Process Control Analysis of Modern Chemical Instruments and Chemical Automation

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Abstract: This paper analyzes the relevant content of modern industrial automation, combines the meaning of modern industrial production and the types of chemical instruments, and studies the modern process instrument and chemical automation in the process of programming, calculation, memory, complex function and fault function. In this paper, the control measures aim to improve the stability of the use of modern industrial instruments and promote the rapid development of the industry economy.

1. Introduction
The continuous improvement of the social and economic level has provided a good space for scientific and technological innovation, and at this stage China's economic development has entered the stage of automation development. In the development process of this stage, in order to seek more economic benefits, enterprises need to pay attention to the specific application of modern industrial instrumentation and chemical automation. By adopting relevant technical means, on the one hand, it can improve the level of enterprise automation control, on the other hand, the implementation of control can effectively reduce the economic risks caused by mistakes, and thus improve the economic profit margin of enterprises.

2. Modern Chemical Automation Analysis
With the rapid development of science and technology, people have more requirements for the quality of modern construction. Therefore, in order to improve the performance of chemical enterprises, enterprises need to pay attention to the transformation of production mode, from traditional production mode to automated production. Compared with traditional production technology, the cost of automated production technology can be effectively reduced by 15% to 25%, while the work efficiency can be improved by nearly 45% [1]. This means that automated production can effectively reduce the quality problems caused by manual operations and improve the stability of the production process. At the same time, in the process of promoting the economic development of chemical companies, technicians need to comprehensively consider the issue of industrial production. Because the industrial economy is still an important pillar industry in China's economic development, the ratio of economic production to total economic output exceeds 30%. Therefore, in the process of industrial production, how to improve production efficiency is the key to ensuring production quality. Consider the economic issues. In the specific production process, automation technology has a very broad application prospect, because automation technology is a combination of the excellent technical content of new technologies such as Internet technology, information management technology, data management control technology. Not only in the industrial production process, but also in other industries, it has achieved very good development, such as medical equipment, transportation management, and regular product production [2]. In the field of industrial production, the chemical
production industry is particularly specific, because many physical reactions, chemical reactions, high-temperature catalyst reactions, etc. are involved in the production process, which means that the chemical product production process has a very strong speciality. Especially in terms of chemical reactions, many products will involve the use of dangerous goods. If there is an unreasonable ratio, it will increase the stability of the chemical production process. The application of automated production technology can be scientifically matched before the formal production. After determining the specific use standards, strict control of the dose data can be carried out to achieve scientific scientific ratio of materials. In addition, in the actual operation process, the practical application of automated production technology can reduce the probability of human error. According to relevant statistics, automation technology can reduce the risk occurrence probability by 35% to 45%, and with the application of automation technology. As the system matures, the ratio will continue to rise. On the basis of ensuring the safety level of production, the production quality and specific production efficiency of the products will be improved.

3. the Significance of Modern Chemical Production
First, we need to conform to the trend of the times. Since the industrial revolution, production technology has been in the stage of innovation and development, and the corresponding mechanical equipment is also in the stage of constant innovation [3]. New technical means and mechanical production equipment together form a modern production model. The traditional chemical production mode requires a lot of manpower and material resources, and because of the artificial blending, many production products simply cannot meet the actual production standards. The raw materials consumed by these products are non-recyclable materials, which will directly lead to waste of resources. The situation happened. Therefore, automated chemical production is the trend of the times and can effectively improve the economic benefits of modern industrial production. Second, improve the safety level of modern industrial production. The chemical production process always involves the use of many chemical products. Some chemical raw materials have certain corrosiveness, and many of the products produced in the production process will directly harm human health, which will lead to the safety level in the subsequent production process. Falling, leading to the occurrence of security risks. Therefore, by applying automated production technology and advanced production equipment, it is possible to create a very safe chemical production environment and reduce the safety production risk by 30% to 55% [4]. Third, enhance the competitiveness of the enterprise market. With the continuous development of the international market, the sales of many chemical products have encountered impacts from other fields, which will directly lead to the reduction of the economic profit margin of enterprises. In order to improve this situation, enterprises need to improve on the basis of ensuring the same production quality. Productivity of enterprise products. The application of automated production technology can reduce the waste of raw material resources, control the production cost of all materials within a reasonable range, and at the same time, in order to reduce human error in the actual production process, such technology can reduce human resources investment, thereby reducing cost of the actual production process [5].

4. Chemical Instrument Type
4.1 Temperature Measuring Instrument
Temperature measuring instruments are very common measuring instruments in the production of chemical products. This is because in the chemical production process, some chemical reactions are often involved. According to the law of conservation of energy, the energy of matter does not disappear, but it will transform the original form of energy, so the energy produced by many chemical reactions will be lost in the form of heat. If the temperature is too high, it is likely to affect the normal use of chemical production equipment. According to previous statistics, when the working temperature is between 20 °C and 37 °C, the surrounding environment will not affect the human operation, and the temperature is also very suitable for the normal working temperature of the personnel. If the
temperature is not in the range, it will affect the working status of the employees and affect the production efficiency of the chemical products. Therefore, in actual operation, it is necessary to control the operating temperature of the equipment and reduce the ambient temperature. The temperature produced during the production process is higher, and it is basically maintained between -300 °C and 2000 °C. Under different temperature conditions, different reaction effects will be caused, so careful control is also required. As shown in Table 1, industrial thermocouples are very common temperature measuring devices. Temperature measuring devices of different materials produce different measurement results. For example, iron-constantan equipment can be used in various environmental temperature measurement, but the upper limit of temperature measurement is only 700 °C, so the temperature equipment made of such materials can only be applied to the production of chemical products with small temperature changes. The temperature measurement equipment of nickel-chromium-silicon-silicon material has a very wide temperature span, and its temperature measurement range is between -270 °C and 1300 °C, but it cannot measure the temperature change under vacuum environment, and the temperature is affected by temperature. The impact is large and requires comprehensive performance considerations. Under normal circumstances, enterprises need to comprehensively assess the reaction temperature of actual chemical products, combined with different temperature changes, determine the specific temperature instruments, and thus improve the stability of the temperature together with the use of the equipment, and the stability of the results.

| name                        | Index code | Measuring range/°C | Applicable Environment                  | Stability evaluation               |
|-----------------------------|------------|--------------------|-----------------------------------------|------------------------------------|
| Platinum rhodium 30-platinum rhodium 6 | B          | 200<X<1800        | Oxidizing environment, neutral environment | Larger relationship with temperature |
| Platinum rhodium 13-platinum | R          | -40<X<1600        | Oxidizing environment, neutral environment | Larger relationship with temperature |
| Platinum rhodium 10-platinum | S          | -40<X<1600        | Oxidizing environment, neutral environment | medium                             |
| Nickel-chromium-nickel silicon | K          | -270<X<1200       | Oxidizing environment, neutral environment | good                               |
| Nickel-chromium-constantan   | E          | -270<X<1000       | In addition to the vacuum environment    | medium                             |
| Iron-constantan              | J          | -40<X<700         | All environments                        | medium                             |
| Copper-constantan            | T          | -270<X<350        | All environments                        | Larger relationship with temperature |
| Nickel chromium silicon-nickel silicon | N          | -270<X<1300       | In addition to the vacuum environment    | Larger relationship with temperature |
| Tungsten-rhenium3 tungsten-rhenium25 | WRe3-WRe25 | 0<X<2800         | In addition to the oxidizing environment | medium                             |
| Tungsten-rhenium5-Tungsten-rhenium26 | WRe5-WRe26 | 0<X<2800         | In addition to the oxidizing environment | medium                             |
4.2 Pressure Measuring Instrument
Pressure measuring instruments are also very important measuring equipment in the production process of chemical products. Because many chemical reactions need to be carried out under a specific pressure, and if the gas generated during the reaction process cannot be discharged in time, it will inevitably affect the internal pressure of the reaction device, causing the internal pressure to be too large, which may affect the reaction rate of the equipment. Therefore, the stability of the pressure measuring instrument during use is also a very important control link. Under normal circumstances, if the reaction process involves negative pressure, the technician needs to control the pressure within 300 MPa, and the pressure control device can monitor the pressure change in real time in order to make timely pressure adjustment.

4.3 Level Measuring Instrument
The level measurement is based on the reasonable control of the material dosage or finished product quality that needs to be placed in the production process of chemical products. These meters have clear requirements for the use of scales. In the specific use process, the reasonable degree of material input in the actual production process is determined according to the dose change, so as to achieve reasonable control of the material usage. At present, in the production process of chemical enterprises, common level measuring instruments include pressure difference measuring instruments, ultrasonic measuring instruments, and capacitance measuring instruments. Different types of measuring instruments are responsible for measuring different relevant data. By controlling such data, the rationality of chemical product production can be effectively improved.

4.4 Flow Meter
The flow meter is used to measure the total amount of gas or liquid passing through the unit time. Such flow can directly reflect the specific production situation of the product during the use of the current equipment, and at the same time, it can preliminarily estimate the pressure condition generated by the product. The situation is related to flow control, thereby improving the effectiveness of flow control. According to the current production situation of chemical enterprises, common flow meters include pipeline measuring instruments, liquid flow measuring instruments, and steam flow measuring instruments. It should be noted that there are differences in the measured variables measured by different flow meters. In the specific operation process, it is necessary to focus on the relevant data display data and adjust it in time to improve the safety of equipment use.

5. Process Control of Modern Chemical Instrumentation and Chemical Automation

5.1 Programming Process Control
In the production of chemical instrumentation, some software will be added to it, which can help the instrument to analyze and replace the hardware circuit when it is used, and then display the contents of the hardware in the software. Especially in some control circuits, by using complex automation control software, the internal structure of the instrument can be simplified, and by using some high-end computer software, its operating mechanism can be changed, thereby improving its running speed. In addition, the control of the programmable function can not only improve the stability of the instrument in modern industrial production, but also maximize its role.

5.2 Computational Function Control
In the production of modern industrial instruments, in addition to ensuring the working efficiency of the instrument, it is also necessary to ensure the stability and accuracy of the operation of the instrument. By realizing the organic combination of traditional chemical instruments and computers, the stability of modern industrial instruments can be improved. Moreover, the addition of a computer system not only adds programmable functions to the meter, but also cleverly applies the accuracy of its computing power operation.
5.3 Memory Function Control
The current hardware facilities of ordinary meters can complete the storage and management of data, and can also store information, but such instruments cannot complete long-term storage and complex information analysis, and easily cause information loopholes. In the modern instrumentation, the memory and storage functions of the instrument can be enhanced, the work of each state can be stored in time, and the query and call of the staff can be facilitated.

5.4 Complex Function Control
For traditional instruments, their own control functions are few and simple, but if the instrument is put into automatic use, it must enrich its functions and be able to deal with problems that conventional instruments cannot handle in time. This not only enhances the role of the instrument in industrial production, but also maximizes the manpower and material resources required in the chemical industry chain, saving money and increasing revenue.

5.5 Fault Function Control
For the role of smart meters, it is necessary to record and store data first. The large amount of data generated in chemical production puts higher demands on the operation of the instrument and the daily maintenance. However, the automation of the instrument in the modern work can give the instrument the function of supervising the fault, promptly reminding the user of the fault location, and greatly improving the production efficiency of the chemical industry.

6. Conclusion
In summary, in the context of continuous improvement of social technology, it is of great significance to upgrade modern instrumentation and automated process control. Enterprises want to fully realize the economic value of automation facilities, they need to combine the current equipment operating conditions and equipment operating environment to understand them in depth, as long as they can find problems in equipment operation in time, optimize the operation efficiency of automation equipment, and then improve the economic benefits of enterprise.

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