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STUDY ON THE DETAILED DESIGN OF INTERIOR SPACE USING COPPER MATERIALS

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Abstract:

This paper will focus on the application of copper materials and artistic expression techniques in the detailed design of interior spaces, and take the detailed performance of copper materials in interior design as an entry point to analyze the cultural and aesthetic value of copper detailing in interior space design, to explore in depth the artistic expression of copper materials in the detailed design of interior spaces. The study and exploration of the rich connotation and expression of copper as an interior space design material, and the exploration of the deeper artistic expression of copper in detail design, to provide a broader range of ideas and vision for the better application of copper materials in the detail design of interior spaces. This paper is based on the language and extensive practical application of copper materials, using a combination of theory and practice, and a method of subjective and objective argumentation.The detailed design is analyze in terms of the purity and comprehensive performance of copper materials in the design of interior spaces. Taking the design of copper detailing as an example to dig deeper into the logic of thinking when the material intervenes in the construction of contemporary interior space detailing design. Based on the theoretical overview and the analysis of actual cases, the theoretical system of interior design theory is further improved by taking copper as an example to create detailing with materials, and by using detailing as a prototype for spatial design, and by summarizing the corresponding design strategies and methods for creating detailing with materials.

Keywords:

Copper Material, Detail Design, Space Prototype, Aesthetics Of Living

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Introduction

In the increasingly diverse contemporary architecture and interior design,the evaluation criteria for excellent design work are no longer limited to form or function. In the past, modernism proposed the design concept of "form follows function" and became the mainstream. But in the digital environment, the internet and virtual communities have not made relationships between people closer, but have strengthened individuals' loneliness and personalization. Therefore, interior design also bears the heavy responsibility of human spiritual and emotional communication. And details are an important medium for expressing the connotation of indoor space quality.

Detail design is the operation of formal connections and techniques in the process of proving and establishing sufficient skills, turning special and accidental details into protagonists. (Christoph Kumpusch， 2016) When constructing spatial details, materials are the most primitive construction elements and the most basic connection points. The texture, texture, color, and other characteristics of different materials can produce different visual and tactile sensations for the creation of spatial details, directly affecting the communication between people and space. This type of material implies the generation or transformation of details, which in itself constitutes the uniqueness of architectural culture. Therefore, when injecting this spiritual value, the general node is a precipitation of the ontology rather than just a connection. In the process of integrating materials into a whole, the design of details includes discovery and emotion. The detailed connection part is the key part of form operation and design and is the focus of indoor space creation activities.(Tang Jinghua, 2019)

Therefore, the study of material details and node creation in indoor spaces is of great significance. Therefore, this article will take copper materials as an example to explore in-depth, focusing on the upper-level thinking of spatial details, revealing the logical relationship between material creation details and architectural space, functions, art and humanistic emotions, regional culture, and other contents. It will also explore how to use detail design as a theoretical system for spatial design prototypes And summarize the corresponding design strategies and methods for material creation details.

Literature Review

International Research Status

The application of modern building and interior detailing materials has long been studied and experienced in developed countries, and many excellent design works have appeared. Some famous contemporary architects have made outstanding contributions to the application of materials and the development of detailed design, such as Carlos Capa, Peter Zumto, Alvar Aalto, Louis Kang, Kengo Kuma, Ito Toyohong, and so on. Ito Toyohong, etc. Their exploration of spatial detail design is not only in the texture, texture, colour of the material itself and the expression of the skin, structure and combination of the detail, but also combines the artistic expression of the material with the pursuit of culture, ecology and sustainability, so as to make the detail and the environment in which the space is situated to establish an organic connection. Careful study of the works of foreign architects can feel the construction of details is the realization of spatial design ideas and the process of in-depth scrutiny, mastery of the detailed construction process, so that architects can establish the overall spatial dominance, and the implementation of a unified design concepts, embodied in the space detailing the design of art, logic and technology.

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In terms of theoretical research, many foreign scholars have conducted systematic research on materials and details. For example, Fran Puton edited the "architectural culture research" to make materials and architecture and other forms of updating to a higher level, the study of the physical properties of the material, the relationship between the material and space, culture, structure and other factors. It has had a significant impact on attitudes towards the study and application of building materials(Fran Puton,2013). Materials, Forms and Buildings, edited by Richard Weston, also links the technical and cultural aspects of materials. The Material Expression of Architectural Design, edited and written by Debel and Patrick Land, provides a basic understanding of materials as the types, history, properties and techniques of several metallic materials, including copper (Patrick Land,2015), have been broadly organised. In addition, there are many books related to architectural structures, skins, details, etc., which are important for the design of metal materials. Kuang Kongming's "Detail Culture" breaks down the concept of "detail" and examines it, not only by listing the works of the many masters of detailing, but also by focusing on how the different details are integrated to make the work compelling and effective. Edward R. Ford's "Architectural Minutiae" expresses the idea that the understanding of the overall space cannot be separated from the understanding of the minutiae, and that the role of the minutiae is not only to create natural insinuations and connections. Pierre Von Maes' Architecture in the Elements analyses and elaborates on the spatial view of form, place, and construction most eternally in the architectural experience (Pierre Von Maes,2014).

Current Research Status In China

Domestic architecture and interior space design, often from the outside looks very luxurious, but usually do not pay too much attention to the details of the design, the rapid development of domestic interior design in the past two decades, the development of the whole industry behind the thriving, or the lack of fine details of the fine craftsmanship, affecting the overall level of quality of the interior design level to enhance the quality of the classic masterpieces that do not give people to leave again and again to savour and think about. However, the rapid development of China's economy, a large number of first-class architects in China's creation for the development of architecture and interior space design provides valuable experience for reference. Domestic designers also pay more and more attention to the design of spatial details and the use of materials.

In terms of theoretical research, the use of detailing and materials has also attracted the attention of many scholars, such as Chen Englong and Mo Tianwei's Architectural Detail Design and Chu Zhiyong's The Material Language of Architectural Design, Yu Qinbo's Non-Standard Materials: Contemporary Architecture: The Use of Non-Conventional Materials, Yu Qinbo's Non-Standard Materials: The Use of Non-Conventional Materials in Contemporary Architecture, and Yu Qinbo's Non-Standard Materials: The Use of Non-Conventional Materials in Contemporary Architecture(Yu Qinbo,2019).Non-Standard Materials: The Use of Unconventional Materials in Contemporary Architecture" by Yu Qinbo summarises the types of metal materials, their properties, and the construction methods commonly used in the development and practice of new metal materials, and provides most architects with a basic knowledge of copper materials. The Poetry of Carlo Scarpa's Spatial Flows, by Riki Chu, analyses the life of Italian architect Carlo Scarpa and many examples of Carlo Scarpa's designs in a narrative style. Scarpa's control of all the fine details of architecture makes spaces appear rational, expressive and beautiful, and his keen touch with materials enriches his spatial language into timeless classics. During this period, there are also some excellent master's theses

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involving the study of metal materials, which mainly focus on the expressiveness and material language of all kinds of metal materials including copper materials, for example, Wang Yan's postgraduate thesis of Xi'an University of Architecture and Technology "Exploring the language of architectural materials of copper" focuses on the expressive techniques and application of copper materials, and Anhui University of Architecture's Tang Jinghua's "Copper Materials in Architectural Decoration Design". Research on Artistic Expression of Copper Material in Architectural Decoration Design" also analyses the application characteristics of copper material in architectural facade(Tang Jinghua,2019)

Methodology

The research of this paper is to illustrate how to create space details by taking copper material as an example. Copper material is the main research object, and its physical characteristics, such as surface color, texture, and texture, will be analyzed in depth, as well as its functional value in interior space. More importantly, it will explore the artistic and humanistic emotional value brought by copper material's intervention in detail design, explore more possibilities of copper material, and ultimately present space design that can touch people's hearts through details, revealing the logical relationship between material details construction and the function, art, and humanistic emotions, and regional culture of interior space, continuously expanding the construction and organization of the overall space from the detail as the smallest unit, shaping space brand image and enhancing space quality.study of this thesis is to illustrate how to create spatial detailing, copper material as the main object of study, will be its physical characteristics, such as surface colour, texture, texture and other characteristics of in-depth analysis it in the functional value of the interior space, more importantly, to explore the copper material involved in the detailing The design of the art and humanistic emotion value brought by the copper material, to explore more possibilities of copper material, and ultimately to present the space design that can touch the human heart with the detailing, revealing the logical relationship between the material detailing and the function of the interior space, art and humanistic emotion, regional culture and other content, with the detailing as the smallest unit constantly expanding to the creation and organization of the overall space, in order to shape the space brand image and enhance the space The design of the space is a reflection of the logical relationship between material detailing and the function and human emotion of the space, as well as regional culture.

The Development Of Bronze Detailing And Its Application In Contemporary Interior Spaces

As a metal decorative material, copper has a long history of use in China. It has unique decoration and texture, delicate effect, and coexistence of fashion and classics. In ancient times，Copper wire and copper foil are local decorative materials in buildings, mainly used for door handles, locks, shutters, guardrails, etc. The unique visual and tactile effects of copper, color, and texture can fully express its noble and classical temperament. Classic brass has a noble temperament, and designers incorporate simple architectural design into this noble temperament, enhancing the quality of architecture. Different materials have different characteristics, and wise architects always maximize the potential properties of materials through various processing techniques, various construction techniques, and various expression methods. In contemporary interior design, the use of traditional materials such as copper creates a unique architectural atmosphere, which is a perfect combination of modern design language and Eastern traditions. Some high-end commercial real estate projects, especially villas, use copper, a traditional and low-key material. It can reflect the tranquility,

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simplicity, joy, and calmness of space, which is difficult to feel in the mechanical and cold buildings of steel and glass in modern cities. From war weapons to national instruments, from royal use to civilian use, copper products were once essential daily necessities for the Chinese people. (Wang Yigang, 2016)The most important significance of this long-standing copper culture for the Chinese people is that they have a profound emotional culture. Copper materials are distributed in every corner of our lives, reflecting their unique beauty and restoring vitality to copper.

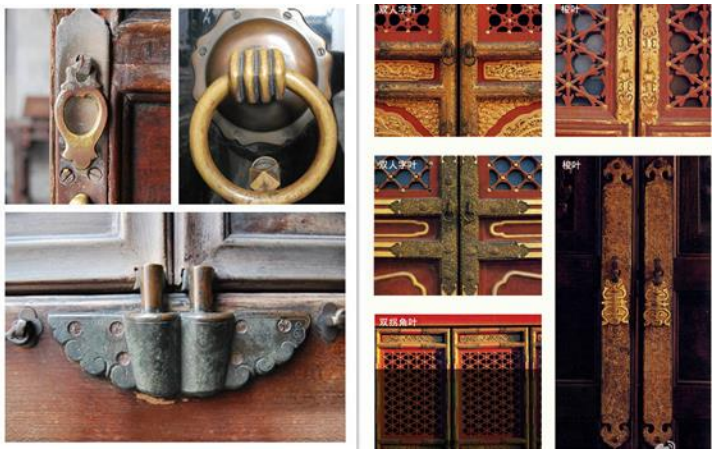

Figure 1: Bronze Components In Ancient Chinese Interiors
（History Of the Use of Copper）

Characteristics of Copper Materials

Copper is highly ductile and easy to work with. The main forming processes are casting, engraving, stretching, welding, cutting and hollowing. The use of copper sheeting on the roofs or spires of medieval churches was very frequent, not only for its appearance but also for its other advantages. Copper panels are often used in the design of architectural facades. With curved, trapezoidal and cornered forms, the construction of copper panels creates a wealth of architectural form and many of the world's classic buildings are known for their use of this technique. Pure copper can be drawn into very thin copper wire to make decorative copper wire, or it can be processed into very thin copper wire, copper foil. Copper wire is made from brass (alloyed copper) and is mainly used in marble, granite and terrazzo. It is used as non-slip wire for spacers and stair treads, as crimping wire for carpets, as decorative wire for walls, etc. Copper wire is strong, it is wear-resistant, non-corrosive and has a golden sheen on the surface.

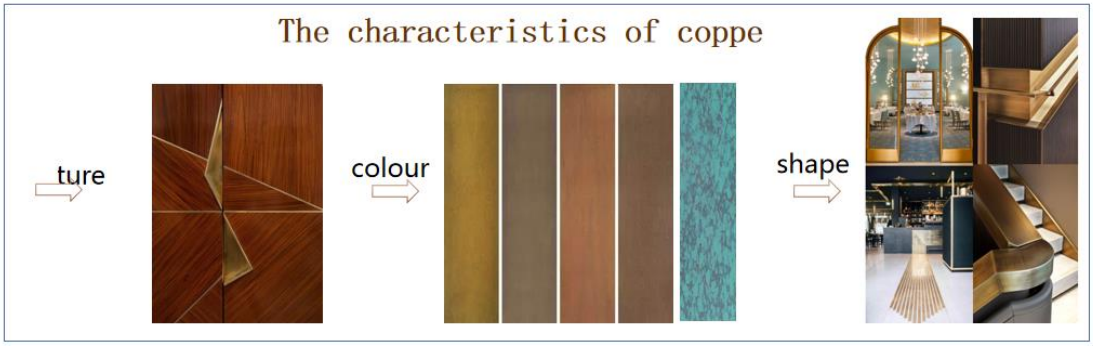

Figure 2: The Characteristics of Copper

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Classification Of Copper Detailing Nodes In Contemporary Interior Design

Depending According to the different roles and application methods of copper materials in space, and different application parts, they can be divided into two categories:

• Surface system: Due to the superior characteristics of copper materials and the unique visual effects of the surface, even if no artificial processing is done, copper materials can produce changes in surface color and luster with changes in time and environment. With the diversification of processing technology, copper materials can also present various forms such as dot, line, face, block, punching, and hollowing, which can be light or heavy. The surface texture can also be presented in smooth and rough, reflective and matte, bright and dull colors, and the texture is varied, making it very suitable for shaping the surface details of space.

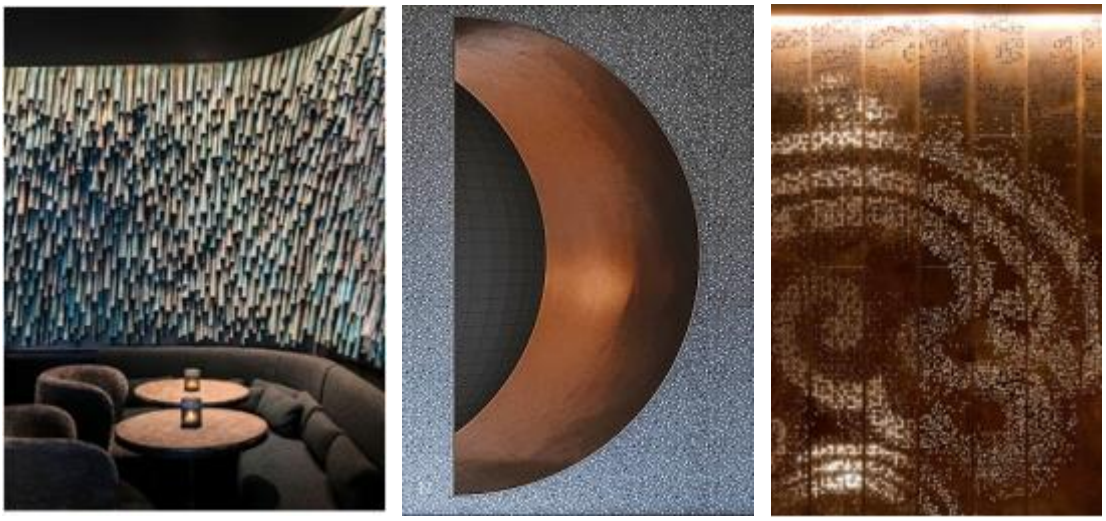

Figure 3: Detail of The Skin in Copper

• Connection system: Copper materials are widely used as connection nodes in architecture and interior space due to their easy-to-process mechanical properties. They are delicate and elegant, showing the exquisite detail expression of copper as a metal material. The form of the connection node is also very diverse, combined with structural function and artistic form, and is often used in the transition and closure of different materials and shapes as a finishing touch. Italian architect Carlo Scarpa is very good at using copper materials as nodes in space details, which not only contain structural functions but also are very rich in decorative aesthetics. This technique is used in many cases he designed. For example, at the entrance of the Olivetti store, copper strips were used to splice the wall, and copper wire was used to geometrically divide different types of stones at the splicing site, making the material transition natural, and also serving as a small part of the surface expression. The metallic luster makes the details shine. The handrail of the stairs also used copper components as connections, making the handrail slender and light. There are also some closure points of the display table.

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Figure 4: The Connection Details of The Copper Material Designed By Carlo Scapa

Value Analysis of Contemporary Copper Material Application in contemporary Interior Space Detail Design

Copper has a unique aesthetic value, both as a skin material and as a component, and its use in interior spaces is a unique and rich aesthetic experience. The AMMO restaurant(Figure 5) is located in a former British armory in Admiralty, Hong Kong.The design of AMMO restaurant was inspired by Jean-Luc Godard's 1960s film "Alvaro City" and uses many copper components to create a vintage and sophisticated atmosphere. In order to echo the science fiction theme of the film, three vortex-shaped chandeliers were installed in the center of the restaurant, with the main structure of the branch-shaped chandelier made of copper pipes. The shell is made of thin copper foil mesh, rushing down from the 6-meter-high ceiling, giving a sense of both hardness and softness. The ceiling decoration is modeled after the interior of a bunker, with the central area being mirrored and reinforced with copper. Under the soft yellow light, the scene of the former military warehouse is artfully recreated. The decorative murals behind the bar are also made of bronze-colored branches, with alternating stripe thickness forming a huge semicircular pattern. The shockwave emitted outward triggers endless imagination, once again alluding to the historical background of the military warehouse. The use of various rich copper components to create interior space details and the artistic design approach showcase the aesthetic value of copper material to the fullest extent.

Figure 5: AMMO Restaurant Detail Design

Humanistic Values

As a metal material with a long cultural history, copper's historical development in the field of culture can be seen as a presentation of the essence of traditional Chinese culture. Even today, copper material is widely used in many fields and has a solid mass base and aesthetic recognition. The use of copper material as a way of intervention reflects in spatial artistic

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language, which leads to the transformation of the composition and humanistic values of interior space and shapes a unique spatial brand image.

The backdrop of the front desk of the FangSuo Bookstore (Figure 6)features a unique copper panel wall with natural brass texture and texture. The brass plates are first roasted to soften them before being pounded and then forged into a brass wall after the brass blocks are transported to FangSuo Bookstore, presenting an atmospheric and magnificent feeling, looking like a spectacular natural landscape painting from the inside out, reflecting the understated, introverted and cultural brand ethos(Vinitha, et al, 2021). In Chengdu, a 'time warp' concept has been used to create a golden-looking sculpture, weighing 16 tonnes, which wraps around the lift and the exit area connected to the square. The bronze is pounded from the inside out, then rubbed and burned with a potion to give it an understated and mysterious sheen, expressing the artistic concept of a time tunnel and symbolizing the arrival of a magical space of real space. In the spatial design of the square, not only copper materials are used, but also natural materials such as wood, bamboo, paper, cloth, and stone, are presented most originally. The use of raw textured materials reveals an unpretentious aesthetic, reflecting the Eastern design philosophy, the principles of books, aesthetic life, clothing design, and coffee selection. "Made from natural materials, it balances aesthetic and practical values". Through the use of materials, it creates a unique and distinctive brand image and human values.(Qiu Yueye, 2021)

Figure 6: The Application of Copper Materials in Fangsuo Bookstore

The Manifestation And Processing Technology Of The Surface Texture Of Copper Material Details

In modern large-scale industrial production of copper materials, surface treatment is relatively simple, and even stainless steel processing is used to imitate the color and texture of many copper materials at a lower cost. However, if copper is only used for its color and lacks more diverse forms of aesthetic value, the intrinsic value of copper cannot be fully explored. The aesthetic experience conveyed by the surface texture, shape, and texture of copper materials is a vivid and artistic craftsmanship, which can be presented through manual processing techniques. Traditional manual techniques for shaping surface textures of copper materials are irreplaceable in modern industrial mass production.modern copper material mass production in large industries, the surface treatment is still relatively single, and even stainless steel processing to imitate the color and texture of many copper materials are more inexpensive if only a single use of copper-colored surfaces, copper materials as a detailed lack of more diverse forms of beauty failed to dig deeper into the intrinsic value of copper. The aesthetic experience

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conveyed by the surface texture, shape, and grain of copper materials is a vivid art of handcrafted beauty that can be revealed through manual craftsmanship. The surface texture of copper is shaped by traditional craftsmanship in a way that cannot be replaced by modern industrial mass production.

Copper Casting Technology

Copper casting technology has a long history, and China's splendid bronze culture was created through traditional casting techniques, which have now become very mature and can create a variety of shapes and textures. In summary, the copper casting process involves melting copper into liquid by high-temperature firing, pouring it into the mold, and then obtaining semi-finished products after the copper liquid cools. There are many ways to cast copper, and most of them require 11 complex and rigorous procedures. The lost wax casting method is a common one, which involves mud sculpting, silicone mold making, resin prototype making, resin embryo trimming, silicone mold making, wax prototype making, wax prototype trimming, sand mold making, casting, casting trimming and processing, surface treatment, and protection. This technique is suitable for producing complex-shaped details with various textures, solid textures, and rich visual and tactile experiences.(Fang Chunzhu,1995)

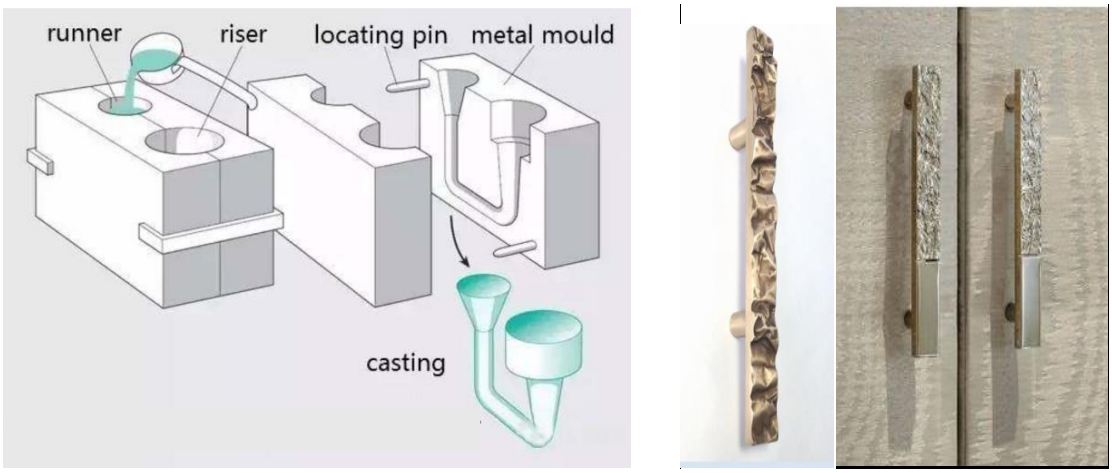

Figure 7:Process Flow and Detailed Effects

The Forging and Chiseling Technology of Copper

The process of forging and burring copper involves heating the sheet to soften its texture, using the metal's ductility and its ability to return to hardness after hammering, and striking it with a tool to shape and create a muscular effect. As a result of the collision of forces, physical states such as size, direction, lightness, strength, rhythm, hardness, softness, order and rhythm are produced. As a result, the copper material also produces various forms of beauty under the action of force. (Zhang Jiayan, 2016) and the striking of different tools also produces different muscular shapes depending on the form of the tool. The forging and burring process makes the surface texture of the copper detail more handcrafted, and the unique and unrepeatable marks made by the craftsman's hammering can be savoured, adding a stronger artistic flavour and ageing to the interior detail.

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Figure 8: Wrought Texture in Copper

Copper Melting and Casting Technology

Copper melting and casting art was pioneered by the Chinese arts and crafts master Zhu Bingren. It controls the liquid state of copper, utilizes the principles of metal ductility, and controls the flow rate, flow direction, formula, and solidification rate of copper during the melting process to create a natural solidification state of copper, called the moldless controllable melting and casting technology. In the creation process, although copper water can flow freely, some unique methods are also used, such as adding lime powder to increase resistance, controlling the flow rate and direction of copper water, or using sand, special containers or media to cooperate with each other to create various shapes, allowing copper to flow freely and unconstrained under high temperature, and completing the expected texture effect before copper solidifies. This technique makes the shape more abstract and free, and achieves more artistic possibilities for copper materials' details and surface.

Figure 9: Copper Melting Process

Copper Etching Process

The etching process generally refers to metal etching, also known as photochemical metal etching, which refers to removing the protective film of the etched area of the copper plate after exposure plate making and development. When in contact with chemical solution during etching, the effect of dissolution and corrosion is achieved, and the effect of irregular texture is formed, and then polished. The basic steps are divided into substrate cleaning and surface treatment - coating - hot air pre-drying - exposure - development - supplementary light curing - drying - etching - deinking - post-production steps, which can be passed Chemical etching etches various patterns and textures on copper plates. The etching process can make the surface

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layer of the copper material rich, the texture is delicate and beautiful, and the details used for the interior are more diverse and rich.

Figure 10:Copper Etching Process

Surface Colouring Process For Copper

The copper colouring process is based on the colouring of the surface of copper after its fine form has been shaped, so that the copper material can have more colour variations in addition to its own inherent colour. The copper colouring process can be roughly divided into two main categories: cold colouring is the chemical reaction between the copper surface and the chemical solvent by soaking or spraying with a chemical solution at room temperature, because the available formula is relatively limited, generally commonly used is copper sulphate or sodium sulphide solution, can form some old bronze effect, the formation of the colour is more limited; while the hot colouring is because the modern process has developed The copper element and the chemical solvent use a variety of heating tools, control the fire, grasp the rhythm of time, deploy the concentration of chemical solvent, brush strokes or spray volume, so that the chemical reacts with the copper surface to produce a colourful copper oxide.(Web-1)

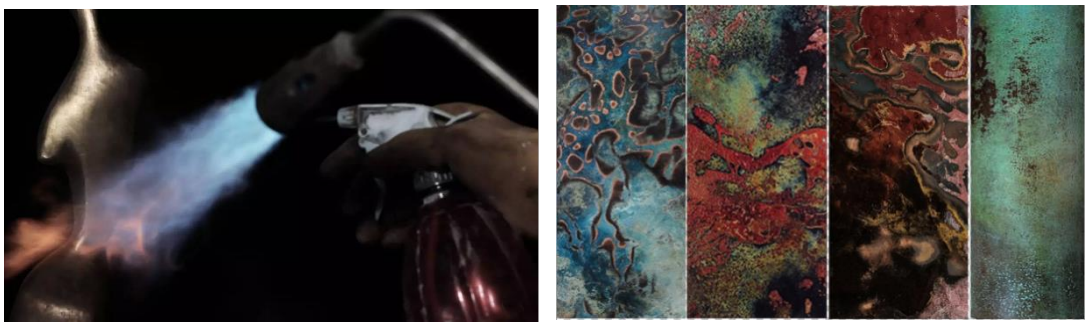

Figure 11: Surface Colouring Processes and Effects on Copper

Conclusion

Copper Copper material has a deep cultural heritage and is widely used in various fields. (Zhu Junyi,2017)Combining the characteristics of copper material and tracing its usage history from ancient to modern times in China, one can understand the development and rich cultural connotations of copper culture. However, besides being used in some antique buildings in China, copper is rarely used in other types of buildings. At present, the application of copper material in interior space details is mostly manifested in the surface design of space parts and the connection-type nodes. It is usually reflected in the functional, structural, and formative connections. Modern copper materials are mostly mass-produced in large industries, and the surface treatment is relatively simple. To make copper material more diverse in interior space

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details design, its form should be more varied and rich in layers, and its handcrafted aesthetic beauty should be further explored from the cultural and emotional level, texture effects, and surface coloring. Various research methods have been employed to yield the following results:

- Analyzing the characteristics of copper materials and exploring their value from both physical and spiritual perspectives.
- Classifying copper material detail nodes into surface systems and connection systems, and demonstrating their functional, aesthetic, and cultural values in interior space design.
- Listing the forms of copper material surface texture and processing techniques, exploring the use of traditional craftsmanship to further explore the possibility of more diverse artistic aesthetics of copper materials.

Different materials have their own advantages and disadvantages, mining material physical characteristics and cultural characteristics, such as copper material in the design of indoor details, unique expression, provides a very good reference for indoor detail design, and with this kind of material construction interior details logical thinking framework, in the present interior space design and forms under the trend of increasingly diversified, can provide creators with a broader space for thinking.

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References

Anink, D. Boonstra, C.， Mak, J.（2018）Handbook of Sustainable Building. *An Environmental Preference Method for Selection of Materials for Use in Construction and Refurbishment*; 56–67

Celadyn, M.（2017）The inner space elements in shaping indoor environment quality parameters. *Integration of Art and Technique in Architecture and Urbanism*; Volume 5, pp. 41–50.

Christoph Kumpusch. (2016). *Detailed culture*. Liaoning Science and Technology Press

Fang，C.， (1995). *Techniques for the production of artistic castings*. National Defence Industry Press

Hegger, M.; Fuchs, M.; Stark, T.; Zeumer, M.（2008）Energy Manual. *Sustainable Architecture*; Birkhauser Verlag AG: Basel, Switzerland.

Kibert, C.J., Ed.; John Wiley & Sons,（2013）Regenerative Development and Design: Working with the Whole. *Sustainable Construction: Green Building Design and Delivery*, pp. 109–111

Pilatowicz, G.（2015）Sustainability in Interior Design. *Sustainability*, 8, 101–104.

Qiu, Y., (2021). Fang Suo: How does a bookstore achieve an annual passenger flow of 2.5 million. *Journalist observation* (first half of the month), 42-45.

Roger Scruton. (2003). *Architectural Aesthetics*. China Construction Industry Press

International Journal of Innovation and Industrial Revolution
EISSN: 2637-0972
IJIREV
Volume 5 Issue 15 (December 2023) PP. 131-143
DOI 10.35631/IJIREV.515014

Schoof, J. （2015）Vintage design or conservation of resources? *Re-use and recycling in architecture. Detail Green*, 1, 6–11.

Tang Jinghua. (2019). Research on the Artistic Expression of Copper in Architectural *(PhD dissertation, Anhui Jianzhu University University).*

Vinitha, V., Kumar, D. S., & Purani, K. (2021). Biomorphic visual identity of a brand and its effects: a holistic perspective. *Journal of Brand Management,* 28, 272-290.

Wang, Y. (2016). Analysis of copper and its alloys in special decorative works. *China Construction Metal Structure*, 64-66.

WUXUANTU official account. https://mp.weixin.qq.com/s/2vCA1Sl4HxDWnHVa6WbQLA.

Zhang，J.， (2016) The aesthetics of force - a test of the art of metal forging. *Suzhou Journal of Arts and Crafts (No. 1)*, 30-34

Zhu，J.， (2017). Study on material application and texture in interior design. *Journal of Heihe College (09)*, 132-133.