Stained Glass in Lingnan Historic Buildings and Its Application in Manchuria Windows

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Abstract. Stained glass has been extensively applied in Lingnan historic buildings, especially unique stained art glass windows which will be usually used at doors and windows needing large-area lighting for the purpose of ventilation and lighting, and they are called Manchuria windows. First of all, under the historical application background of stained glass in the Lingnan area, this study discussed the types of stained glass and the technological development in Guangzhou. Secondly, the fabrication process of glass etchings was generalized. Next, the application laws of stained glass in Manchuria windows of Lingnan historic buildings were explored. Finally, the basic combination modes of stained glass applied in Manchuria windows were obtained. These laws and modes can not only provide a reference for the repair of Lingnan historic buildings but also constitute an enlightenment on the windowing form and artistic creation of modern buildings.

1. Introduction

Yarn, oilpaper, oyster shell, etc. have been the main lighting materials applied to windows of traditional buildings in the Lingnan area. With the development of five-port trading since 1840, new materials started being used in traditional buildings. As the 1920s-1930s witnessed the vigorous development of Lingnan building industry, many overseas Chinese returned to construct their hometown, thus introducing many western new-type building materials. Guangzhou was the first one affected by the new building materials, followed by Chaozhou and Shantou in the eastern Guangzhou, and this influence gradually extended throughout the Lingnan area, setting off the craze of application of new building materials, among which stained glass was mainly introduced from Europe.

Up to the late 18th century, glass gradually started being used in doors and windows in Chinese architecture. The increasing use of glass windows in palace triggered the enthusiasm of upper class for glass, and soon, glass became popular in the mansions of rich merchants, and glass was initially used in the Lingnan area and southeast coastal areas in China. These laws and modes can not only provide a reference for the repair of Lingnan historic buildings but also constitute an enlightenment on the windowing form and artistic creation of modern buildings.

2. Types of Stained Glass

The glass materials commonly used in the historic buildings in Guangzhou include colorless glass, stained glass, tinted glass, patterned glass, etching glass, frosted glass, etc. The “red frosted glass” frequently used in Lingnan garden buildings in the late Qing Dynasty is exactly stained glass. The existing eight art glass pieces, “Eight Scenes of Guangzhou”, which was composed of gold pieces of glass in the Qing Dynasty, can be viewed in Qinghui Garden.
In addition, the imported pieces of glass have been reprocessed by Lingnan craftsmen, thus forming new artistic expression forms of glass with Lingnan cultural characteristics, such as artistic patterned glass, etching glass and frosted glass, which are typical products in the combination of Chinese and Western elements. The glass technologies largely include frame processing technology, etching processing technology and frosting processing technology, etc., which can not only be independently used but also be used in combination to generate diversified stained glass window arts with Lingnan characteristics.

3. Fabrication Process of Stained Glass Etchings

It is recorded that the glass etching technology originated from the 32nd year of Tongzhi reign (1893) in the Qing Dynasty, when a Huang-surnamed Guangdong ambassador brought the glass etching technology he learned in America to Guangzhou for trial production, and combined it with Chinese and Western methods to fabricate glass etching product, which was then used in buildings after being improved by local people in Guangzhou. It is a pity that this technology basically fails to be handed down from past generations.

In the 1950s-1960s, Sir Mo Bozhi and Sir Xia Shichang once exchanged with each other over this technology and published it in a book titled Courtyards in Lingnan after an arrangement. The fabrication process of this technology will be hereby summarized in the following research.

3.1. Material preparation

The tinted glass is cleaned up, and the colored plane of this material is placed above. Bituminous black paint is coated on the material as the protective cover and paraffin is used as the boundary envelope, and then tinfoil is pasted after the protective cover is 90% dried.

3.2. Carve draft

The painter’s draft ketch or copy is pasted onto the tinfoil, the tinfoil part except lines is scrapped away using a nicking tool or needle tip, the pattern to be etched is reserved, and the bituminous black paint is washed off using kerosene.
3.3. Pattern etching
The corrosion surface is washed by using hydrofluoric acid solution, it is then soaked in the mixed liquor of hydrofluoric acid and nitric acid or hydrochloric acid with a certain concentration, the soaking depth is determined according to the thickness of corrosion surface, and it is generally taken as 1.5 cm. The corrosion usually lasts 2-3 hours. After the surface frame processing material is corroded, the uncorroded pattern part is left.

![Pattern etching](image)

Figure 3: Pattern etching (painted by the author)

3.4. Cleaning of finished product
The tinfoil covering the pattern is uncovered, the protective cover is washed off, the oil stain is then removed using alkali, the raised color pattern is left, and thus the glass etching is finished.

![Cleaning of finished product](image)

Figure 4: Cleaning of finished product (painted by the author)

4. Stained Glass and Manchuria Window
4.1. Correct understanding of Manchuria window
Manchuria window is formed by embedding the tinted glass etching in the traditional wooden frame. As practical artwares integrating the Chinese and Western cultures, tinted glass etchings are formed through technical treatments of imported glass material, such as etching, grinding or frosting and decoloring, with traditional decorative patterns as the contents. The glass colors include red, yellow, blue, green, purple, gold, silver, etc., and along with different shape designs, the windows become elegant and beautiful.

Because the Chinese pronunciation is same, square Manchuria windows are also mistakenly called “Manzhou window”. Here, “Manchuria window” refers to the square window on nomadic tents in Manchu of the Qing Dynasty. When used in imperial palace, this kind of square windows were connected together to form a certain combining form (generally 6 or 9 ones in one group, at most 16 ones in one group).
In terms of Manchuria glass, stained glass is mistakenly regarded by many people as Manzhou glass. There is also a saying of “Manzhou window”, in which “Manzhou” means that all the window of one wall is fully open, and this is why it is called “Manzhou window”. In fact, that is not the case. Stained glass was initially called Manchu because during Kangxi Period, the stained glass presented by foreigners as a tribute to Emperor Kangxi as brought to southern China and used by local residents who called this colored glass Manchuria glass. As it was gradually spread for a long time, it was mistakenly deemed that stained glass was namely Manzhou glass, and the window installed with Manchuria glass was called Manchuria window.

4.2. Combining form of Manchuria window
In fact, stained glass may not always be Manchuria window, the stained glass windows which are open in one wall may not be Manchuria window, either, as Manchuria window has its own combination characteristics and artistic expression form. Hereby the characteristics of orthodox “Manchuria window” are summarized as follows.

4.2.1. Fang-Dou combination
The glass is divided by the groined shape into a large square in the middle, and four small squares are formed at four corners, where the large square in the middle is called “Fang” and those at four corners are called “Dou”. There was no decorative pattern in the middle “Fang” at the beginning, but it was then replaced by etching glass with pattern formed by technologies like etching, four “Dou” are colored, and the remainder can be colored or not.

4.2.2. Colours of glass
There is monochrome glass centering on basic colors: red, green, blue and yellow, and also etching glass and painted glass. In general, the part with more complicated technology and more elaborate pattern is located at the main middle position.

4.2.3. Combination of units
A window can be a combination of two units, four units, six units, nine units or even 16 units according to the windowing demand, among which the four-unit combination is the most common, and the 16-unit combination can basically reach the full-wall effect, namely, nearly the whole wall is a window, but this is rarely seen.
4.2.4. Opening and closing form of window
The window frame is fixed with copper rings, the opening and closing (up-down form) are controlled by using flexible brass buckles, and the window is locked inside the building with bronze locks, but the hardware is seldom seen at present.

4.2.5. Alternation of various combinations
There is a groove inside the window frame, and the window of each unit can be alternated as required. The scene outside the window matches with the glass color, the color in the corresponding season is converted into an area parallel to the line of sight, and this is called four-season window, where “spring” represents green hue, “summer” red hue, “autumn” yellow hue, and “winter” white hue. Sir Mo Bozhi used many Manchuria windows, which were ingeniously combined under movement changes, in his North Garden Restaurant and South Garden in Guangzhou.

5. Conclusion
With the gradual utilization of stained glass in Chinese traditional buildings in the late 18th century, especially its rapid development in Lingnan area, lighter and more colorful architectural art of Lingnan buildings has flourished.

Firstly, stained glass is featuring varied types and workmanships, and it is the most graceful when used as etching glass in Manchuria windows. By tracing the origin of Manchuria windows, the differences between “Manchuria window” and “Manzhou window” were explained in this study.

Secondly, the “Fang-Dou combination” laws of stained glass in a single window body were figured out by analyzing the internal form of each unit window.
In the end, multiple combination forms of panes and transformation modes of “four-season window”, the sequential combinations of which could be adjusted according to the season, were generalized and summarized. The study results can not only provide a reference for the protection and repair of historic buildings in Lingnan area, but moreover, these laws and ingenious transformation modes of combinations are worth learning for modern buildings in the aspect of windowing form.

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