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Field programming technology for instrument sensor's correction parameter

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Abstract. In the process of industrialization, a large number of mechanical equipment has been gradually applied to the development of various industries. The field programming technology for instrument sensor's correction parameter has a very important impact on the maintenance of equipment. In order to better improve this technology, first of all, the related concepts of field programming technology for instrument sensor's correction parameter were clarified through the reading of relevant data in this paper. Then, the temperature sensor was used as an example to further verify that the field programming technique for instrument sensor's correction parameter is obviously superior to traditional correction technique in sensor repair. The purpose of this research is to provide a theoretical basis and scientific support for the development of China's machinery industry.

Key words. Instrument and meter, sensor, correction parameter, field programming technology.

1. Introduction

With the development of the times, the world's economic level has developed to a great extent in the current era. Especially with the new era theme of peace and development, all sectors of the world have made progress and promotion. In some machinery manufacturing industry, its development has gradually become the basis for the development of various fields of the times. The development of the machinery manufacturing industry has provided certain impetus and positive influence for each profession's development. In the development of machinery industry, the application of some equipment and the application of instrument sensor have been gradually generalized. Instrument sensors play an important role in many industries, which are very important to normalize the running state of some equipment and monitor the whole operation process of the equipment. However, in the traditional mechan-

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ical manufacturing industry, because there is a big error in the making process of instrument sensor, which causes a certain negative impact on the normal operation and maintenance of related industries and equipment. With the rapid development of science and technology, more innovative science and techniques have been created and gradually applied to various industries, and they have brought some positive impetus for the development of these industries. As one of the important science and technology, computer technology plays an important role in the development and progress of various industries. And in this trend, the computer industry has gradually combined with various traditional industries, which have brought about certain results for the development of these industries. The purpose of this research is to analyze the influence of field programming technology on the instrument sensor's correction parameter, so as to provide a reference for the development and theoretical improvement of instrument sensing technology in our country.

2. State of the art

Since the industrial revolution, the present era has begun to develop in the process of industrialization. In this trend, more and more mechanical equipment has been gradually applied to people's production and life. The application of the mechanical equipment is very important to people's production and life [1]. However, as people begin to pursue more efficient production and the cost control, people are required to use more sophisticated and complicated equipment in the process of production. With the continuous complication of the mechanical equipment, the relevant technicians are required to monitor the equipment more accurately and grasp the operation state of the whole machine in real time. Only in this way can we better carry out timely maintenance of mechanical equipment, so as to improve the efficiency of the entire production line and reduce the operating cost directly or indirectly [2]. On this basis, the application of instrument sensors is very important for the related technicians to monitor their mechanical equipment. Many researchers have begun to study the precision of instrument sensors for further improvement, and combined computer technology with the traditional instrument sensors. This has brought about a very important impact on the normal operation of the related machinery, and further reduced the cost of industrial operation, thus making the comprehensive economic level of the world greatly improved [3].

3. Methodology

The economic development of the current era has begun to show a gradual upward trend. Under the background of this great era and the trend of economic development, the economic level of our country has also been affected to some extent. China's various industries have had a certain degree of progress and development, and the overall strength of our country has begun to be further improved. Especially since the reform and opening to the outside world, China has gradually entered the industrialization era. More enterprises have begun to use a large number of mechani-

cal equipment for the production of enterprises. The mechanical equipment not only has liberated the hands of the people, but also greatly improved China's economic level because of higher production efficiency and lower production cost [4]. However, in the use process of mechanical equipment, further maintenance is needed, which can better ensure the normal operation of the machine and more accurately grasp the relevant data for information of the operation process. Therefore, the instrument sensors are gradually used in various mechanical operations, which provide a certain technical support for the efficient operation of the entire production line [5].

Nowadays, the manufacturing industry in our country has begun to increase gradually, and the use of different instrument sensors has gradually increased, and instrument sensors have begun to diversify (see Fig. 1). Because all kinds of data in the development of the industry have been stored, a large number of correction parameters have also been introduced into the instrument sensors in China to make the data more accurate. These correction parameters include the temperature parameters and correlation parameters of mechanical sensitivity. And some sensors have many nonlinear correction parameters in operation, which is very important for the further improvement and normal operation of instrument sensors [6]. However, there are many shortcomings and defects in our instruments and meters. In our country, the traditional way is usually used for the change of the instrument sensor's correction parameters. But in the repair of traditional instrument and meter equipment, the outer shell of the instrument sensor is removed and the CPU and some related components are repaired. Furthermore, it needs to rewrite the program for the storage device that stores the data, so as to restore its true long running performance [1]. Therefore, when the instrument sensors are damaged to some extent, the traditional repair methods may achieve the ultimate goal of restoration. However, the steps involved in this repair process are more complicated. Because only targeted programs are rewritten for the wrong program, the program may not be rewritten to match the previous program, and the operation process of the whole instrument sensor is restricted to a certain extent [7]. Therefore, the traditional repair technology for instrument sensor may make the reliable performance of the whole mechanical equipment gradually decreased, and further affect the development of related industries in China. However, with the rapid development of computer technology, the technology has more information sharing. Through the preparation of related procedures, it can effectively realize the accurate operation of related instruments and programs. Different from the traditional human perception, this technique can be used to evaluate the performance of related machines more objectively [8]. Our country has gradually introduced this kind of technology and related theories into the development of related industries in our country, and has made certain achievements. In this paper, based on the present situation, the shortcomings and defects of the correction factor in the development of traditional sensor technology in our country were pointed out. In addition, through the analysis and application of the field programming technology for instrument sensor's correction parameters, the research aimed at providing a theoretical basis and scientific support for the development of related industries in China.

First of all, through the reading and summary of relevant information, the relative

Fig. 1. Application of instrument sensor

concepts and advantages of field programming techniques for instrument sensor's correction parameters were analyzed to further make the relevant concepts clearer [9]. On this basis, the related properties of the main control element EEPROM chip of field operation technology were analyzed [10]. The relevant properties of the chip are shown in Table 1.

The main research object of this research was the correction parameter of temperature sensors in common instruments. Firstly, the relevant attributes of the main control element EEPROM chip were assigned. Then, the nonlinear compensation technology model was introduced to compare and analyze the related characteristics before and after the application of field programming technology [11]. The related model for nonlinear compensation techniques is shown below:

$$P'(U) = a_0 + a_1 U + a_2 U^2 + \cdots + a_n U^n \,, \tag{1}$$

or

$$P'(U_i) = \sum_{j=1}^{n} a_j U_i^j \tag{2}$$

$$\sigma = \sum_{i=0}^{m} [P'(U_i) - P_i]^2 = \sum_{i=0}^{n} (\sum_{j=0}^{m} a_j U_i^j - P_i)^2 \,. \tag{3}$$

Finally, through the investigation of related technicians, the importance of this correction parameters technique to sensor repair in our country was confirmed.

4. Result analysis and discussion

This study first read and summarized the related researches, and then summarized the related concepts of field programming techniques for instrument sensor's correction parameters. Some researchers believe that in field programming techniques, the interface of the sensor is connected with the interface of computer technology. Then, when the sensor operation program is found to be insufficient, the

sensor can be repaired by simply knocking the computer keyboard. The main features of field programming technology are reflected in that when the correlation parameters of the sensor is repaired, it breaks the single way that relies on manual detection to repair in traditional technology. In addition, the system realizes the monitoring of related error data relying on the transmission between computers.

Table 1. Summary of the related attributes of the main control element EEPROM chip

Attribute	Interpretative statement	No.
CommPort	Serial communication, that is, string slogan;	X1
Setting	Serial number settings, mainly consists of baud rate, parity, data bits and stop bits, in the middle with a comma interval;	X2
InBufferSize	Gets or set the current receive buffer size;	X3
InBufferCount	Get the number of bytes in the current receive buffer;	X4
InputLen	Determine the number of bytes read by the nIput property, which reads the full buffer when 0;	X5
InputMode	0 indicates receipt of text type, and 1 indicates binary reception;	X6
OutBufferSize	Set or get the current send buffer size;	X7
OutBufferCount	Get the number of bytes in the current send buffer;	X8
Rthreshold	Set the number of characters in the receive buffer to trigger the OnCom event, and 0 indicates the non - triggering event;	X9
Sthreshold	Set the number of characters in the send buffer to trigger the OnCom event, and 0 indicates the non - triggering event;	X10
OutBuffersize	Set or get the current send buffer size.	X11

In order to better ensure the correct operation of the entire repair process and the work of the sensors, the computer operating circuit and the overall monitoring system of the field programming technology of the instrument sensor's correction parameters are further improved [12]. In the related circuit setting, in order to obtain better performance of instrument sensor and store the monitoring data, the position of the sensor correction factor must be better controlled, such as putting it in the EEPROM chip. Only in this way can the relevant data information stored by these sensors be not lost. In the current instrument, the related chip devices are mainly composed of serial chips and parallel chips. And the two chip technologies have their own advantages and disadvantages in sensor repair. The differences between them are mainly in terms of the transmission speed between sensors and computers, the occupation of related resources and the formation of related circuits. Therefore, in order to operate and correct the correction factor of the instrument sensor more accurately, it is necessary to generalize and clarify the related theory of the circuit. On this basis, through the actual repair needs, the line is further selected accurately,

and then the programming technique of the download path of the sensor correction factor is analyzed [13]. In the process of programming, we mainly analyze the ways of obtaining data, the data transformation related systems and data transmission ways, and determine the relevant programming commands. After the commands are entered, the computer passes the command through the interface to the sensor. The instrument sensors that receive the relevant instructions will automatically detect their temperature, sensitivity and other related indicators, and further analyze the detected data comprehensively. The analyzed data is transmitted to the computer terminal via the interface to the computer. And through the display of the computer model, people can determine the current state of the relevant mechanical equipment.

Therefore, through the connection of computer system and sensor and the use of related programming technology, the real-time monitoring of mechanical equipment is realized. Compared with the traditional sensor correction parameters technology, the field programming technology of the instrument sensor's correction parameters can be free from human subjective factors. And because it can detect real-time automatic completion of the relevant indicators, more information can be applied to the later analysis of machine running status, which makes the analysis accuracy higher and analysis results more credibility. Under these advantages, the field programming technology is gradually combined with the sensor correction factor, and applied to the actual operation and monitoring of mechanical equipment. It has a positive impact on the maintenance of mechanical equipment, and provides technical support for enterprise operation and reduces efficiency and operation cost further, so as to provide a reliable basis for the comprehensive promotion of the world economic level (see Fig. 2). In this study, the field programming technique of the instrument sensor's correction parameters was compared with the traditional sensor correction coefficient technique [14]. The results are shown in Table 2.

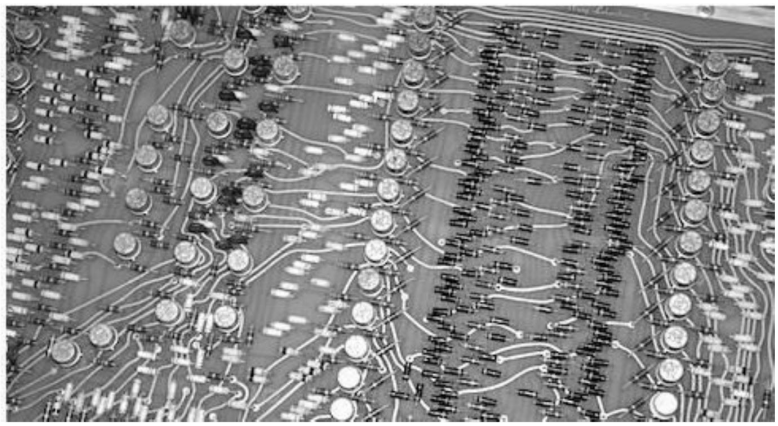

Fig. 2. Development of field programming techniques for instrument sensor's correction parameters

Table 2. Advantages of field programming techniques for instrument sensor's correction parameters

	Field programming techniques for instrument sensor's correction parameters	Correction factor technique of traditional sensors
Accuracy	High precision, multiple functions automatically	Low precision, relatively simple function
Reliability	It can automatically compensate for the drift of the system characteristics due to changes in operating conditions and environmental parameters, and the reliability is higher.	Relatively low stability
Stability	Compensate for the drift of the temperature and the drift of sensitivity, automatically change the range, and can carry out the self-test of the system, and the stability is higher.	Relatively low stability
SNR	The technology has the functions of data storage, memory and information processing, and can eliminate the noise in the input data by digital filtering, so it has a relatively high SNR.	Relatively high SNR
Resolution	This technique can eliminate the influence of complex sensitivity in multi parameter state by data fusion technology, so as to ensure high resolution for measuring specific parameters.	Relatively low resolution
Adaptability	The technique has the function of judgment, analysis and processing in the process of information data transmission, which makes the system work in the optimized low power state and the optimized transfer rate.	Relatively poor impact

Taking the correction parameters of the common instrument temperature sensor as the example of this research, the various indexes of its central space were designed as shown in Table 3. Before and after the application of this technique, the temperatures of the sensors were measured. The result is shown in Fig. 3. The results show that this technique can effectively improve the performance of sensors.

Table 3. Design of the relevant attributes of the main control element EEPROM chip

Attribute	X1	X2	X3	X4	X5	X6
Set-point	2	9600,n,8,1	1024	1	1	1
Attribute	X7	X8	X9	X10	X11	
Set-point	1024	1	1	0	1024	

Finally, through the questionnaire, the correlation between field programming technology and traditional technology for temperature sensor was compared. The results are shown in Fig. 4.

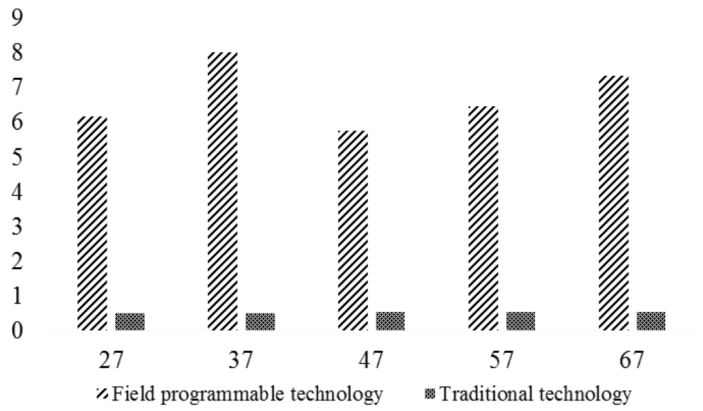

Fig. 3. Comparison of field programming technology and traditional technology for temperature sensor

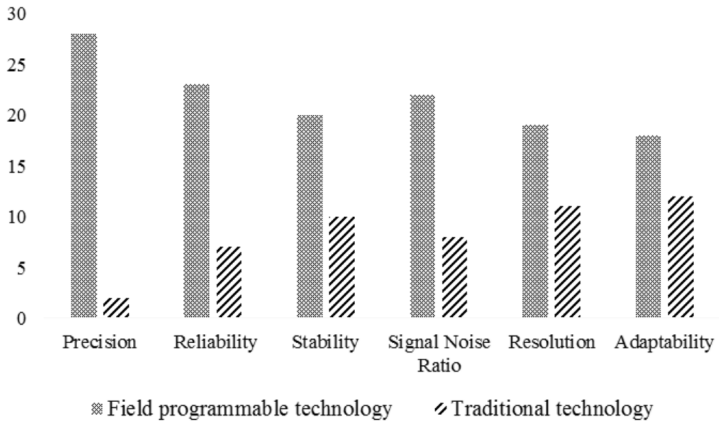

Fig. 4. Comparative analysis of field programming technology and traditional technology for temperature sensor

5. Conclusion

With the development of the times, nowadays, our society is developing towards industrialization. The extensive use of machinery and equipment is one of the most important forms of industrialization. In the background of this era, China has introduced a large number of industrial equipment in various industries. In the process of production, the relevant running equipment is further controlled by its operation and working state. Only in this way can equipment maintenance be realized. In addition, the industrial production cost is reduced, so as to further enhance the industry's economic development level. It is very important for instrument senor to monitor the mechanical equipment. With the development of the times, the field

programming technology of the instrument sensor's correction parameters is very important for the application of instrument sensors. In this paper, the comprehensive analysis and the discussion of the related theory concept were firstly carried out. On this basis, the strength of the temperature sensor was explained. The purpose of this research is to provide theoretical basis for the development and theoretical improvement of our instrument sensor, and provide a reference for the continuous improvement of the comprehensive economic level in all sectors of our country.

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