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# Research and Application of Intelligent Power Supply of Huadu to Dongguan Highway

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**Abstract:** Under the background of rapid promotion of green highway construction, highway construction pursues efficiency, quality and engineering durability, environmental protection. Highway engineering construction has the phenomenon of high cost and large consumption of supporting power supply system. How to effectively control the power system is an urgent problem when facing highway construction units. Taking the expressway from Huadu to Dongguan as the research object, this paper studies and applies the smart power supply safety management and smart power supply system. This system can effectively deal with the problems of power supply and distribution supervision of Huadu to Dongguan expressway. It can improve the overall operation and management level. It is suitable for promotion and application in Guangdong province and the whole country.

## 1. Introduction

Green highway is an important part of green transportation. According to system theory and cycle cost theory, the main purpose of green highway is to use the least resources and have the least impact on the environment. Green highway's construction runs through the whole cycle, including planning, design, construction and operation.

In recent years, there are many electric fire accidents in China, which cause heavy casualties and property losses. According to statistics, from 2011 to 2016, a total of 524,000 electrical fires occurred in China, resulting in 3,261 deaths, 2,063 injuries, and direct economic losses of 9.2 billion RMB, accounting for more than 30% of the total number of fires and casualties in the country, especially accounting for 70% of the total number of serious and extremely large fires.

At present, the main problems of electrical fire system include: single alarm mode, disconnection between equipment and alarm and maintenance.

Highway engineering projects are equipped with large steel processing plants, concrete mixing stations, mobile board houses, etc. There are complex power lines, power equipment. And the construction site is dense, construction site dormitory is also dense. Fire safety measures are insufficient, once electricity danger happens, personnel life and property loss are serious.

## 2. Study area

The Huadu-Dongguan expressway project is a key construction project of Guangdong province and Guangzhou city, and it belongs to the seventh important highway in Guangzhou high speed expressway network. The route starts from the south exit of Baiyun airport in Guangzhou and is



connected to the airport expressway. It goes east through Renhe town and Zhongloutan town in Baiyun district, Zhongxin city and Jiulong town in Huangpu district, China-Singapore town, Yongning Street, Xiancun town and Shitan town in Zengcheng district, and ends at Shitan town and is connected to Zengguan Shenzhen expressway. The completion of this project will better enhance the traffic capacity of Baiyun international airport and is of great significance to the economic development of Guangzhou airport economic zone, China-Singapore knowledge city and Zengcheng national economic development zone.

### 3. The working principle of Intelligent Power Supply

(1) The system is composed of intelligent monitoring terminal, wireless transmission equipment and cloud transmission equipment.



Figure 1 Map of system schematic

(2) This system is through the installation of intelligent monitoring terminal, a real-time acquisition and upload residual current electrical wiring. The system is also need security state parameters, such as temperature, current, voltage. And also need cloud platform based on the analysis of diagnosis, timely find leakage, overload, short circuit, three-phase imbalance, overvoltage, poor contact, such as abnormal temperature rise of electrical fire the problems. With the help of smart terminals such as mobile phones and PCS, transparent monitoring and management of potential electrical fire hazards. It can be realized anytime and anywhere, and remote power failure and arc extinguishing functions can be realized.

(3) Intelligent power consumption is an innovative application designed to deal with the potential electrical safety problems. It can replace the traditional electrical fire monitoring system, and fully display the information, online status and monitoring video. It is a new-generation electric power safety management system integrating information integration, collection, transmission and intelligent data analysis. It pays more attention to the information interaction between the system, users and terminal devices. Smart power consumption safety management system will be added to the smart fire control construction.

### 4. Functions of intelligent power supply platform

(1) The intelligent supervision service system deals with the problems of electricity management and electricity safety. The management personnel can master the data of electricity safety in real time through the mobile APP, and provide the basis for supervision and decision making for safe production.

(2) Cloud service platform - 24-hour online monitoring and management. Based on the safety electricity sensor terminal installed in the distribution cabinet, it monitors the power supply side in real time and measures the safety electricity parameters with electricity, and uploads safe electricity cloud platform through the internet. Through the cloud platform of the intelligent electrical fire cloud monitoring system, the in-situ electricity safety can be learned at anytime, anywhere through the

mobile phone App or Web client. In case of abnormality, it can timely remind the personnel in charge of the potential safety hazard through early warning.

(3) Local supervision system -- audible and visual alarm. Once the monitoring value is abnormal, the local alarm will be triggered to sound and light alarm. The cloud platform monitoring system mobile phone APP and Web client will send out alarm prompt synchronously, and the duty personnel will be reminded for maintenance in various ways. The intelligent power consumption security hidden danger supervision service system has the function of user permission management, and the corresponding administrator can only view the real-time data of power consumption security that belongs to his authority.

(4) By using the mobile APP and the authorized account, the client can log in by password, the management personnel can know the on-site electricity security situation at anytime, anywhere through the mobile phone or the computer on the Internet. Electricity management personnel in its supervision system "user management" Settings interface, can be very convenient to set up the phone number to receive SMS alarm. Through setting, the alarm information can be sent to the mobile phone of the responsible personnel for safety management, and the abnormal situation of electricity consumption can be known in the first time.

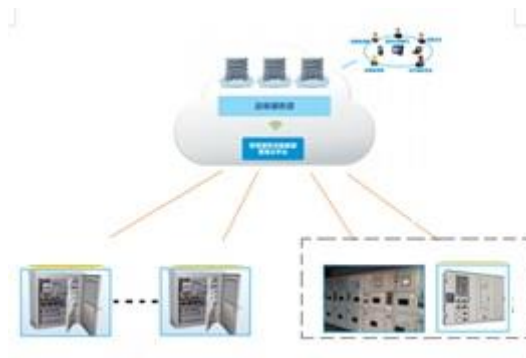


Figure 2. Figure of alarm function

(5) Big data analysis function. Intelligent electric power safety service system also provides alarm record, historical trend, report analysis and other functions. Platform regular weekly statistics current electricity data and generate test report. It can login platform browse according to the selection, view the history of the single parameter back to address curve line (such as temperature, leakage current, etc.). By contrast analysis of the operation of the road which a few important load, the client can see the day, month and year of overall power load and the peak valley of day power consumption. They also can analysis and provide exception alarm circuit alarm reason.



Figure 3. Big data analysis diagram

## 5. Conclusions

In this paper, the intelligent power supply system solves the problems of low energy saving effect in the construction process of Huadu-Dongguan expressway. The system has stable operation, obvious energy saving effect and high intelligent degree, providing an effective auxiliary control means for the construction management of Huadu-Dongguan expressway.

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