

## Automatic detection and implementation of underground pipeline

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### Abstract

the automation level is increasing day by day in our country, both in terms of health care, transport, agriculture and military industry and so on all aspects significantly increased, according to the basic fact, I put forward in this paper the automatic control test this technology application in underground pipeline detection and maintenance, the technology based on sensors, radio transmission, human-computer interaction, through computer terminal to the information of dealing with the economy in order to achieve accurate detection of fault diagnosis. Most of the traditional pipeline management methods are manual regular inspection, but as the construction structure of underground pipelines in China becomes more and more complex, relying only on manual inspection not only consumes time and energy, but also has incomplete maintenance, which has great contingency and lag. However, automatic inspection is not limited by this.

### Keywords

underground pipeline; Automatic detection; Risk assessment; Economic benefits;

### 1. Introduction

underground pipeline corrosion occurred pipeline discouraged, the main reason of safety accidents, how effective to detect the part corrosion research is a very important research subject, using the basic principle of transient electromagnetic method to the fault detection of underground pipelines, measure of pipe wall thickness, a safety, to determine whether the pipe for in-pipe robot have used for pipe crack defect detection, etc. Gas diffusion in underground pipelines will cause serious consequences. The factors affecting gas diffusion include pipeline pressure, leakage area, surface wind speed, atmospheric stability, wind direction and other factors. In order to effectively detect defects in pipelines, this paper will introduce a simple automatic detection system to realize real-time monitoring of pipelines and facilitate manual intervention by maintenance personnel.

### 2. The basic principle of automatic test control

Automatic test system refers to the use of a variety of test instrument for the production process of main process parameters for measurement, instructions or record system called automatic test system, to implement according to the measurement and automatic control of underground pipes must be with the help of a sensor in the field of science and technology progress, now in the market circulation of various sensors and a capacitive sensor, piezoresistive sensor, inductive sensor temperature sensors, optical sensors, acoustic sensors, etc. In order to realize the accurate detection of underground pipeline, the most suitable inductance sensor with better precision should be used. Inductance sensor can effectively detect whether the pipeline cracks and other related safety hazards. Timely and effective collection of information, through the subsequent amplification and transformation device, sent to the microcomputer to achieve timely feedback of information, sensor, like the human senses, is a necessary means to perceive the external world.

Power amplifier and protection devices, sensors information tend to be weak signal, in order to extract useful information for subsequent amplification device for information transmission and the

processing of related, in our country now due to the rapid development of micro/nano technology and integrated chip widely popular, most of the power amplifier is a rectifier and filter and so on each device integration, complete the more complex functions, I here introduce the function of the power to put the device only, other accessories will be introduced, the other size classification has a medium power amplifier according to the power three, because of underground pipeline detection signal does not require a larger power, Therefore, small power amplifier should be selected. At the same time, solid-state photoelectric coupling power amplifier has the advantages of preventing external interference, high accuracy, not easy to distort, wide range of environmental temperature change and other excellent performance, and it has certain advantages in the safety monitoring of underground pipelines.

Filter rectifier unit, is an indispensable part of the automatic control field, after the power amplification of the signal while meet the requirements of information transmission, but also to amplify the noise signal, the useless if noise signal to the computer terminal, often wrongly, lead to serious distortion of information acquisition it also loses the fundamental significance of automatic control. The filter device can repair the burr of the amplified signal. The burr of the voltage or current signal is often the fundamental cause of distortion. The rectifying device can realize ac-dc changes and prepare for the final A/D conversion.

A/D conversion device, the microcomputer can only identify the 0 and 1 codes, and most of the information transmitted from the outside is analog signal, which requires A conversion device to convert the analog signal into digital signal, and then transmit to the microcomputer. This device is A/D conversion device. Commonly used conversion devices include 8-bit 12-bit, 8-bit most commonly used A/D0809 and 12-bit A/D574, etc. Based on the underground pipeline detection device, the information accuracy requirements are high, so A/D574 will be used to complete the function of accurate conversion.

Control and information processing unit, as the name implies, the control unit is just like the human brain, coordinating the execution of various information successively. Without a good brain, control will lose its meaning. The most widely used industrial controller is c51 series single-chip microcomputer, which is cheap in price, simple in language, and can be used for protues simulation experiment, so before the real application of this set of equipment, can be a simulation simulation, greatly improve work efficiency, avoid economic waste. At89c51 simple programming, more interfaces, with clear address, data and control bus, used in the automatic detection of underground pipelines is very suitable.

1.6. The basic principle of A complete set of control devices, sensors to detect pipeline leakage or damage information, non-electricity information can be converted to electricity, the conversion of confidence after A power amplifier amplification, and then by the rectifier filter unit of information processing, processing of electricity through A/D conversion, analog to digital quantity excessive, the last 0/1 code sent to the computer terminals, data analysis and processing, manual intervention, implement the inspection maintenance.

### **3. Implementation measures for automatic testing**

To obtain relevant institutions of financial support, automatic detection technology application in underground pipeline control is not widespread, practitioners may from this technology, but any one technology innovation comes from dares to breakthrough, driverless cars also has aroused heated discussion, some people disagree, some support, but whatever the outcome, tech giants are toward this direction to explore, in the same way, the same to the safety of the underground pipeline maintenance and management, automatic detection technology applied in the industry will greatly improve the labor costs to increase economic benefits.

Training of professional mechanical and electrical control personnel, people need to have special automatic control to analyze the collected information, studied mechanical and electrical control without a staff, is unable to understand the meanings of the collected information conveyed,

measurement and control technology is essential for a nerazzurri automatic control field, can use the computer now, and simulation software for physical simulation can avoid a lot of detours and these technologies are to receive professional training.

It is also very important to coordinate with the pipeline layout and design department. There are strict requirements on which part of the pipeline to install detection devices and the number of detection devices.

Finally, have a good team, is paid close attention to the safety of underground pipe, any one accident could cause huge casualties human and financial resources, how to efficiently, to detect the possible risks in advance, will be the primary problem of underground pipeline management, a good team is essential to the strength, to achieve automatic detection of pipeline, and is not an easy thing, need to have the design of the comprehensive management solution, complex underground pipeline environment, the environment is different from the ground, all of the original testing must be after the simulation experiment can be put into use, this will require a professional r&d team, realize the modular division of labor, In order to achieve the purpose of maintenance and overhaul, we will develop a high quality automatic detection system.

#### 4. Conclusion

It is believed that under the strong support of the professional team and relevant departments, the automatic detection system will be put into use. The extensive use of the automatic detection system will bring great economic benefits and solve the problems that have troubled pipeline management practitioners.

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