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The "shape" and "meaning" of the roof arts in Chinese classical architecture

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Abstract: This paper takes the “roof” in Chinese classical architecture as the research object. The breakthrough point of this paper would be the perspective of design aesthetics. Through the rational and perceptual analysis of the roof art, this paper would reveal that the roof shape has the double artistic features: “beauty of shape” and “beauty of idea”. This paper would have a comprehensive analysis for the following aspects: the rational method of roof construction, the emotional feeling of the roof construction and the implied meaning of beauty in the roof construction.

1. Introduction
Chinese classical architecture can refer as a "roof art" from the visual and sensory point of view. It is different from the Western classical architecture that pays more attention on the vertical effect of the building. In its shape design, Chinese classical architecture would like to concentrate more on carve and shape of the roof. Among them, the "roof" has the largest body mass in the proportion of the overall building. Beside this, it also has the following features: the most abundant changes, diverse decorative components, the most far-reaching eaves as well as the most diverse type, level and form. The relationship of its volume is enough to cover the body of the whole architecture. Therefore, we can say that the roof of Chinese classical architecture is equal to the Chinese classical architecture itself in its visual image. It has already become the most recognizable component of the Chinese classical architecture. The functional properties, shape modeling and the intrinsic cultural philosophy of the roof are reasons why roof can represent the image of Chinese classical architecture. (Note: The "image" refers to the overall appearance of the Chinese classical architecture and the most intuitive feelings to the audience.) In addition, the form of reverse flow line of the roof is the root for the whole building community to present a beautiful skyline. Therefore, the design of the roof inevitably contains a profound artistic wisdom and creates artistic conception. At the same time, it has the double artistic features: “beauty of shape” and “beauty of idea”. At this point, the breakthrough point of this paper would be the perspective of design aesthetics. This paper would have a comprehensive analysis for the following aspects: the rational method of roof construction, the emotional feeling of the roof construction and the implied meaning of beauty in the roof construction. Through the comprehensive analysis, it will reveal that the “roof” in Chinese classical architecture has aesthetic principles and it will interpret its internal “shape” and “meaning”.

2. The rational method of roof construction
The rational method for the roof of Chinese classical architecture mainly reflected in the following aspects: the scientific feature of construction theory, the propriety of use form, artistry of design
technique and order of the Confucian etiquette. Among them, “the scientific feature of construction theory” is starting from the function of the roof to highlight the real function of the roof. “The propriety of use form” refers to the characteristic that the form of the roof should match with the use function. “Artistry of the design technique” is in terms of design techniques. The “order of the Confucian etiquette” refers to the fundamental law that decides the roof level and form. Therefore, the three elements of the rational method of roof construction can conclude as following: scientific functional attributes, artistic style and the cultural attribute of etiquette. The correlation and fusion between these elements becomes the intrinsic motivation of the roof design. The following will have a detailed analysis towards it:

2.1 The science of roof structure.
The roof of Chinese classical architecture usually relies on tile. The main reason is to consider the fire protection, waterproof and drainage features of the whole building. The main structure of Chinese classical architecture is made of wood (this paper takes the “Beam lifting structure” as example). Therefore, the main function of roof is for protection of housing and internal frame structure.

In addition, the ridge of Chinese classical architecture uses the curve shape instead of linear type. Let us take the hip roof as example, the central ridge is bent slightly (Note: the "song type" bending larger whereas "Qing type" bending smaller) but vertical ridges at the side show a clear curve shape. (Figure 1) The Purlin beam structure which interior building made by methods of raising and folding eaves makes slope of the roof present multiple segments and derives curved roof. (Figure 2) The efficacy and advantages of the ingenious construction method mainly shows in the rainfall rate and time. According to physical calculation, the curve interface has faster drainage time and it is not easy to cause water phenomenon compared with linear interface. In the arc and angle projections, the roof of Chinese classical architecture is very appropriate. (Figure 3, figure 4)

2.2 The use of appropriate roof shapes.
There are many different kinds of roofs in Chinese classical architecture that mainly contains veranda hall, hanging hill, hard hill, tip save, Xie Shan, etc. Different roof forms are suitable for different functions and ranges. For example, veranda hall and Xie Shan mainly applies to the palace, temples, gardens and other official buildings, hard hill are mostly used in civil buildings, whereas the tip save and Juan Peng are used in the garden pavilions and corridors as well as the sacrificial ritual buildings (such as: qiniandian belongs to the round tip save). In addition, the shape of the roof will accumulate or overlap due to the function and level of the building, such as the building like the attic, veranda hall and Xie Shan. Therefore, the rational method of the roof can be seen from the unity of function and form.
2.3 The art and advance of roof modeling.

The roof of Chinese classical architecture has the principle of modern design aesthetics on the base of inheriting the ancient wisdom. That adopts the design method of point, line and surface combination to constitute the streamlined cornices. Each link is placed on top of the roof. Among them, the "point" mainly focuses on Chiwei parts and the decorative cornice and the "line" is reflected in the ridge and the “surface” is composed of four sides of the slope and tile stack. (Figure 5) The essence of this kind of aesthetic principle aims at establishing a complete art form through the stitching and occlusion of the different parts of the "point, line and surface". Then it can produce a harmonious aesthetic effect. Therefore, it can be said that the roof of Chinese classical architecture contains the aesthetic rules of modern art.

![Figure 3: Mechanical Analysis of curved surface and straight line](image1)

Figure 3. Mechanical Analysis of curved surface and straight line
(Note: the acceleration of the surface fast at the beginning, so the time would be quick )
Source: author draw

![Figure 4: "Lift fold system" angle, radian chart](image2)

Source: A pictorial history of ancient Chinese architecture Hou Youbin, Li Wanzhen

![Figure 5: Roof "point, line, surface" analysis](image3)

Source: Author draw

2.4 The order of the roof construction.

The roof of Chinese classical architecture has the strict hierarchy and institutional requirements instead of random building. It has its own unique building system that needs to in accordance with the contents of the rite. Such as the higher level roof form like veranda hall, eaves and tip save can only serve royal family. At the same time, residential buildings shall not use yellow glazed tiles. Each roof form represents a different level. Such as the level of veranda hall and tip save is higher than that of Xie Shan and hanging hill. The eaves roof form is higher than that of single roof. Therefore, the roof of Chinese classical architecture has the strict order and hierarchy. From the point of view of design, this rank and order subjective stability and strengthen the structure and content of the roof and makes it have the characteristics of "model" and "standardization". It can seek unity on the base of obtaining rich form. Therefore, it also constitutes the cultural factor of the rational method.

In summary, the “beauty of form” in the roof of Chinese classical architecture is a combination of
functional science, artistic design and cultural etiquette. The "beauty of form" can also bring to strong sensibility that contains rich moral beauty. The following will have a theoretical exposition about it.

3. The emotional feeling of the roof construction

The roof of Chinese classical architecture can bring out the "lively" and "vivid" emotional experience through the beautiful curve and neutralization culture on the base of following the principle of scientific, rational, etiquette principles. (Note: "Neutralization" culture refers to the influence and inspiration of Chinese classical culture on architectural art). The deepening and understanding of this kind of emotion mainly comes from the collision and blending between the different cultures and it also comes from perfect integration between modular system and the curve modeling under this system. At this point, the neutralization of culture and the conformity between "regular system" and "natural curve" are important reasons for roof art to convey a sense of emotion.

3.1 The cultural neutralization in the roof of Chinese classical architecture

From the above discussion on the scientific nature of roof shape, we can conclude that the shape design of ancient roof following the specific program, that is the Confucian "rites". It fully embodies the Confucian culture for the influence of roof shape. The modeling also shows the design principles of equilibrium, symmetry and modulus. From the design of the roof curve can also see that the ancient roof has smart, elegant, streamlined features. Its style is the highlight of Taoist Culture. Therefore, Chinese ancient roof contains both rational "ritual", but also contains the emotional "music". It is under the strict system but keeps its flexibility. Although it is in the method of modular system, it is still flexible. Therefore, China ancient roof design is generated by fusing multicultural and has obvious cultural characteristics of "Neutralization". The solemn and intelligent features of roof itself can be sensed in the viewer's visual attention to resonate emotional experience with each other.

3.2 the perfect integration of the "data" and the change curve.

The ancient Chinese roof has uniform system. Although there are some differences between the song style and the Qing style roof in the positioning method of the frame, they are still based on fixed data. They take the "bucket mouth" and "material" as a unit. (Figure 6) Therefore, the method of its manufacture is unified. In addition, the ancient roof can also form a graceful curve, so it has the aesthetic feature of "line seeking". It is hard to imagine that the inner structure of the roof contains complex rational principles and complicated data just from perceiving individually from the form. Therefore, the roof in ancient architecture is a combination of "rational method" and "sensibility". It explains the reason for the "curve shape" of the roof. At the same time, it interprets the original implied testimonies through the beautiful shape.

In summary, the emotional feeling of the roof construction in Chinese classical architecture is to resonate emotional experience with each other through the viewer's intuitive feel for the roof of the external form. It makes the audience further comprehend its deep beauty through its own cultural connotations on the base of audience to appreciate the architectural "beauty".

Figure 6. Frame location

Source: A pictorial history of ancient

Figure 7. Decorative component location map

Source: Author draw Chinese architecture
Hou Youbin, Li Wanzhen
4. The implied meaning of beauty in the roof construction

The meaning of roof in Chinese classical architecture mainly highlight through the implication beauty of decorative component and the symbolic meaning of form itself. Among them, the "decorative component" is a specific materialized form to convey the meaning. It is the dominant media of the "meaning". The form of the "pictographic meaning" is relying on the decorative elements and curve shape. It is the metaphysical experience from the perspective of Philosophy. It is the recessive element of the "meaning". The following will respectively elaborate the implied meaning of the roof art from the aspects of materialized decoration and metaphysical philosophy.

4.1 The implied beauty of materialized decoration.

The roof of Chinese classical architecture has decorated many component and animal on the base of integral streamline modeling. These elements are arranged at both ends of the roof ridge, before the ridge, and at both ends of the ridge. These decorations select animal or a row of "animal" as a component. (Figure 7) It contains a profound moral and functional thinking when it plays a decorative role. The roof of Chinese classical architecture has been adhering to the concept of "fire prevention" in its design. Thus, the designer starts from the function thinking to introduce the Mythical Animals on the roof that has the fire prevention implication. It symbolizes that the animal can protect buildings and controls the fire. For example, the Chiwen at he both ends of the ridge is the animal that can spit water. There are other Pegasus, hippocampus, dragon, Phoenix and suanni, etc. In addition, the roof of the animal also provides with a Xiezhi that represents moral and justice. The use of these elements also subjectively enriches the curve shape of the roof. In addition, from the decorative component itself as a symbol of the role for a deeper extension, we can also see that this symbolic meaning contains "personification" characteristics. To seek shelter, security; pray for wealth, good luck; justice, goodness belong to the scope of human nature. This kind of personification and ideographic characteristics are in accordance with the expression of "borrowing objects and love" in literature and art. Therefore, the decorative component of the roof both contains allegorical and anthropomorphic features. It has become the "Artifacts" media for ancient craftsmen to design roof and express their inner thoughts and circumstances. At this point, it can be said that the decoration of the ancient roof is not random filling. It is based on the premise of functional thinking and desire of human nature to enrich the roof form and content and to highlight the unique design idea of craftsmen through the symbolic animal. At the same time, this idea is consistent with the modern design aesthetics that expresses the design idea in the form of concrete images. Therefore, the decorative components of the roof are through the two attributes to reflect "beauty of meaning".

4.2 metaphysical meaning of the roof shape.

Chinese presents the curve shape of ancient roof that is unique in the history of world architecture (Notes: the architecture history of Japan, South Korea, North Korea have inherited the Chinese architectural system. Therefore, Chinese ancient is the source and fundamental of the world architecture). This curve form deeply expresses the philosophy meaning that Chinese people pursue "refined dust" and "Nirvana rebirth". The Book of Changes has recorded that the things beyond the shape is law and the things beyond the shape is device. The modeling and decoration of the roof curve is a device. The philosophy and meaning that above the shape is law. Chinese people call their living land as the Divine Land from the ancient time. And it can also be called Phoenix land. The ancient people have linked the rise and fall of the Boulevard as well as the emergence of the great man with the Phoenix. The Phoenix's rebirth has also become the longing for the ancients. In the design of roof in Chinese classical architecture, the mainly feature are far-reaching eaves and reverse flow line. This also contributed to the construction of the community presents a beautiful "curved corridor" as if merging with the sky. This flying and elegant shape just as the Phoenix wings that can fly in the world, the shape of the roof of the "metaphysical meaning" is to express the rebirth of immortality and convey the eternal philosophy. Although the wood frame building itself is temporary, the connotation of the roof form of the building is infinite and eternal. The building can be burned, but rebirth after the ashes will become more perfect. At this point, the roof curve shape by the expression of "metaphysical
meaning" is reborn, perfection and eternity "Daoism" spirit.

5. Conclusion
From the above analysis of the rational and emotional analysis of the roof, we can see that the roof design in ancient China is based on rational and testimonies. The goal is beautiful, vivid and elegant. It has the dual attributes of "beauty of shape" and "beauty of meaning". It can through the culture of "Neutralization" and "blend" to get a deep sense of beauty. So far, we can draw a conclusion that roof in Chinese classical architecture is simple but with profound meaning. Through the combination of theory and form, it can reach the unity of shape and meaning. It not only realizes the perfect combination of function and form in the design of "form" and "meaning", at the same time, they can resonate with each other with the design ideas in modern times. It can be seen as the typical work in the combination of shape and meaning.

Reference
[7] 《Book of Change》