

# Research on the Application of LED Media Building Curtain Wall in Urban Outdoor Advertising

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**Abstract.** As a new form of outdoor advertising, LED media building curtain wall has become an important carrier of modern advertising communication. It is a combination of art, media, advertising and technology. Through the analysis of the working principle of LED media building curtain wall, this paper elaborates the application of LED media curtain wall in urban outdoor advertising, and proposes the future development trend of LED media curtain wall advertising. It will have the functions of outdoor advertising and new media advertising, and exert its strong economic pulling effect in the field of outdoor advertising. On the one hand, the content will tend to be public welfare; on the other hand, with the development of artificial intelligence technology in the form of advertising, it will move towards to interactive experience communication. The media building curtain wall advertisement which created by using new media technology not only blends with the surrounding atmosphere, but also beautifies the urban environment while allowing consumers to accept advertising information and enhancing the advertiser's brand communication value.

## 1. Introduction

As a new form of outdoor advertising, LED media building curtain wall creates a new urban landscape combining science and art for modern cities. In modern society, the LED media building curtain wall has become an important carrier of information dissemination, which can showing art, advertising, media and city information.

## 2. Working Principle of LED Media Curtain Wall

LED advertising is a form of outdoor new media advertising, which is the perfect combination of new media technology and outdoor advertising. LED is short for light emitting diode. The LED panel is a display screen for displaying text and images by controlling the display mode of the semiconductor light-emitting diodes. The LED display mainly includes graphic display and full color display. The graphic screen is usually used to play text, and the full color screen can play text information and video images. LED display screens are widely used in advertising, medical, aerospace, performance and many other fields due to their vivid colors, strong stereoscopic effect, high brightness and large size.

The history of LED technology is not long. The earliest red LEDs were produced in 1969, and the low-efficiency LEDs began to be used for indicator lights, numbers and text displays in the 1970s. Since the 1990s, LED full-color display had become a new type of information display media that had developed rapidly in the world. The large-area display screen composed of LED dot matrix module or LED pixel units, combined with microelectronics, optical, information processing, and many other modern high technology, become the best carrier of commercial advertisement outdoor release.

LED media curtain wall is based on LED material technology, multimedia technology and exterior wall image art creative perspective, plus design elements such as sound and image, and become a new form of outdoor advertising. In recent years, with the development of cities and the

intensification of advertising competition, the media curtain wall art forms in modern cities are more and more popular among citizens[1]. In general, the building is illuminated by modern media curtain wall LEDs, making the building like a huge TV screen that displays dynamic video images. The screen can display pictures, videos, news, and events, and even live interaction with people. It can display a wide range of advertising and social information, bringing people a new visual form, thus creating new urban outdoor advertising.

LED building curtain wall relies on the complex computer control system of modern building skin screens and lighting components of the screen, operating interactive forms, advertising, lighting, audio and video, architectural environment, television and video programs on media wall surfaces. This kind of large project usually designed by architects, engineers, programmers, and advertising designers together. Some LED screens can also let the viewer see a complete screen image at a relatively low resolution, giving the impression that the "screen" is a huge LED screen integrated with the building. The entire powerful operating system which was controlled by computer networking could realize network synchronous update and play the latest developments anytime and anywhere. It also can realize the interregional connection of different cities LED curtain walls and multi-screen interaction.

### **3. Application of LED Media Curtain Wall in Urban Outdoor Advertising**

The LED media curtain wall display was applied to the building curtain wall, especially on the glass walls. The technology that could not damage the appearance and structure of the glass curtain wall is solved, and the multimedia effect is most powerfully expressed under the premise of maintaining the transparency of the glass curtain wall. This technology provided as much colors and graphics as possible for outdoor advertising and represented a new form of media communication[2]. Now there are new media curtain wall projects were born in modern cities every day. They became the city's landmark buildings. Through showing the advertisements, the culture of society and urban, and the history and art of the city, they were welcomed by the public. For they could made the city brighter and more attractive, while greatly improved the construction quality of the building.

#### **3.1 LED glass curtain wall outdoor advertising represented by urban landmark buildings**

With the development of modern urban construction, more and more large-scale buildings with novel shapes stood up and became new urban landmarks. To a certain extent, they represented local cultural characteristics and technological level, and these buildings are mostly glass curtain walls structural form. Such as the Nanchang 303 Greenland Center, is one of Nanchang's landmark buildings, and the highest building in the region, and is now the highest "double tower" in central China. With 35,300 square meters of LED lighting curtain wall area, it successfully surpassed the Guinness World Record of 32,400 square meters of the world's tallest building, and became the "world's largest LED lighting curtain wall". It all used LED lighting lamps, could save more than half of energy than ordinary landscape lamps. After more than a year of meticulous carving, it finally successfully completed the installation and commissioning of 101088 LED pixel points and 35,300 square meters of LED lighting curtain wall. The 303 Greenland Center with embedded advertising information was like a magic mirror. With changing the colors of the pattern, it could cause a strong visual impact through constantly playing various texts, patterns, TV commercials or live broadcasts. The construction of the 303 had made the skyscrapers of the Red Valley Beach New District twinkling and shining, and it had become a beautiful landscape on the banks of the Ganjiang River.

#### **3.2 With the appearance of a transparent LED display represented by remarkable transparency, the advertising screen gives a realistic sense of suspension**

The transparent led display had a very high perspective that not only ensured the lighting requirements and viewing angle range of the lighting structure between floors, glass facades, windows, etc., but also ensured the original lighting perspective function of the glass curtain wall. Its heat dissipation performance is also very good. It could well reduce the fire safety hazard after heat generation, and

the texture is light and thin, which would not stress the load-bearing structure of the original glass curtain wall and help enhance the aesthetic appearance of the building.

Firstly, the main advantage of LED transparent display is the product structure. The transparent LED display is composed of ultra-thin LED light strips. It has a corresponding box structure, which can be seamlessly spliced and installed in a large area. Secondly, it saves cost and does not require steel frame structure. It is often installed behind the glass curtain wall or glass window, and be fixed by the mounting structure such as point support, which saves a lot of installation and maintenance costs. It can be installed and maintained indoors, and easy to operate. The third is the LED transparent display has rich effects. The minimum pixel spacing of the transparent LED display on the market can be about 3mm. It can display high-definition display screens, which can make the advertising screens feel suspended in the glass curtain wall, and has good advertising effects and artistic effects.

#### **4. The future development trend of LED media curtain wall advertising**

In the current situation of a slight slowdown in the overall growth of the advertising industry, the growth rates of outdoor advertising and new media advertising are developed rapidly, and becoming a leader in the advertising industry. China is entering a period of rapid development of urban construction. The LED media wall advertising and urban construction complement each other and develop side by side. The LED media wall advertising has the functions of outdoor advertising and new media advertising, and will exert its strong economic pulling effect in the field of outdoor advertising.

##### **4.1 LED media curtain wall advertising content from a single ad to "advertising + public welfare"**

The LED media curtain wall appears as a public space, especially in some urban landmark buildings, it represented the image of a city. The content of the LED media curtain wall display, in addition to the single-form commercial advertisement, should also take into account the information needs and social responsibilities of the audience and guide the public. Such as it guides the public's concept of public welfare and serve the public in order to improve the quality of the public and achieve the purpose of regulating public behavior. In the release of public interest information, it should be considered to publish different public information for different places. For example, the commercial block could publish information such as weather forecast, while the bus stop could release information such as bus operation, while we could create a festive atmosphere in the festival. The large-scale outdoor public service advertisement of "City Smiley" and "City Instant", which was planned and produced by the Yangtze River Daily, is a successful example. They invited the public and photographers to focus on the 24 hours of the people, and recorded a day in Wuhan with wonderful photos, which were more direct, real, more convincing and impactful. If these photos could spread through the media wall, there would be good communication results. Under the spontaneous efforts of the government and advertisers, the advertising content of LED curtain wall would inevitably move from a single advertising form to an advertising and public welfare advertising mode.

##### **4.2 Advertising forms move from one-way communication to interactive experience communication**

Interactive experience communication enhanced the audience's participation and interactivity in advertising, and made the audience to actively participating in the advertising process. With its novel way of expression and interactive design of creative content and thinking, it could attract the audience's attention and satisfy the audience's curiosity and entertainment psychology. [3].

*4.2.1. Based on the development of AR technology and VR technology, the interaction between people and LED media walls makes the building curtain wall fresh.*

Based on the development of AR technology and the maturity of somatosensory technology, H5 video and human-computer interactive games can realize the interaction between the audience and the curtain wall. It also can be connected with the mobile phone to realize human screen interaction, multi-frequency linkage and space separation, and make the building curtain wall live.

Interactive advertising can reduce the effectiveness of ineffective advertising and audience harassment, and improve the audience experience. The advertising information is placed on the building curtain wall media, allowing consumers walking near the media wall to connect with the media wall through the movement of the body, and a series of human-computer interaction games, and the game itself is a well-designed advertisement. In such a game of participation by the whole people, the advertising information is skillfully embedded[4]. To a certain extent, it can avoid the audience's rejection of advertising and carrier, and let the audience actively participate in the advertisement. It creates contents independently, actively share the communication to reduce the appearance of large-scale hard-core advertising. Its entertainment and novelty can improve the audience's experience and prevent audiences from compromising media advertising. Although the interactive outdoor advertising relies on the development of new technologies and new materials, it is not only need to balance the gap between the actual technology level and the ideal effect, but also need to balance the relationship between the audience and technology and product advertising, and make sure do not let the interactive advertising become into a technology show.

*4.2.2. Based on the development of naked-eye 3D technology, outdoor advertising video is more shocking and interactive.*

In recent years, whether it is a Hollywood sci-fi blockbuster or a Disney animation, 3D movies has already "flyed into the homes of ordinary people". Its realistic scenes and deep picture will give people an immersive feeling, and the superb visual impact is loved by many movie lovers. With the further development of 3D technology, naked-eye 3D technology was emerged. If you walk out of the theater and apply the naked-eye 3D technology to the wall of our media building, what kind of visual experiences will it form?

LED media wall advertising creates an immersive creative visual space that emphasizes people's all-round visual experiences. This is the creative content playback method provided by LED technology. Barco of Belgium, the world's leading representative of LED technology, has the core concept of "changing lifestyle, improving quality of life and creating business value".

### **4.3 Focus on sustainable development, combined with green and solar energy, to achieve energy conversion and advertising sharing on the same screen**

The biggest feature of the glass curtain wall is the giant screen. This giant screen can be visually shocked, and if it combined with the solar energy, this giant screen glass can become a city's energy conversion center. The development of solar energy technology had produced a kind of "power glass", also known as cadmium telluride thin film solar cell, which is known as "oil field hanging on the wall". This solar cell single piece covers an area of 1.92 square meters, weighs 30 kilograms, and can generate 260 degrees to 270 degrees per year. If this glass material is applied to the glass curtain wall, the photoelectric curtain wall is realized. We can use it for power generation during the day while use it as an advertising carrier at night to realize advertising communication. Its economic and environmental benefits and cultural benefits as landmarks are well presented.

## **5. Summary**

The form of outdoor media is innovating, materials are innovating, technology is innovating, and the operating concepts are also innovating. The media building curtain wall advertisement created by using new media technology not only integrates with the surrounding atmosphere, but also convinces the urban environment while allowing consumers to accept the advertisement information and enhancing the brand communication value of the advertiser, but there are still some problems in the development process.

LED media building curtain wall advertising with high brightness characteristics is likely to bring certain visual pollution. Ultra-high brightness and large-area visual light source at night bring a certain degree of visual pollution to the whole city[5]. The main influencing factors of the light intrusion on residential buildings are the relative positional relationship between LED screen and residential building, LED screen intrusion brightness level, numerical change and alternating colors and lights. Therefore, it is necessary to negotiate with the regulatory authorities to develop standards

to control the maximum brightness of the media building curtain wall, and reduce the difference in brightness during advertising. The design of the building curtain wall and the living building should be as close as possible to a straight line distance of 150 meters.

As an important element of modern urban culture, LED media curtain wall advertising is the leader of urban cultural thoughts, the deductive of trend culture, it also be an important part of modern urban cultural image. As a new member of the outdoor advertising family, LED media curtain wall advertising should focus on the application of high-tech and green energy-saving raw materials, and uses digital technology to create visually stunning outdoor LED advertising. At the same time, we should keep the coordination of urban architectural environment and overall style, and promote the progress of the whole urban culture and the prosperity and development of the economy.

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### **References**

- [1] Memari, M. Ali, New developments in curtain wall and glazing systems, *Curtain Wall Systems: A Primer*, January 1, pp. 194-209, 2013.
- [2] T. Liang, New Media Art Shapes City Identity From the Perspective of the Image of the City, *Design Research*, Vol.4 No.3, pp.32-38, 2014.
- [3] M.C. Chen, J.Y. Ciou, and G.S. Jhang, LED image display system with mobile app control, *Computers & Electrical Engineering*, Vol.52, pp. 1-11, 2016.
- [4] K. Myungsook , Interactive Outdoor Advertising to Enhance Consumer's Experience from the Perspective of the Executives , *Journal of CEO and Management Studies* , Vol.19 No.3, pp.211-228, 2016.
- [5] L. Heebok, L. Si-Hoon, Plan to Improve the Regulations on Outdoor Advertising: Focusing on LED Placard and Support of Small and Medium Business Operators, *Advertising Research*, Vol.106, pp. 73-110, 2015.