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Operation and Management of Electrical Equipment in Iron and Steel Enterprises

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Abstract: How to ensure the reliable operation of the complex and huge electrical system composed of a large number of electrical equipment in iron and steel enterprises? Combined with working experience, the author introduces four main factors affecting the normal operation of equipment, analyzes five main problems existing in the operation and management of electrical equipment, and puts forward corresponding improvement measures, so as to improve the management level of electrical equipment in iron and steel enterprises.
Keywords: iron and steel enterprises; electrical equipment; operation management

In recent years, with the rapid development of the economy, society, and science and technology, electrical technology has been advancing rapidly, and electrical equipment is gradually moving towards intelligence, integration, modularity, and networking. Modern electrical equipment has been widely used in various fields of the national economy. As an important pillar industry of China's economy, the introduction of modern electrical equipment in the steel industry is conducive to improving product quality, energy conservation and emission reduction, and reducing production costs [1,2].

At present, the main electrical equipment used in steel enterprises includes transformer stations, high and low voltage distribution cabinets, switchgear, frequency converters, soft starters, high and low voltage motors, various detection electrical equipment, as well as remote control and monitoring systems.[3,4].

1 The main factors affecting the normal operation of electrical equipment

1.1 Institutional and management factors

For enterprises, a good management system can effectively improve work efficiency, stimulate the work potential of employees, increase cohesion, and help establish the corporate image, thereby improving the economic benefits of the enterprise [5]. For the electrical equipment management department, the main task of management is to ensure the effective implementation of systems for the operation, maintenance, and inspection of electrical equipment. The quality of management work directly affects the safety, reliability, and continuous operation of various electrical equipment. Therefore, it is necessary to adopt efficient, scientific and reasonable management methods to meet the production needs of enterprises.

1.2 Personnel factors

The operation management, daily inspection, maintenance and upkeep of electrical equipment require relevant operators to have high professional knowledge and professional qualities [6]. Operators should strictly follow the operating procedures, eliminate illegal operations, fulfill their duties, identify hidden dangers, and reduce the probability of electrical equipment failures caused by human factors.

1.3 Technical factors

One is that various types of electrical equipment in steel enterprises are complex and diverse, usually provided by different manufacturers. The signal analysis and processing methods of each equipment are also different, especially after the intelligence and modularization of electrical equipment, it poses a huge challenge to the compatibility and stability of remote control systems and various monitoring systems. The second issue is that some electrical equipment technologies are relatively backward, and the process of equipment updating and replacement is complex, with slow progress, which

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seriously restricts the improvement of production efficiency and the long-term development of enterprises.

1.4 Environmental factors

For some production workshops of steel enterprises, there are situations such as high temperature, high dust concentration, and poor ventilation. Electrical equipment such as detection components, motors, and distribution cabinets that are exposed to this working environment for a long time will have a certain impact on their normal operation and service life. There are certain safety hazards for the process flow that requires high continuity of production.

2 Problems in electrical equipment management

2.1 Institutional aspects

The various regulations for electrical equipment are important guarantees for the effective implementation of relevant management work and important measures for the normal operation of electrical equipment. However, there are three problems in the actual implementation of the electrical equipment management system: firstly, some enterprises have failed to scientifically and reasonably classify various types of electrical equipment based on their actual situation and develop sound management systems; Secondly, the relevant management systems have not been revised and improved in a timely manner based on the updates and upgrades of relevant equipment; Thirdly, the relevant management system was not effectively implemented in the daily operation management, inspection, maintenance, and other practical work of equipment after completion.

2.2 Daily inspections

Daily inspection is a necessary task to ensure the normal operation of electrical equipment [7]. It can be effectively determined whether the equipment is in normal working condition through methods such as "seeing, listening, smelling, and testing". However, in practical work, there are often problems such as careless, careless, and perfunctory inspection work. Some abnormal states before electrical equipment failures are not detected and dealt with in a timely manner, ultimately leading to the occurrence of electrical equipment failures.

2.3 Personnel aspect

The professional quality and skill level of electrical equipment operators, especially frontline personnel, are the key factors determining whether management measures and related systems and regulations can be effectively implemented. There are two shortcomings in terms of personnel: firstly, the structure of electrical equipment professional technical personnel is unreasonable, lacking professional technical personnel who have both a good theoretical knowledge foundation and strong practical experience, and can timely and accurately handle electrical equipment faults; The second reason is that the training mode for professional technical personnel is single, usually with a group of technical personnel responsible for the operation and management of an electrical equipment. There is a lack of communication and learning among the various groups of personnel, resulting in a self sweeping work mode. A single technical talent can no longer meet the requirements of modern electrical equipment management [8].

2.4 Emergency response

Emergency response measures are important measures for quickly eliminating electrical equipment faults and restoring production. However, some companies often do not attach enough importance to emergency response measures and overlook their importance. The main problems are as follows: firstly, the emergency measures for electrical equipment operation management lack operability; The second is the insufficient reserve of vulnerable electrical equipment and commonly used components required for maintenance and repair in key links; The third is the formalization of emergency drills for electrical equipment failures, which are disconnected from actual production; The fourth is the lack or incompleteness of emergency measures for personnel injuries caused by electrical equipment accidents.

2.5 Education and training aspects

Some steel companies have overly formalized the education and training of electrical technicians, with a single and boring content, losing its true significance.

3 Improvement measures for electrical equipment management

3.1 Institutional aspects

By constraining various systems in a scientific and reasonable manner, we can ensure that all work is organized and based on evidence, thereby ensuring the normal operation of electrical equipment in the enterprise. One is to improve various management systems. The electrical equipment supervisory department of steel enterprises should improve various management systems based on the characteristics of various electrical equipment and the actual production process of the enterprise. The second is to ensure the effective implementation of relevant systems, by improving and strengthening management methods to ensure the effective implementation of various systems. The third is to update the system in a timely manner. The electrical supervisory department updates and adjusts the relevant management system in a timely manner based on the updates of various electrical equipment and personnel adjustments, ensuring that system updates are synchronized with equipment updates [9].

3.2 Daily inspections

Daily inspection work is an important means to ensure the normal operation of various electrical equipment. Doing a good job in daily inspection work should start from the following five aspects. One is to establish a sound inspection system and related inspection checklist, ensuring that all inspections are conducted without missing or missing items; The second is to enhance employees' sense of responsibility, conscientiously perform their duties, effectively carry out

daily inspection work in accordance with operating procedures, and keep relevant records; The third is to do a good job in shift handover work, and each team should provide a detailed explanation of the operation of the electrical equipment they are responsible for during the handover; The fourth is to promptly handle problems and make predictions in advance for abnormal situations of electrical equipment; The fifth is to regularly calibrate the instruments and meters used in the inspection work to ensure the accuracy of relevant measurement data [10].

3.3 Personnel aspect

Firstly, it is necessary to introduce a group of professional technical talents with rich experience in electrical equipment operation and management, familiar with equipment performance. Secondly, it is possible to strengthen the communication and coordination mechanism among various departments within the enterprise, especially between the talent utilization department and the human resources department, and to enhance the communication and learning among various electrical equipment technicians. Finally, it is necessary to improve the talent cultivation mechanism and form a talent cultivation model within the team that uses the old to lead the new and pass on the knowledge, cultivating a group of comprehensive talents who are familiar with the performance of various electrical equipment and have strong fault handling abilities.

3.4 Emergency response aspect

Develop scientifically reasonable, comprehensive, and highly operable emergency response plans based on the characteristics of common accidents in various electrical equipment, and prepare emergency response personnel and commonly used accessories. Regularly carry out targeted accident emergency drills to enable relevant personnel to proficiently master the accident handling process, accident response measures, and on-site emergency rescue measures for injured personnel. Inspect the connection between various links and processes of emergency response, as well as the cooperation of relevant personnel. When an accident occurs, all personnel should closely cooperate, each link and process should be connected in an orderly manner, with moderate relaxation and urgency, and the emergency response ability of electrical equipment accidents should be effectively improved to reduce production downtime and economic losses caused by accidents.

3.5 Education and training aspects

The education and training work of steel enterprises can be divided into two categories: first, professional skills training; The second is safety training. Electrical professionals and technicians should receive education and training before taking up their posts, pass the assessment, and adhere to the principle of holding a certificate for employment. Professional skills training should be tailored to the category of electrical equipment, and regular targeted, rich in content, and innovative in form education and training should be carried out. Through education and training, electrical technicians are able to understand industry trends, development trends, and equipment updates, proficiently master the parameters, performance, work characteristics, operating procedures, and common troubleshooting methods of various electrical equipment, remote control, and monitoring systems in our company.

Safety training refers to the personal safety of technical personnel. Safety training should be combined with various examples of electrical equipment accidents and carried out in a targeted manner according to the type and characteristics of the enterprise's electrical equipment. Through safety training, electrical professionals can enhance their safety awareness, enhance their self-protection ability, and achieve the "three no harm" principle. The significance lies in warning technical personnel to strictly follow the operating procedures, eliminate illegal operations, command violations, and ensure personal safety.

4 Conclusion

As an important equipment in the production process of steel enterprises, the operation status of electrical equipment directly affects production efficiency, product quality, and enterprise benefits. The electrical equipment management department enhances its management level through measures such as improving systems, improving or introducing advanced management methods; Effectively carry out daily inspections, repairs and maintenance, equipment upgrades and renovations, improve the stability and reliability of electrical equipment and related systems, and ensure the reliable operation of equipment; Improve the professional skills and safety awareness of employees through the introduction of professional technical talents and education and training work; Shorten the impact time of electrical equipment accidents and reduce the degree of impact of electrical equipment accidents through the implementation of emergency measures. So as to improve the operational management level of electrical equipment in steel enterprises and ensure the needs of production and operation.

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