities and challenges in materials, crafts, and expressions.

The research results of this study are the combination of traditional sculpture crafts and modern technology, which provides new possibilities and broad prospects for the inheritance and innovation of sculpture art. Therefore, it is further concluded that the latest scientific and technological means, such as artificial intelligence and augmented reality, should be studied and applied to inject new vitality into sculpture art. This study provides a lot of valuable reference significance for future research in this direction, which mainly affects interdisciplinary research and cooperation, promotes interdisciplinary research in the fields of art, technology, materials science, etc., and explores more innovative paths. Future research should focus more on the direction of scientific and technological applications for in-depth exploration. In the future, with the advancement of science and technology and the deepening of interdisciplinary cooperation, sculpture skills will surely show their unique charm and value in a wider field.

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