Measurement management of electronic instruments

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Abstract: With the continuous development of science and technology, electronic instruments and meters measuring equipment in accuracy, accuracy and sensitivity has been rapid development, and widely used in scientific research and production in China. As a measuring tool, instrument measurement can detect, analyse and manage products, effectively improve product quality in product production supervision and inspection, effectively reduce resource waste, and protect the legitimate rights and interests of users. Although the accuracy of electronic instruments is required more and more, due to poor management, there are often various problems in the use process. In this paper, combined with the extensive needs of electronic instruments in the new situation, the current development status of electronic instruments in China is analysed, and relevant improvement measures are put forward for the problems, aiming to strengthen the measurement management of electronic instruments and ensure the smooth progress of scientific research and production.

1. Introduction
Electronic instruments and meters play an important role in the process of industrial production, which is an important factor to ensure product quality. According to the current situation of electronic instrument technology in China, the measurement accuracy of electronic instrument is generally not high, and the probability of failure is too high, which increases the cost of measurement equipment in enterprises, and is very unfavorable to the sustainable production of enterprises. At the same time, in the production of these instruments, the function of supervision and management is ignored, and there are problems of low certification rate and high maintenance rate, which seriously restrict the application and development of instruments in China. Therefore, only by paying more attention to the standard management of electronic instruments, can we continuously improve the level of industrialization in China.

2. Main measures

2.1. Strengthen the process management of electronic instruments
The user unit shall establish and improve the standardized system for the use, maintenance and repair of instruments and meters, and make detailed provisions on the allocation and selection of electronic instruments, procurement and selection, transportation, acceptance, warehousing, storage, requisition, etc. Calibration and sealing shall be carried out in strict accordance with the standard implementation status mark, instruments shall be used in strict accordance with the standard, and fault equipment shall be recorded, evaluated and maintained.
2.2. Establish instrument maintenance cycle
Each instrument has its corresponding service life. During the use of electronic instruments, regular inspection and maintenance should be carried out to extend its service life. The inspection cycle of each equipment is slightly different. The inspection frequency with higher frequency and higher accuracy should be higher than that of ordinary equipment. At the same time, the determination of inspection cycle has some standards that need to be changed, and the frequency of later inspection should be higher than that of the previous period. And it is necessary to verify the actual operation on site. At the same time, properly coordinate the inspection and operation of each equipment, and stagger the maintenance and operation time to ensure the normal operation of other equipment.

2.3. Improve the quality of management personnel
With the improvement of the complexity and technology of electronic instruments and meters, new requirements are put forward for professional surveyors. Measurement management personnel should not only have comprehensive professional knowledge, rich working experience and excellent working skills, but also have good moral standards, so that they can be competent for instrument management. In view of this, the user needs to strengthen the training of management personnel, guide professional personnel to the production line to actually understand the problems, and realize the innovation of management methods and management thinking in practice.

2.4. Trouble shooting of electronic instruments

2.4.1. Fault classification of electronic instruments.
Before the maintenance of electronic instruments, the fault types should be analyzed and surveyed. Only by understanding the actual operation, can the fault positions be accurately and rapidly located and the maintenance work be reduced. According to the occurrence time of the fault, we can roughly divide it into early fault, sudden fault, progressive fault and compound fault; according to the form of fault, it can also be divided into functional fault, potential fault, artificial fault and natural fault; according to the impact caused by the consequences, it can also be divided into well-known fault, serious fault, general fault, light fault, etc.

2.4.2. The method of electronic instrument trouble maintenance.
1) Intuitive judgment. Through the inspection of the appearance of the equipment, it is mainly divided into the inspection before and after the power on of the electronic instrument. Before the power on, the integrity of the appearance of the instrument, the switch knob, the panel and each part after the parts are disassembled shall be observed. After confirmation, carry out power on inspection to check whether there are obvious symptoms such as ignition and smoke, so as to determine the fault location of electronic instruments.

2) Power supply detection. Thoroughly check the power supply of electronic instruments and meters, and check whether the power supply voltage of electronic instruments and meters is normal, so as to ensure the stable operation of power supply of equipment during operation.

3) Each instrument has its own parameter standard. Inject correct signal into the failed electronic instrument, observe and judge the failure point of the electronic instrument through the comparison of terminal or waveform, and carry out further maintenance, which can effectively save maintenance time.

4) Line detection method with the help of the short circuit check of the conductor, the two ends or multiple different check points are connected by a conductor, and the fault point is determined by judging the voltage.

5) Separation detection method. In order to distinguish the fault point better, we can check it by means of splitting, divide the working circuit into several important parts, and then carry out closed measurement for each part of the circuit one by one, and finally find out the problem.

6) Overall comparative inspection. For the faults that are very difficult to deal with and find out, we can generally observe the normal operation of the same type of equipment, whether it is voltage, current, various parameters or other aspects can be analyzed. As a whole, we can use the elimination method to
compare one by one to judge the faults, which takes a long time. Generally, it is used for the relatively complex structure, lack of specific materials and actual operation it is a relatively difficult instrument.

2.5. Calibration management of instruments

Whether for the sake of improving product quality, complying with industry specifications and quality system requirements, or for the sake of safety, it is very necessary to calibrate instruments. Only through regular calibration, can we reduce the drift of instruments in the use process and ensure the accuracy and reliability of the measurement results, which has a positive role in ensuring product quality, optimizing production process and improving production capacity. Instrument calibration will be affected by many factors, such as human factors, external environment, and equipment factors. In order to do well in instrument calibration, it is necessary to comprehensively control the factors affecting calibration quality.

2.5.1. Quality control of calibration device and calibration equipment

The quality control of calibration device and equipment is the basis and guarantee for the quality of instrument calibration. The enterprise should organize the quality control of calibration device and equipment in combination with the management procedure of measuring equipment. From the bidding and purchasing process to the acceptance, use, calibration and deactivation of calibration devices and equipment, daily management shall be carried out, management account shall be established, calibration devices and equipment shall be subject to quality inspection on a regular basis, and they can only be put into use after passing the inspection. In addition to these daily quality control measures, there are also some special methods, such as interim verification method, which is to check whether the calibration device and equipment can maintain the confidence relationship in two consecutive uses, and the ability verification method. The enterprise can organize a special quality management department to compare and analyze the calibration results of the same sample in different laboratories, and then make a further evaluation of the verification results.

2.5.2. Quality control of calibration method

The quality control of calibration methods is to ensure that the methods and procedures adopted for calibration meet the quality requirements of instruments, and it is also a part of the quality control of instrument calibration. The calibration method shall follow the document control procedure and establish the management list according to the requirements, so as to ensure the standardization and unity of the calibration method and the accuracy of the calibration procedure. When determining the calibration method, it should be based on the relevant international standards, national standards and industrial standards. Then the enterprise can further refine the standard requirements according to its own situation and establish the calibration method standard system. In the calibration of instruments, the staff should sum up the experience and form the operation instructions according to the operation conditions, so as to improve the technical effectiveness of the calibration work. When determining the calibration range of instruments, the staff shall appropriately expand the calibration range, which shall be greater than or equal to the specified calibration range. In the process of calibration, the staff must strictly monitor the whole process of calibration, and the management personnel must also play their own role in supervision and guidance, to supervise and inspect the calibration site of instruments and meters, to ensure that the calibration work is carried out in accordance with the quality requirements and standards, so as to ensure the implementation effect of the calibration method. In particular, when some important instruments or newly promoted instruments are calibrated, or when factors such as staff and calibration environment change, management personnel should strengthen supervision and strictly control the quality of calibration work.

2.5.3. Quality control of calibration staff

The quality of instrument calibration work is directly affected by the professional technical ability level and responsibility awareness of the staff. Both the operators of instruments and the staff who directly
participate in the calibration and maintenance work should strictly follow the internal human resource management system of the enterprise and receive the supervision and management of the enterprise. For one thing, the enterprise should strengthen the training of the staff's professional ability, improve their calibration skills through a large number of practices, reduce the non-standard and unskilled operation in the actual work, and strengthen the supervision to ensure that the staff can operate in accordance with the relevant procedures of instrument calibration, develop a continuous training plan, and ensure the staff's calibration level. For another we should pay attention to the cultivation of staff's responsibility and professional attitude. In the enterprise, we should strengthen publicity, carry out quality control activities, gradually form a culture of quality first in the enterprise, and combine ideological education to gradually enhance the sense of responsibility of the staff. In order to implement TQM effectively, the economic benefits of technicians must be closely linked with the quality of measurement and inspection, and the quality management reward and punishment system of measurement institutions must be strengthened. Through the establishment and implementation of the reward and punishment system, accelerate the enthusiasm of personnel for the implementation of total quality management, and truly achieve the quality management of the whole staff and the whole process.

2.5.4. Quality control of external environmental conditions

The external environment of instrument calibration mainly refers to the environmental conditions of the laboratory. It is necessary to strengthen the quality control of the laboratory to avoid the impact of environmental conditions on the calibration results. At ordinary times, we should pay attention to the monitoring of Laboratory environmental indicators. If we find any non-standard places, we should improve them in time. We should control all environmental indicators of the laboratory under the standard conditions of calibration work, such as adjusting the temperature of the laboratory with the help of air conditioning, making the humidity of the laboratory reach the humidity requirements of calibration through ventilation, humidifier, etc., in order to avoid the magnetic field to the calibration quality. The laboratory should pay attention to demagnetization to avoid strong magnetic field.

3. Conclusion

The development speed of electronic instrument products is accelerating, and it is widely used in China's industrial production. In order to improve the accuracy of product testing and reduce the waste of resources, on the one hand, the quality of model products can be guaranteed through the development and introduction of high-precision, high-accuracy and high-sensitivity instruments and measuring tools; on the other hand, the use and management of measuring instruments should be paid full attention to, and the enthusiasm of all parties should be fully mobilized in strict accordance with the testing methods and relevant regulations to achieve testing. The work is accurate, providing reliable quality assurance for the R & D and production of model products.

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