Research on the Application of Electrical Automation Technology in Electrical Engineering

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Abstract. Since China's accession to the WTO, the socialist market economy has been rapid development, electrical automation technology has also been rapid and more mature, which makes important contributions to China's rapid socio-economic development, the unprecedented development and use of electrical automation technology promotes and gradually widens the way of the construction of the electrification project. This paper focuses on the analysis of three distinctive characteristics of automation technology monitoring, explores the current application of electrical automation technology in China's electrical engineering, finding that it is mainly used in power plants, substations and electroplating network. This paper analyzes the three types of automation modes, finding that from the daily necessities to the field of aerospace technology, have been a large extent use of electrical automation technology, which continues to enhance our comprehensive national strength.

INTRODUCTION

Electrical automation technology achieved remarkable results with the process of current international industry, especially with the development of China's industrialization process and constantly expanding on the practical application areas. It has entered electrical, electronics, communications, machinery and many other areas. Because of the high level of China’s economy, there’s almost no modern technology if there’s no electrical automation. Electric automation has become an important part of our modern
social economy, electric automation knowledge expands over time, and now it contains network information technology and computer technology, also includes the integration technology of motor technology and electromechanical. According to the different use methods, electrical automation technology is divided into four areas of electrical engineering applications: power plants, substations, power distribution and distribution systems.

ANALYSIS OF AUTOMATION TECHNOLOGY’S MONITORING FUNCTION

The reason why electrical automation technology can be applied is that it can effectively monitor the machine required in production process and actually control the operation, manage each program in order to achieve the overall system centralized remote control, reduce labor loss and operational risk, and improve work efficiency. There are three main features using the current electrical automation technology to achieve monitoring functions: first, remote monitoring, second, centralized monitoring, third, field bus monitoring. Analysis as follows,

Analysis of Remote Monitoring Features

The meaning of remote monitoring, to say specifically is effectively controlling the computer network connection for devices that need to be monitored. Remote monitoring can avoid many unfavorable environmental factors, so remote monitoring can minimize costs, the reliability of monitoring technology can be improved, and the flexibility of monitoring can be continually improved. However, the communication speed will be reduced because of the increase in cable, which will affect the monitoring technology, so it can’t be applied to larger automation systems, it works well for local systems, but with the progress of technology, it will improve well.

Analysis of Centralized Monitoring Meaning

Centralized monitoring, as the name suggests, is to concentrate varies functions for effective control, these functions can run the system components up only need a processor. As the operator is away from the dangerous device, the advantages is obvious: it runs convenient, just by moving fingers; system design is also very easy, it’s easy to understand the principles; control requirements are also low, not need a lot of steps. However, there is also a clear deficiency: with only a processor, sometimes heavy operational tasks focused on the processor above, will reduce the processor processing speed,
even appear suspend fault. In addition, the processor links a large number of cables, the cable will also affect the normal operation of the processor, long-term interference eventually lead to system reliability continues to decline, it will increase maintenance costs and increase maintenance and repair work. In general, to reduce the pressure on the processor to prevent sudden failure, we should prepare a set of processors to improve the monitoring effect in the monitoring room.

Analysis of Field Bus Monitoring Features

Field bus monitoring has been widely used in the field of electrical automation monitoring system, which is the best way to monitor, using this monitoring method can make China's current electrical automation system design target improve a level, and no longer limited by the local environment, using the interval design for the specific function of the device can reduce the design cost, it is not necessary to use terminal cabinets or isolation equipment. As the implementation of the interval design, you can freely combine each device to enhance each of the independent functions, to effectively improve the reliability of the system. As technology continues to evolve, field bus monitoring will continue to improve.

ANALYSIS OF THE APPLICATION OF ELECTRICAL AUTOMATION TECHNOLOGY IN CHINA TODAY'S ELECTRICAL ENGINEERING

With the pace of China's economic construction increased, electrical engineering has become increasingly complex, it has a very complicated procedure whether in the stage of initial use or specific use. Through the application of electrical automation technology, each complex management procedures can be easier to operate, the electrical engineering quality and the work efficiency is further improved. Specifically, the application of electrical automation technology in electrical engineering usually has four aspects:

Electrical Automation Technology Used in Power Plants

In general, the application of electrification automation technology in power plants is to establish a reliable decentralized measurement and control system. The so-called decentralized measurement and control system is the electronic management system which measure and control every management procedures hierarchically. It consists of three parts: the network system, the control unit and the monitoring part decentralized monitoring and controlling various
procedures. The network system consists of multiple units, first establish a set of scientific and practical Internet, and then set up a remote control station to control the Internet, and then through the data communication system to provide specific data for the operator to analyze and get the appropriate method of operation. Control unit and process supervision focus on a variety of production processes and timely display, which is conducive to the operator to obtain important data, analyze the situation and save time and effort. Decentralized measurement and control system can obtain data signal output by a variety of programs and make appropriate classification, then print out the results with computer for operator to observe and make deep analysis and speculation, in order to grasp the operation of the program equipment in the shortest time, thereby reducing the pressure on staff and improving work efficiency.

The application of electrical automation technology to the construction of hydropower plants, can achieve a single machine to maximize at least, and then automated process the subsidiary utility, continue to increase investment can enable enterprises to achieve full management automation, this will not only improve the producing safety of hydropower plants, but also improve the safety performance of the entire power supply system, in order to improve the producing efficiency of hydropower plants.

Using electrical automation technology to the production management of current thermal power plant is integrated processing the generators, boilers and transmission systems, transform them into unit system operation mode, the operator can access to relevant data and see the operation of mechanical and electrical equipment just by looking at the monitoring system but not enter the scene to manage, if they find something abnormal by analyzing and processing the data obtained, they can determine whether there is a hidden electrical on the mechanical equipment and what measures should be taken to deal with it, thus can improve the power generation capacity of thermal power units, reduce the risk of manual testing and reduce maintenance costs. It can effectively unify the whole plant unit through the electrical automation technology, and promote efficiency that the normal operation of thermal power grid continues to improve, strengthen the operator's management efficiency of the unit. With the continuous innovation of modern technology, more electrical automation technology will be applied to the thermal power enterprises, which will promote the thermal power enterprises more intelligent and professional, to achieve higher standards of network and automated management.
Application of Electrical Automation Technology in Modernized Power Network Dispatching

Facilities that modern national grid needs are fixed, they realize the effective management mainly though the use of electrical automation technology system, depending on the role of each part, the grid dispatching automation system can be divided into two parts, one part is hardware, including the workstation and the central server, as well as the display providing the operation and other equipment. The other part is software, obviously a computer network system. The process that power grid dispatching to achieve electrical automation technology is that scientifically monitoring and effectively scheduling to ensure the normal operation of the grid business with the help of computer network systems. Mainly use of power system network in powerful area to achieve a variety of terminal connections, connect the power plant, station, workstations and dispatch centers as well as other places were originally established separately one by one, make automatic dispatching unified, to improve the efficiency of power grid dispatching center, improve the market competitiveness of power grid dispatch center, conform to the develop needs of current domestic market. Carrying out grid dispatching work with electrical automation technology can help the grid management to improve the management level, collect data timely, find problems may existed in the grid, take measures to deal with problems in time, strengthen the automation management capacity of power production and operation, and constantly develop the power grid scheduling efficiency of key technology.

Electrical Automation Technology is Widely Used in Advanced Substations

With the continuous development of science and technology, electrical automation technology using in power station is also improved, many procedures those need to be manually dealt with originally have achieved automation operation, this is the result of the development with times, and it avoids the possible errors in manual operation. The current station’s work efficiency is greatly improved because of the automation management, and reduced the harm of manual operation. Now many enterprises in China gradually use automatic electrification technology like intelligent robots instead of artificial, indicating that electrical automation technology is increasingly mature, substation work gradually reduces the dependence on people and comes into a new stage of development. As long as China's technology science develops to a certain stage, a lot of substation work will be implemented unattended mode, then China's substation automation technology will be in a world-class standards.
**Electrical Automation Has Been Widely Used in Power Distribution Systems**

To see the development process of China's power distribution system, in the past, the application scale is small, but since China's accession to the WTO, we absorbed a lot of international advanced technology and the electrical automation technology has been widely used in the distribution system now. According to the development of China's power distribution system, power distribution automation model can be divided into three categories:

The first, power distribution use the model of centralized monitoring automation, this model works most efficiently and saves a lot of manpower. The second category, locally controlled feeder automation mode, with this model in special circumstances can reduce maintenance costs. The third category, the distribution automation mode which combines the centralized monitoring and corresponding distribution management with scientific methods. The first and third types of models are considerably reliable and have been vigorously promoted in China's power distribution system, they both use distributed structure and the same power distribution system, that is, putting the master station and sub-station together to form a unified system model. The application of electrical automation technology to the distribution system will help improve the staff’s working environment, improve the productivity, reduce the staff’s labor intensity and promote the upgrading of the modernization technology of the distribution system, it is more stable that makes the running time of the power distribution longer and can create higher economic efficiency.

**Development Direction of Electrical Automation Technology in Electrical Engineering**

First of all, with the rapid increase of electricity consumption in China, high frequency development is increasingly obvious, which promotes modern electrical technology’s development. We should pay attention to the research of high-frequency and guide the electrification technology towards the high frequency.

In addition, due to the continuous breakthrough in computer network technology, and is applied to many areas, electrical automation technology is no exception, any technology want to be spread to the world must promote though network. This requires that electrical automation technology must be combined with computer technology in the future.

Another point, the current electrical automation technology should be moving towards artificial intelligence, due to the continuous progress of
modern industrial technology, many enterprises gradually use intelligent machine gas instead of artificial labor to save labor costs, this requires electrical automation technology based on the modern network to build its own information platform and information database that artificial intelligence needs to develop more advanced automation technology.

SUMMARY

Through the above analysis, we can know that with the continuous innovation of modern science and technology, electrical automation technology has also been improved, the model applied to the electrical engineering continuous innovate, makes a significant contribution to our modern electrical engineering construction. At present, more China's industrial use electrical automation technology, it can be said that formal electrical automation technology is an important supporting force for China's industrial development. Due to the rapid development of modern science and technology, a technology will be eliminated if it is stagnant, this situation forced China making efforts to invest a lot of manpower, material and financial resources for electrical automation technology research and development, and apply the latest research technology to the electrical engineering construction timely to promote China's comprehensive national strength among the world-class.

REFERENCES