

Discussion on the regional cultural semantic design of urban rail vehicles

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Abstract: As an important part of modern urban public transport, urban rail transport has an unignorable role. It provides great convenience for the travelling of urban residents with its efficient, convenient and environmentally friendly features. However, when we look at the current urban rail transport vehicle design, it is not difficult to find an important problem: most of the vehicle design ideas are still stuck in the level of imitation and borrowing, but the embodiment of regional culture is very limited. This lack of regional cultural connotation of the design approach, so that the urban rail transport vehicles in some way lost the uniqueness and differences, can not fully demonstrate the history, culture and geographical characteristics of different cities. This is undoubtedly a great pity, which has a certain impact on the development of cities and cultural heritage. In this paper, we will make an in-depth analysis and research on the current situation of urban rail transit vehicle design from the perspective of regional cultural semantics. We will explore how to integrate regional cultural elements into the vehicle design, so that the vehicle can become a window to display regional culture while carrying modern technology. In addition, we will also explore the principles and methods of regional cultural semantic design of urban rail transit vehicles to provide new ideas and directions for future urban rail transit vehicle design.

With the rapid development of the economy and the acceleration of urbanisation, people have put forward higher requirements for public transport. In recent years, various places have increased their investment in the public transport industry and constructed and renovated a large number of public transport facilities. However, due to the natural environment, climate characteristics, cultural heritage, historical heritage and economic conditions of each city, there are many problems in the construction and renovation of metro in different degrees. One of the most important points is the lack of underground vehicle design with regional cultural characteristics. This paper discusses the regional culture of urban rail vehicles, and seeks to provide reference for the design of urban rail vehicles in the future.

1. Basic Connotation of Railway Vehicle Culture

1.1 Basic attributes of rail vehicles

Rail transit vehicles are means of transport that provide convenient travelling services for urban

residents. According to the object of service and mode of transport, rail transit vehicles can be divided into urban rail transit vehicles and intercity rail transit vehicles. Urban rail transit vehicles are trains that mainly provide daily travelling services for urban residents, with the characteristics of large capacity, fast speed, safety and reliability. As a human-oriented transport, rail transit vehicles should pay attention to visual aesthetics, so that they not only have functionality, but also artistic aesthetics. In recent years, China's rapid development of urban rail transit, urban rail transit vehicle design has been further attention, and gradually formed a "standardisation, serialisation, combination" development trend. On this basis, regional cultural semantics as a form of expression rich in local characteristics is applied to urban rail transit vehicle design, making it not only functional and aesthetic, but also regional and cultural.^[1]

1.2 The concept of urban culture

Urban culture refers to the sum of material and spiritual wealth created by human beings in a certain area in the process of social development, and it includes both material culture and spiritual culture. The level of material culture includes all kinds of physical buildings, roads, squares, bridges, gardens and so on in the city; the level of spiritual culture includes the political system, ideology, literature and art, traditional customs and so on. Urban culture is a special material and spiritual culture with unique regional and national characteristics formed in the process of human historical development, and it is also created and accumulated by urban residents in their long-term production and life. It is closely related to the natural environment and historical conditions, and at the same time subject to the constraints of the social and historical development of the region. It is both a product of the historical development of human society up to a certain stage and the result of the combined effect of the natural conditions, geographical environment and humanistic environment of a region in the course of the historical development of human society.

1.3 Urban rail vehicle design

The rail transit vehicle is an important part of the urban rail transit system, one of the window images of the city and one of the important means of transport for people's travelling. In the design of rail transit vehicles, on the one hand, it is necessary to give full consideration to the expression of the regional cultural semantics of the city, and on the other hand, it is also necessary to take into account the requirements of the train itself in terms of modeling, decoration, colour and so on. Through the extraction and design of regional cultural semantics, regional culture can be integrated into the modelling, colour, decoration and other designs of the rail transit vehicles, thus making the urban rail transit vehicles more local characteristics and contemporary atmosphere, and at the same time, enhancing its own cultural image and artistic charm. For example, the train of Guangzhou Metro Line 2 incorporates Lingnan cultural elements into its design, using colour symbols such as "Cotton Tree Red" and "Fragrant Cloud Yarn", which represent the characteristics of the Lingnan culture, and incorporating the new Chinese style. Shanghai metro line 1 train to "sea culture" as the theme, in the shape of the "sea architecture" in the commonly used curved beam shape. Chongqing Metro Line 3 train adopts the elements of "Mountain City Architecture" and iconic buildings such as Chongqing Red Land and Yangtze River Ropeway, highlighting the unique urban temperament of Chongqing.

2. Relationship between regional culture and urban rail vehicle design

In modern design, the development and application of regional culture has become a topic of global concern. Due to historical factors, the formation and development of regional culture has

obvious regional characteristics, which makes the regional culture and modern design have a lot of intersection and communion, and become an important driving force for the development of modern design. Modern design has a great influence on regional culture, especially in the design of urban rail transit vehicles, in-depth excavation and use of local regional culture is not only conducive to the enrichment of the theory of rail transit vehicle design, but also able to enhance the image of the city and enhance the cultural taste of the city. From a macroscopic point of view, regional culture is the sum of local characteristics formed in the history, geography and customs of a region. Therefore, urban rail vehicle design can integrate the unique cultural factors of the region into the rail vehicle design. However, from a microscopic point of view, any form of art is a product of a certain cultural background. Urban rail transit vehicle is an important symbol and important carrier of a city's overall image and taste, so in its design is bound to incorporate the city's unique human landscape, historical stories, social customs, folk customs and other factors.^[2]

3. Methods of regional cultural semantic expression

Regional cultural semantic expression refers to the method of transforming elements of regional culture into modern design language to convey specific cultural connotations on the basis of a full understanding of the connotations and characteristics of regional culture. Different from general product design, the semantic expression of regional culture in rail transit vehicles should be combined with its special attributes to avoid conflict with its original culture. Therefore, the regional cultural semantics should be deeply analysed and excavated in the design of rail transit vehicles, and the regional cultural semantics should be combined with the functions, forms, colours, materials and other elements of the rail transit vehicles, and be transformed and expressed in a reasonable way. Specifically, regional cultural semantic expression methods mainly include metaphor, abstraction, deconstruction, reduction and so on. These methods can make the design of rail transit vehicles more unique and characteristic, thus giving rail transit vehicles new vitality and unique charm.

3.1 Metaphors

Metaphorical method refers to a method that in the design of rail vehicles, through the deep excavation of regional cultural semantics, associates it with the design elements of rail vehicles and shows it in a concrete form. The use of metaphor in the design of rail transport vehicles can transform the concrete form of regional cultural semantics into abstract concepts, making rail transport vehicles more cultural and regional. For example, in Beijing Metro Line 3, the Great Wall is used to express its cultural connotation. Beijing is an important political, economic and cultural centre in China, so the Great Wall is used as one of the main image features of the rail transit vehicle in the design of Line 3, combining the unique regional culture of Beijing with the Great Wall, and the cultural connotation is fully expressed through the metaphorical method, and at the same time, the cultural connotation is shown. It is a metaphor to make its cultural connotation fully expressed, and at the same time, it shows the characteristics and personality of the design of the rail transit vehicle.

3.2 Abstraction

Abstraction method refers to the transformation of regional cultural semantics into concrete forms on the basis of full analysis and understanding of regional cultural semantics, and the use of modern design language to express and shape them. In the design of rail vehicles, the abstract method can make the regional cultural semantics more general and inclusive, which is easy to be accepted and understood by people. In the design of rail vehicles, the form can be abstracted and transformed, and the function and form of rail vehicles can be presented through the re-creation of

regional cultural semantics, so as to make it more representative and unique. For example, in the design of Chongqing rail transit vehicle, the form of Chongqing rail transit vehicle is transformed into graphic elements with Chongqing regional characteristics, which can be simplified into an oval, square or rectangle. At the same time, these geometric shapes are abstracted and transformed, so that they have a certain degree of versatility and extensibility.^[3]

4. Concepts and characteristics of regional cultural semantics

4.1 Morphological characteristics

Morphological features refer to the shape, colour and material composition of the appearance of underground vehicles. Different regions and cultures have different natural geographic environments, and their architecture, humanities and other factors will have an impact on the underground cars, so the underground cars show significant differences in morphological characteristics. In the architectural form, due to the differences in urban spatial form, so the metro cars show different spatial forms. In terms of colour, the differences in regional culture lead to the differences in the colour of metro vehicles. For example, Beijing as the capital of China, its colour system mainly reflects the political culture and historical and cultural characteristics, Beijing metro line more grey tones as the main tone, and in this way and the surrounding environment in harmony; and Shanghai area more use of colour system, and has distinctive features; Guangzhou area more warm tones as the main tone.

4.2 Colour characteristics

Colour is one of the important ways to convey the semantics of regional culture. In different regional cultural contexts, people's preference and choice of colours will have different tendencies. Therefore, in the design of metro vehicles, we must take into full consideration of the regional cultural context of the selection of colours, so that passengers can feel the unique cultural connotations and spiritual temperament contained in the regional colour. Urban rail transit is a symbol of civilisation and vitality of a region, reflecting the level of economic development of the region and the people's aspirations for a better life. Therefore, the design should also take into account the unique and distinctive human environment and natural conditions of the region.^[4]

5. Status of development of urban rail transport

In the current process of metro construction and renovation in major cities in China, most of the design of China's rail transport vehicles are mainly imitated and borrowed, without fully taking into account the regional cultural elements. For example, Tianjin metro line 1 in its first phase of the project mainly from Italy imported 25 trains of 8 sets. However, as these vehicles are mainly designed in accordance with the Italian imported trains, they do not take into account the regional culture of Tianjin and the local passengers in Tianjin to adjust the colour, shape and structure of the original vehicle appearance. Similarly, Wuhan Metro Line 2 imported 25 8-car trains, mainly from Japan, for its first phase of construction, but again, these vehicles were not designed to take into account the colour, shape and structure of the original vehicles as adapted by Wuhan's local commuters.

6. Regional cultural semantic design initiatives for urban rail vehicles

6.1 Extraction of cultural symbols

For urban rail transit vehicles, in order to realise the semantic design of regional culture, the first step is to carry out the extraction of cultural symbols. The process of extracting cultural symbols is

the process of locating and classifying cultural symbols, i.e. through research and analysis, it is summarised into various forms of expression such as visual, auditory, olfactory, gustatory and tactile, etc., so as to better categorise and extract them. At present, the problem of unclear extraction of cultural symbols exists in the design of many urban metro vehicles. Such as in some urban metro lines using the traditional Chinese garden architecture elements for modelling design, but it does not reflect the cultural connotation of effective analysis and interpretation. In the current design of some urban metro lines, although on the surface seems to be novel form, unique structure, chic modelling, but lack of personality characteristics and cultural connotations different from other urban metro vehicles.^[5]

6.2 Use of regional cultural elements

The use of regional cultural elements is of great significance to the design of urban rail vehicles. It can not only directly reflect the regional cultural characteristics of a city through the train modelling and decorative materials, but also enable the train to form a strong visual impact with the regional culture of the cities along the way in the process of high-speed driving. Metro vehicles as a kind of urban public transport, its internal decoration should also reflect this feature, and coordinated with the regional cultural elements of its region. Such as Nanjing metro line 1 used "Qinhuai River" and "Yuhuatai" two city symbols, in the overall colour and shape, have highlighted the unique historical and cultural characteristics of Nanjing. At present, most of the metro lines in the design of the overall shape of the lack of recognition, the overall colour and shape is too monotonous and other problems. Therefore, according to the regional cultural characteristics of different cities in different regions, different ways of expression should be used for design.

6.3 Extraction of regional cultural elements under innovative design thinking

Urban rail transport vehicle design is a systematic project, from the current development of urban rail transport vehicle design, the extraction of regional cultural elements has become a more common phenomenon. If the regional cultural elements only stay in the traditional application level, it is difficult to meet the needs of the current development of urban rail transit, but also not conducive to improving the recognition of urban rail transit trains. ^[6]As an organic part of urban space, the design of rail vehicles is inseparable from urban architecture, landscape environment and regional environment. Rail transport vehicles in the design process, not only to reflect the personality of the city, but also to make the vehicle has a certain uniqueness and recognition. For example, traditional architectural elements, folk elements and other elements into the design of rail transport vehicles, so that it becomes a business card of the city; in the design of traditional festivals, drawing on the characteristic elements or customs to enrich the cultural connotations of the design of rail transport vehicles and so on.

6.4 Urban Railway Train Modelling Design under Innovative Design Thinking

The modelling design of urban rail transit should be able to reflect the regional cultural characteristics of the city, and the elements of regional culture can be integrated into the train modelling during the design process to meet people's aesthetic demand for underground trains. Traditional train design, generally in the front or rear of the car to add some decorative elements, so that the front or rear of the car looks more atmospheric, beautiful. The modern underground train can use advanced computer technology to refine the regional culture of the city, forming a unique artistic language, through the use of different colours and materials, showing a new aesthetic interest. For example, when designing the Beijing urban rail transit logo, Beijing Metro used the Chinese character "Jing" as a design element and highlighted it in red. The carriages are decorated with Chinese red and blue as the main colours. Such a design follows the principle of "one car, one

scene", taking into full consideration of its cultural connotation, regional characteristics and aesthetic needs, and realising the harmony and unity of "human-vehicle-environment". Therefore, in the design of rail transit vehicles, suitable colours and materials should be selected according to the semantics of different regional cultures, the characteristics of different models and the needs of different passenger groups.^[7]

6.5 Focus on the integration of tradition and modernity

In the combination of regional culture and rail vehicles, it is necessary to inherit and develop traditional culture, but also to give full consideration to the development of modern design. The integration of tradition and modernity is to find the most suitable combination point in inheritance and development under the premise of respecting the regional culture, so as to achieve the organic integration of tradition and modernity. Hangzhou is a city with profound historical heritage, it is not only one of the birthplaces of Chinese civilization such as Wu-Yue culture and Hemudu culture, but also the famous "First Southeast Scenic Spot" in history, so in applying the regional culture to the design of rail transit vehicles, we should not only pass on the characteristic architectural style, decorative techniques and colour matching elements of traditional culture, but also take into full consideration the development of modern design. Therefore, when applying the regional culture to the design of rail transit vehicles, we should not only inherit the architectural style, decorative techniques and colours of the traditional culture, but also absorb the modern design concepts and techniques, so as to integrate the traditional and modern design elements.

7. Conclusion

There are still many deficiencies in the design of urban rail transit vehicles in China. By analysing the regional cultural semantics of urban rail transit vehicles and according to the characteristics of regional culture, the principle of designing urban rail transit vehicles with "regionality" as the core is proposed. In the design method, the urban rail transit vehicle design with regional characteristics can be realised through the refinement and transformation of regional cultural characteristics, and the urban rail transit vehicle design with regional characteristics can be realised through the organic combination of traditional art forms and modern art forms. This design method has certain reference value for the future design of urban rail transit vehicles in China.

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