

Optimization of Coal Dust Control System in Thermal Power Plant

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Abstract

During the working process of coal handling system in thermal power plant, some dust will inevitably be produced. A series of relevant measures have been taken to reduce dust and reduce the harm of these dust to the environment and people. A large amount of dust will be generated in the working process. If it is not handled in time, it will seriously threaten the personal safety of coal handling personnel and the integrity of equipment. Therefore, in order to reduce the environmental pollution caused by dust generated by coal transportation and avoid potential safety hazards.

Keywords

Coal Handling System, Dust Suppression, Thermal Power.

1. Introduction

Coal handling system is very important in thermal power plant and is an indispensable part of thermal power plant. The coal handling system includes many aspects, such as coal combustion, coal handling, transportation and selection. However, these jobs may cause certain pollution to the environment. After the coal powder floats into the air, because these dust contain a lot of harmful substances, if it is absorbed into the body, it will also cause great harm to the human body. Therefore, it is necessary to strengthen the management of coal dust. During the construction of coal, it is necessary to reduce the scope and amount of coal dust, 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 their health. At present, there are three aspects of coal dust cleaning in China: hydraulic cleaning, vacuum cleaning and manual cleaning. The relevant treatment methods of coal dust treatment in the coal handling system of most power plants in China can be summarized as follows: vacuum plus manual cleaning, hydraulic cleaning and vacuum plus hydraulic cleaning. According to relevant data, the effect of hydraulic cleaning is better than the other two, which is highly praised by most power plants; The second is vacuum cleaning plus hydraulic cleaning, which has a worse cleaning effect than hydraulic cleaning, but it also operates in some favorable places, so some power plants are still willing to use this method; The last vacuum cleaning has some defects and imperfections, so it is rarely used in power plants in China. Hydraulic cleaning has been used for a long time and its development is relatively perfect. Now it is welcomed by most power plants and has become the mainstream cleaning method for coal dust control in coal handling system.

According to the long-term investigation of dust, there are many factors that can cause coal dust during the operation of thermal power plant. Due to the long-term accumulation and joint action, the pollution of coal dust to all aspects is increasing. Therefore, in order to control coal dust more effectively, we have conducted a series of investigations on the causes of coal dust: the acceptance and unloading of coal mainly refers to the direct unloading of coal transportation vehicles to coal storage sites [1-3]. In this working stage, when unloading coal, the tools for transporting coal will certainly collide with each other because the coal falls, so that the coal blocks collide with each other, and it is easy to generate dust in the air and disperse it to all corners of the place. When unloading coal, there will certainly be coal imbalance due to the limitations of coal. Therefore, in the process of

adjusting coal distribution, there will also be collision between coal, resulting in the dispersion of coal dust [4]. In addition to the above reasons, if the relevant equipment of the coal transportation system cannot be sealed scientifically, it will eventually lead to the emergence of dust. Because the dust of coal is the cause of air, it will volatilize to a certain extent. Therefore, it is necessary to strengthen the management of coal dust and plan a scheme suitable for solving the diffusion of coal dust to reduce the harm of coal dust.

2. Analysis on Direct Harm of Dust in Coal Dust System of Thermal Power Plant

Coal dust does great harm to human body. It can harm all parts of human body. Because of people's special body structure, it has a certain protective effect on coal dust, and coal dust will not all enter people's body [5]. But more or less, it will inhale a lot, which will have a serious impact on people's respiratory tract, lungs and skin. Because human skin is the first and most exposed to coal dust, the damage to human skin caused by long-term exposure to coal dust is the greatest, which may cause skin allergy.

2.1 Discussion on Dust Suppression and Dust Removal Measures of Coal Handling System

In thermal power plants, dust removal from the coal supply system is usually combined with water spraying and mechanical dust removal. For example, the coal unloading ditch and the car dumper are installed with the spray dust feeding system, and the dust is absorbed after spraying [6-8]. At transfer station, crusher, coal bunker, etc. Install pressure dust remover and spray dust suppression device. Through dust remover, local negative pressure is formed in the most concentrated dust part. Characteristics of coal combustion in coal transportation system. There are differences in physical and chemical properties of coal around the world, resulting in differences in the characteristics of pulverized coal separated from coal materials. These differences have a certain impact on the selection of dust collector. Process layout and process conditions of coal transportation system. The dust removal and ventilation system serves the coal transportation process. The layout of the dust removal system shall be subject to the overall process discipline. Different types of dust removal equipment can be selected according to different layout modes of dust collectors. Operation and maintenance workload of dust removal equipment. The daily operation and maintenance of dust removal equipment plays a decisive role in its normal operation. Cleaning the dust collector is dirty and tired. When selecting dust removal equipment, priority should be given to dust removal equipment with less maintenance workload, convenient operation and low technical requirements for maintenance workers. Initial investment and operation cost of dust removal equipment. The investment of the dust removal system cannot be recovered through income. Only on the premise of meeting the dust concentration in the air of the workplace and the emission concentration of the dust removal system, can the initial investment and operation cost of the system be comprehensively compared to reduce the cost of the system life.

2.2 Rational Allocation of Coal Resources

The key to reduce dust lies in the rational allocation of coal resources. It is necessary to strengthen the control of the source of power coal procurement, and fully consider the particle size, hardness, moisture and dust of raw coal, so as to further reduce the proportion of dust generated in the process of coal unloading and transportation [9-10]. When the power plant considers doping some inferior coal blocks in the combustion coal blocks in order to save capital, it must fully consider the fineness and hardness of raw coal before doping.

2.3 Mechanical Ventilation and Dust Removal

In the coal bunker room of the coal conveying system, some coal chute and guide chute of the coal crusher room [11], the amount of dust is relatively large. In order to make the dust removal effect more obvious, negative pressure dust collector is usually used for dust removal in these places, which can greatly reduce the content of pulverized coal [12]. At present, it is also adopted by most power

plants in China, and the effect is very obvious. Coal dust control is a very complicated and difficult systematic work. It is not enough to rely solely on the dust collector for dust removal, and it is difficult to achieve the purpose of control [13]. It requires the joint efforts of all parties, adhering to the purpose of "seven points of prevention and three points of treatment", the combination of prevention and control and comprehensive treatment, so as to achieve an ideal treatment effect. The unpowered dust removal system technology adopts a new closed guide chute for dust prevention and dust reduction, which has been installed and used in the transformation projects of Guodian Xuanwei and other power plants and operates well [14]. Compared with other dust removal equipment, it has the advantages of good dust removal effect, no power consumption, no water consumption, no opening and closing operation, no noise, no secondary pollution, etc. Therefore, it is recommended to install unpowered dust removal device in the transfer station of the power plant.

2.4 Belt Curtain

In order to separate the airflow and coal flow, let the expansion box integrate the dusty airflow, and reduce the contact between the dusty airflow and the coal flow when the belt is running [15], several dust-proof curtains can be added at the outlet of the guide chute. These dust-proof curtains are composed of several rubber strips, and the diameter of each rubber strip is 5 ~ 6mm. These dustscreens can be made of materials with abrasion resistance, flame retardancy and aging resistance. The advantages of this material are: (1) increasing the air resistance at the outlet of the guide chute can reduce the pressure of the dusty air flow to the expansion tank; (2) when the dusty air flow enters the guide chute with dust-proof curtain, the propagation direction is changed due to the obstruction of the curtain, so that a large number of dusty particles remain in the curtain; (3) When large coal blocks enter the curtain, the rubber strip on the belt will be pulled up, and the gap of the curtain will become smaller, which can prevent a large amount of coal dust, and then reduce the dust by humidifying and filtering the dusty air flow. Then, set a dust concentration sensor in the area to avoid the pollution caused by too much dust.

3. Conclusion

To sum up, the dust pollution in the coal transportation system of the power plant is directly related to the water content, coal type, equipment shutdown and system layout. In the actual dust prevention process, relevant departments and engineers are strengthening the research on new technologies and new equipment to effectively solve the dust problem. As for the very dangerous dust formed in the coal supply system, the relevant personnel shall strengthen the research on coal dust control, establish a scientific treatment of awareness, and study the measures proposed in the article according to the specific problems of coal dust, so as to solve the problems formed in the coal supply system.

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