

# Research on Modernized Treatment Technology of Coal Dust in Thermal Power Plants

Yifei Chen

Fujian Huadian Kemen Power Generation Co., Ltd., Fuzhou, Fujian, 350500, China

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## Abstract

During the working process of coal handling system of thermal power plant, some dust will inevitably be generated. If it is not handled in time, it will seriously threaten the personal safety of coal handling personnel and the integrity of equipment. With the advancement of technology and the improvement of safety requirements, the comprehensive treatment of dust in the coal transportation system has attracted increasing attention. Therefore, in order to reduce the dust and reduce the damage to the environment and the human body from these dusts, this paper conducts research on the modern treatment technology of coal dust in thermal power plants.

## Keywords

Thermal Power Plant, Coal Handling System, Dust Removal System.

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## 1. Introduction

The coal transportation system is very important in thermal power plants and is an indispensable part of thermal power plants. In most coal-fired power plants, the coal loading area is generally the most polluted place. The coal transportation system generates a large amount of dust during the process of fuel unloading, stacking and reclaiming, storage, transportation, crushing, and transportation. Coal dust not only pollutes the environment, endangers human health, but also affects production and operation safety. Therefore, it is necessary to strengthen the management of coal dust, reduce the scope and amount of coal dust during coal construction, try to protect the staff from the harm of coal dust, do a good job of protection, and reduce the inhalation of coal dust to ensure good health [1].

In coal-fired power plants, coal is stored, transported, sieved, crushed (or ground), and burned in the boiler to convert the chemical energy of the coal into heat. In order to control the coal dust that is generated during the storage, crushing, and transportation of bulk coal and partly overflows, many coal-fired power plants adopt wet dust removal (including water spraying for dust suppression, high-pressure water spraying for dust suppression, water bath dust removal, wet turbulence/cyclone dust removal Etc.) [2-8], dry dust removal (including bag dust removal, electrostatic dust removal, cyclone dust removal, etc.) [9-17], no/micro power dust removal [18-20], dry fog dust suppression and dust removal [21,22] and other technologies.

## 2. Analysis of the Status Quo of Coal Dust Control in the Coal Conveying System of Power Plants

The coal transportation system of the power plant consists of the following parts: belt conveyor system, relay station, coal unloader, coal storage yard and coal crushing chamber. In power plant relay stations, coal crushing chambers, coal unloaders and other production sites, coal dust pollution is still very serious, not only destroying the production environment, but also seriously affecting the health of workers at coal transportation sites. Judging from the current situation, the dust prevention measures adopted by the coal transportation system have a certain inhibitory effect on coal dust, but

there is currently no effective solution. In order for the dust-proof device to exert the best dust-proof effect, it is necessary to fully understand the coal dust of the existing coal transportation system and its control method, and to design a scientific, reasonable and effective coal transportation system to fundamentally eliminate the problem of coal dust problem [23].

### **3. Main Dust Suppression and Dust Removal Measures for the Coal Conveying System of Coal-Fired Power Plants**

The key measures for dust suppression and dust removal in the coal conveying system of coal-fired power plants include: (1) Optimizing the design to improve the characteristics of fine particles in the coal flow, such as minimizing the height drop of the turning section, using a curved coal falling tube instead of a traditional square coal falling tube, Change the inclined pipe transition of the coal drop pipe to a circular arc transition, reduce the horizontal angle between the coal drop pipe and the coal conveyor, etc., to reduce the generation of coal dust from the source; (2) Select the equipment, such as the use of high-efficiency dry fog Dust suppression and removal facilities suppress the generation and overflow of dust from the source, thereby reducing the dust concentration in the workplace; (3) Strengthen equipment operation and maintenance, fine-tune frequent adjustments to maintain high dust removal efficiency, repair leaks in time, adjust sealing gaps, and improve equipment operation Safety, reliability and economy.

### **4. Application Effect of Micron Dry Fog Suppression and Dust Removal Technology in Coal-fired Power Plants**

Avoid spontaneous combustion and deflagration of coal dust, reduce hidden dangers of production safety. The micron-level dry mist dust suppression and dust removal device realizes dust source control, effectively reduces the unorganized emission of dust, and greatly reduces the transfer station, crushing room and dry coal shed of the coal transportation system. The coal dust concentration in the workplace is far below the lower explosive limit of bituminous coal dust, and there is almost no possibility of bituminous coal dust explosion, which effectively avoids the potential safety hazards of coal dust deflagration and explosion. Even if a small amount of dust spills, these dusts adsorb, adhere and settle when they contact with dry fog, which increases the diameter of dust particles, reduces the specific surface area of dust particles, and reduces the flying ability of dust. It also increases the air humidity in the limited space such as the coal falling pipe (or coal chute), the guide chute, and the working environment of the coal conveying structure, reduces the ambient temperature, greatly reduces the explosion probability of bituminous coal dust, and effectively reduces the spontaneous combustion of coal dust. The safety hazards of explosion, basically eliminate the safety production hazards caused by coal dust and coal dust cloud explosion. At the same time, it reduces the failure rate of the coal handling system equipment, improves the reliability and availability of the coal handling system equipment, and reduces the maintenance workload and maintenance costs.

### **5. Conclusion**

During the operation of thermal power plants, there are many factors that can cause coal dust to be produced. Because of long-term accumulation and joint action, coal dust has become more and more polluting in all aspects. In order to achieve the expected results of dust treatment during the dust treatment of coal trestle bridges in thermal power plants, a comprehensive comprehensive treatment plan must be carried out. Dust prevention and control should be implemented through various fields to improve the safety and reliability of coal trestle bridges. If the related equipment of the coal transportation system fails to carry out the scientific sealing work smoothly, it will inevitably lead to the appearance of dust. Because coal dust is the cause of air, there will be a certain degree of volatilization. Therefore, it is necessary to strengthen the management of coal dust, plan a suitable solution to the spread of coal dust, and reduce the harm of coal dust.

In summary, the dust pollution in the coal transportation system of power plants is directly related to water content, coal type, equipment shutdown and system layout. In the actual dust prevention and control process, relevant departments and engineers should strengthen the research on new technologies and new equipment to effectively solve the dust problem. Enterprises should find out the main cause of dust and make corresponding solutions in time.

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