

ANALYSIS OF APPLICATION AND DEVELOPMENT TRENDS OF AUTOMATED INSTRUMENT CONTROL SYSTEMS

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Abstract: With the development of modern science and technology, artificial intelligence has penetrated into various existing industries in China. It not only effectively improves the work efficiency of the industry, but also brings It has stimulated the upgrading of software and hardware equipment in the entire industry. This article analyzes the application advantages of instrument automation control systems and combines its current development and application status. Based on the development trend of automated instrument control systems in the future, and based on the current development status of enterprises in China, corresponding suggestions for the development of instrument automation are put forward to realize the production and operation of petrochemical enterprises. Networked, model-based and scientific production management, and safe digitalization integrating scientific management and control.

Keywords: Automation; Instrument; Control system; Application; Development

1 INTRODUCTION

With the development of modern science and technology, artificial intelligence has penetrated deeply into our country In various existing industries, it not only effectively improves the work efficiency of the industry, but also It has driven the upgrading of overall hardware and software equipment. Automation instrument control system system, with the help of automated measurement and data processing under unsupervised use of modern Taking advantage of the Internet, various data are transmitted to the background control and central processor. This greatly facilitates the management and later maintenance of various modern electrical equipment. This improves the overall operating efficiency of the enterprise and reduces operating costs. From this it can be See, the emergence and application of automated instrument control systems have a profound impact on the development of the entire industry All play a positive role in promoting and profound influence, promoting the development of China's equipment industry Development, automated instrumentation is an indispensable part of petrochemical production.

2 AUTOMATED INSTRUMENT TESTING CLASSIFICATION

From the perspective of instrument types, Currently the most widely used automation instrument in the petrochemical industry There are four main categories of instruments: pressure instruments, level instruments, temperature instruments and measuring instruments."

2.1 Pressure Instruments

In the production process of enterprises, the control of pressure can undoubtedly help maintenance Effectively understand the gas stabilization process in existing pipelines with on-site operators In the past, pressure gauges were mainly used for pressure measurement, but traditional pressure gauges It requires dedicated personnel to carry out regular monitoring and detailed records, which undoubtedly increases Increased daily operating costs of the enterprise. Automated pressure instruments apply modern digital technology technology, connect it with the background database, and use pressure transmitters to realize the data The transmission can help managers more intuitively understand the gases inside different pipelines. changes over a period of time, and its accuracy is higher, which can better prevent Prevent problems before they occur and avoid hazards caused by gas leaks or pressure changes. since The automatic pressure gauge has accurate data, is durable and has a low failure rate, which is a safety measure for the petrochemical industry. Efficient production provides a strong guarantee.

2.2 Level Instrument

In petrochemical enterprises, liquid level measurement methods are often used. Level instruments mainly use position recording to measure products, such as in chemical production. It can be used to measure the height of the sample; in the production and processing of oil and gas fields in oil pipelines Oil level position measurement by facilities; laser ranging used in railway electrification projects These all belong to the category of level instruments. Automated level instruments utilize modern information Information technology realizes the measurement of different material levels and the control of liquid level height. State settings, the control valve achieves accurate control of the material level, and reports through the upper and lower limits Alarm and electrical interlocking to prevent the occurrence of can eruption and other phenomena, providing reliable production safety Rely on protection.

2.3 Temperature Instrument

In enterprise instrumentation applications, the application of temperature instruments is for existing equipment. Understand the heating and heat dissipation conditions to help enterprises reasonably control temperature. control, especially in some industries with extremely strict temperature control, a good temperature Control equipment and temperature instruments play a vital role. traditional temperature meter Mainly using thermal resistors or hot spot couples, etc., and with the development of modern information technology development, more intelligent temperature control systems are adopted, with the help of PLC control system to monitor and manage temperature in real time, and centrally import data into In the central processing unit, it is processed and analyzed later. through automated temperature The temperature meter measures changes in temperature in real time, and the timeliness and accuracy of the data are greatly improved. Big improvement.

2.4 Gauge

Automated measuring instruments are configured through the control system and use preset flow rates The limit value is automatically increased and decreased by adjusting the opening of the control valve, and the convection Accurately control the flow rate to ensure that the flow rate is within the optimal range. The operator passes the Provides parameters for system data analysis such as system data and actions collected by the instrument to provide human Manual adjustment provides guarantee. Measurement accuracy and timeliness of automated measuring instruments Well, flow control is more reliable.

3 INSTRUMENT AUTOMATION CONTROL SYSTEM APPLICATION EXCELLENCE PAD

3.1 Storage Function

The traditional instrument control system is more of a display and display of original numbers. Presentation, the staff records the numbers in different periods to form a certain Phase digital trends. Using combinational logic circuits and sequential circuits like this The instrument can only realize memory at a certain moment. Therefore, it undoubtedly requires People must monitor existing instruments regularly, which improves the use of enterprises labor costs and duplication of work by staff. More importantly, due to the The data cannot be recorded in real time, resulting in incomplete recording of the final data. It cannot truly reflect the equipment and air pressure, temperature and other data in the pipeline at different times. According to the situation. Modern automated instrument control systems can undoubtedly control data Carry out real-time monitoring and storage, and classify the data at each stage into the final stage. into a central processing unit, and sort the data at different times as needed. and output, which facilitates later processing and analysis of data, and also provides future The coming device management provides effective data support.

3.2 Instruments Increase Calculation and Data Processing Capabilities

The automated instrument control system adopts modern digital management technology, which It is embedded with a microcomputer, so compared with traditional management methods, one In terms of improving the accuracy of digital records, it is more accurate than traditional manual records. More detailed and accurate, on the other hand, it can more intuitively present the time at a certain time data changes, form intuitive images, and record and analyze data in different periods changing conditions, thus improving the analysis of data directly during the data collection process. analysis, which greatly improves the efficiency of enterprise operation and management, and provides a basis for later maintenance and management. Foundation.

3.3 Expandable

A very important point of digital management is the scalability of the software itself There is no need to add external hardware like the traditional management method, but You only need to install the corresponding software inside the system to expand the existing system To improve the applicability, more abstract programs are used instead of more complex processors. At the same time, the visual operation also makes the expanded software application simpler. Simple, no longer need to perform repeated data programming and circuit changes, greatly Simplified program design to facilitate later targeting based on the conditions of different devices expansion and operation.

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4.1 Transformation of DCS

The development of modern technology means the improvement of enterprise management level and efficiency. This traditional decentralized control system (DCS) Corresponding changes will inevitably be made. From the current development of foreign multinational companies and system updates, instrumentation Automation is moving towards large-scale integration, that is, traditional DCS Integrate and centralize decentralized control systems to form an integrated management system to improve the company's own operation and management efficiency and truly achieve integration ization control. at the same time, The advantage of integrated control also lies in the sharing of information, which avoids Eliminate the obstacles of information exchange and transmission under decentralized control, thereby better understanding the current situation Some equipment operations are arranged as a whole and later maintenance and management are carried out to achieve the goal of Integration of management and control and decision-making aspects.

4.2 Control Software will Gradually become Standardized, Commercialized and Streamlined

Use more advanced software control systems to improve project control capabilities and overcome the existing problems of the system, such as nonlinearity, time variability, and instability, and at the same time. At this time, the future automated instrument control system will inevitably tend to be standardized and process-oriented. The biggest advantage of management is that everything can be managed according to predetermined arrangements, which facilitates commercial management and ensures the orderly connection between various parts. connection, allowing the equipment to be expanded and combined with more processes, thereby ensuring automatic optimizing the extensibility, flexibility, safety and convenience of instrument control systems.

4.3 Network Development Trend of Automated Instruments

The 21st century is the era of the Internet. The development of the Internet has greatly improved the speed of information transmission and communication, and also ensures the smoothness of information in the unified network. shared. The combination of automated instrument control systems and the Internet is the general trend in the future. trend, the automatic control system and field equipment are added to the factory information network, thereby forming It has become a new enterprise network layer, in which a collection of various data analytics is implemented. This enables the mutual conversion of back-end and front-end data, and extends new types of Automated instruments, i.e. IP intelligent field instruments, can Make reasonable corrections and early warnings for changes at different times, based on embedded The control network architecture of the Internet makes the network transparent and covers the entire Enterprise-wide application entity. The backend management of the frontend is realized, and it is no longer On-site equipment monitoring, but discussing how to deal with it in the background meeting, This is then fed back to the front desk to ultimately form a correction method.

4.4 Development Trend of Openness of Automated Instrument Data

Nowadays, more and more measurement and control instruments use Windows, Linux, VxWorks serve as the core of system software and high-performance microprocessors The embedded system technology in which the processor is the core of the hardware system. Agilent Instruments The instrument equipment should have all interfaces of the computer, such as USB interface, printing computer interface, LAN network interface, etc., to realize data input and output diversification to better visualize existing automated instrument data ization and operability, realizing multi-level data application and diversified interfaces ization, making the application fields and transmission modes of data more extensive, laying the foundation for the future of enterprises. It laid the foundation for the development of equipment as well as the debugging and improvement of equipment.

5 SUGGESTIONS FOR THE DEVELOPMENT OF INSTRUMENT AUTOMATION

5.1 Introducing Advanced Sensing Technology

As the level of sophistication of future equipment continues to increase, modern high-tech enterprises The types of equipment involved in the industry, especially the need for different types of equipment in early planning It depends on the differences in the same region and the different requirements of the environment for the equipment itself. Targeted equipment planning and demand design, at the same time due to automation The equipment itself is more compact and complex than traditional evolutionary equipment. complex, so although in the later stage, both in terms of specific equipment usage and cost expenditure are lower, but more manpower is required in the early planning and design to and substation operation and management costs. At the same time, due to the complexity of the internal structure and the impact on equipment, which requires a more in-depth understanding and exploration of existing The adaptability of the equipment to the environment during actual application. Therefore, it is necessary to enter In one step, more compact sensing equipment is introduced, such as PID proportional calculus and other methods. In the original adjustment method, this will cause complex problems of multiple loops in automation. The problem was solved very well. Ensure that high-precision equipment operates at its best.

5.2 Improve the Integration of Software and Hardware

Integration between equipment is the key to whether the automated instrument control system can be effectively applied The key point is that with the application of standardized software and hardware equipment and PLC, The use of programmed controllers strengthens the coordination and fit between different devices, thus Devices of different specifications can be managed uniformly through the same command, and the transmission The complex control of the system becomes simple and flexible, and at the same time the more complex ones are Some controls are programmed with software, thereby replacing corresponding hardware controls and a large number of circuits used for timing, thus satisfying the personalized management of enterprises on the one hand. Demand. On the other hand, it better ensures the accuracy of existing instrument measurement data.

5.3 Strengthen the Development of Comprehensive Intelligence of Instrument Regulators

With the continuous development of microprocessors, it will inevitably promote the continuous development of intelligent management. With continuous development, the data processing speed and processing effect are more comprehensive, and the

Visualization, and the extended functions are more diversified, which can meet the needs of enterprises. Different needs in actual work and operations. While strengthening the computing function, Better promote the increasingly perfect instrument automation functions, which can realize a variety of manufacturing input signals simultaneously, PID automatic setting and EEPROM technology use, etc., which will also make future equipment operation easier and And due to intelligent instrument adjustment, it will further promote the automatic adjustment of instruments. It has comprehensively improved the operating efficiency of the entire system and the feedback on faults. and prompt rate.

6 CONCLUSION

In the current era of rapid development of information technology, how can enterprises integrate modern The application of information technology to one's own enterprise development will directly determine the future of the enterprise. Market Competitiveness. The application of automated instrument control systems is undoubtedly the most important part of modern electrical. One of the important breakthroughs in engineering development, through automated management, data The convenience and effectiveness of processing reduce the operating costs of enterprises, thereby improving enhance the company's own market competitiveness. The digital oil field adopts informatization and automation A unified system of technology to carry out decision-making, management, execution and control of production Carry out comprehensive management and give full play to its system in production technology, safety management and operation management It has the best effect on multiple noodles such as cooking. The development of automated instruments in my country in recent years Great progress has been made, and at the same time, we need to learn from advanced science and technology at home and abroad. During the research process, make full use of existing research results, avoid low-level and basic repetitive work, and promote the development of automated instruments more rapidly and comprehensively.

Utilize advanced technology and research results to gradually improve the design of automated instrumentation and During construction, equipment maintenance should be done well in daily production to ensure the long-term and reliable operation of automated instruments. Stable operation ensures accurate and timely control of production parameter measurement and ensures control The system automatically processes production parameters through information technology to detect and eliminate production faults in a timely manner. obstacles, provide a strong basic guarantee for superiors' decision-making, and realize a network of production management safe digitization that integrates oriented, model-based and scientific management and control, so as to Lay a solid foundation for the development of petrochemical enterprises.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

REFERENCES

- [1] Zhu Wenlong. Development status and trends of intelligent instrumentation in my country. Heilong Jiang Science and Technology Information.2011 (02).
- [2] Liu Chunlin, Application and Development of Automated Instrument Control Systems III. Private Technology, 2011(01).
- [3] Liu Jinhui, Liu Xiangpeng. Automation instrumentation and control system. Private Technology, 2011(01).
- [4] Chen Gongbin. Application and design of automated instrument calibration system.China House Real Estate Industry, 2011(03).
- [5] Cheng Zhaoqiang. Application of automated instruments M. Xinjiang Nonferrous Metals, 2011(S1).
- [6] Li Jing. A brief discussion on the development of automated instruments M. Business Culture (Academic Edition). 2009(06).
- [7] Shen Yu. Research on chemical production control automation instruments. Silicon Valley, 2008 (09).
- [8] Zhao Qun, Zhang Xiang, Xie Suzhen, Li Hui. Current status of automated instrumentation and control systems A review of current status and development trends. Modern Manufacturing Technology and Equipment, 2008(04).