

# Research on Automatic Monitoring and Diagnosis Technology of Gateway Metering Based on Big Data Analysis

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## Abstract

With the continuous development of big data in China in recent years, due to the complex construction personnel, poor working environment, short construction period and other factors, the construction process is relatively more dangerous sources. Safety accidents with negligent measurement at gateways often occur, such as falling objects injuring people, partial cave-in, etc. These situations have brought varying degrees of economic and property losses to construction enterprises. Analysis from the perspective of energy metering can be found that the cause of this situation on the one hand is the security responsibility is not clear, on the other hand, the enterprise's internal management problems, energy metering management at the same time, there is a flaw lack the necessary protection measures, the effective security responsibility will not be able to implement to a specific staff. Due to the lack of education and training of management personnel and operation technicians, the overall lack of safety technology training, and the existence of illegal command and operation situation. This paper, by analyzing the automatic monitoring of gateways metrology, adheres to the principle of construction quality and safety, and gradually strengthens the safety responsibility consciousness of grassroots managers, completes the automatic monitoring of gateways metrology from many aspects, and carries out a comprehensive discussion on gateways metrology.

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## Introduction

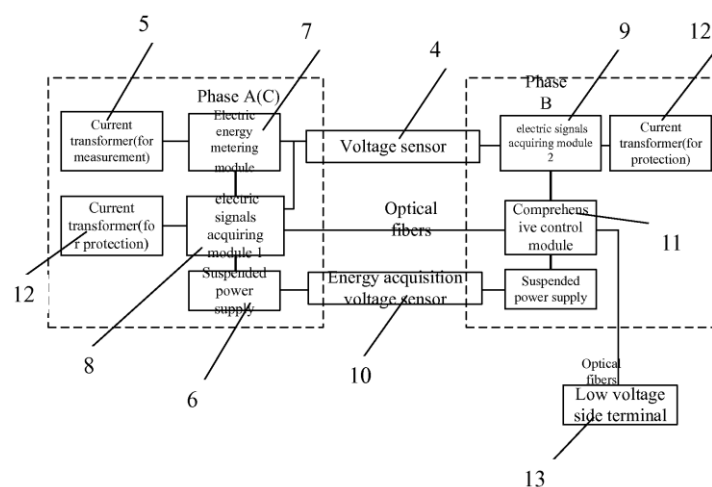
Automatic monitoring of gateway measurement based on big data is an important component of the specific construction of the project, and the project department is the core department of the construction side. To ensure the completion of the project on time, the first thing is to establish a sound management system and capable leadership. Carry out overall planning and scientific arrangement for the whole project in the construction process, properly

coordinate all work contents, and promote big data gateway measurement in an orderly manner<sup>[1]</sup>. In addition, work responsibilities should be clearly divided, leadership responsibilities should be divided for each project, unsafe factors in the construction process should be studied in depth, and a scientific and reasonable production safety management system should be established accordingly to ensure the timely completion of the total construction period.

## 1. Problems existing in automatic metering monitoring at gateways

Before the test and diagnosis, the project implementation should be planned and arranged according to the actual work situation and the project design requirements. The project leader and supervisor should make a comprehensive assessment of the scientificity and rationality of the project, and check out the potential risks or problems. The project

construction party should take the overall construction schedule and plan of the construction project as the general starting point, and make the arrangement of gate measurement in monthly units. In addition, it should focus on solving key problems in gateway measurement, flexibly allocate, dynamically manage and optimize each construction element, as shown in the structure in Figure 1 below, so as to ensure the quality assurance of the master plan to be completed on time<sup>[2]</sup>.



**Figure. 1.** The overall structure and points of metering at gateways.

The flexible allocation of gate measurement includes two aspects: on the one hand, the allocation of construction equipment and construction consumables; on the other hand, the arrangement and scheduling of construction technicians,

management personnel, and third-party supervision and construction personnel. When the time limit for construction is relatively tight, the construction side should organize personnel to allocate materials to ensure the continuous operation of gage measurement. If the construction plan cannot be completed on schedule during the implementation process, it is necessary to conduct timely problem investigation, timely solve the problem, and readjust the construction plan. At present, there are still many problems in the automatic monitoring of

construction process, which need to be dealt with pertinently.

### 1.1. The production safety management system is not implemented

Automatic on-site monitoring of construction needs to start from the project safety production management system, but often many of the safety production responsibility of the gate measurement is unclear, reward and punishment is not clear, the system is not perfect; The automatic monitoring system of some gateways metrological is a mere formality and the safety measures are not in place as a whole. At the same time, team inspection and project inspection are all deficient, which leads to a relatively weak safety guarantee system on the site as a whole, and the construction of the project often has a large

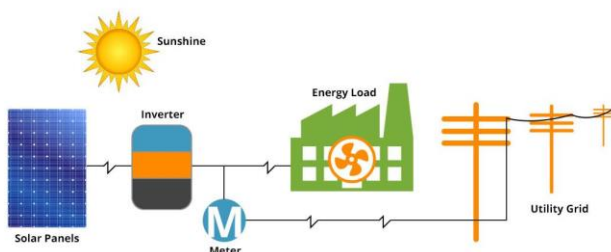
potential hidden danger.

### 1.2. The automatic monitoring institutions and managers cannot meet the actual needs

Safety management organizations and management personnel are often neglected, in the concrete project of the gate measurement, full-time automatic monitoring personnel is not able to meet the actual needs of the project. Most of the safety technicians have poor overall construction safety literacy and have a vague understanding of automatic monitoring of enterprises, which makes it difficult for them to perform their duties.

### 1.3. Starting with safety training

Training the code of conduct of construction personnel is one of the most effective ways to promote the automatic monitoring of project construction. But with the continuous development of enterprise scale, the existing staff are often difficult to meet the needs of large-scale construction, in the process of project construction is gradually introduced more "subcontract work" and "migrant workers", the influx of this part of the personnel on the one hand to the metering of great vigor and vitality, but due to the awareness of the risk of project does not reach the designated position, safety quality is not up to standard and other elements, they also became a project construction is not standard of major hazards, and use as shown in figure 2 of the new model can effectively alleviate the situation:



**Figure 2.** Gateway metering application system using new energy.

For the construction unit, internal cause changes external cause, external cause determines the behavior. Therefore, a quality assurance system at all levels should be established to carry out regular quality inspection on each construction team. The construction quality inspection needs the participation of many parties in order to ensure the coordination and efficiency of the gate measurement. The main participants are the leaders of the construction unit, the direct person in charge of the project, the owner, the government quality supervision department and the relevant staff of the construction supervision department. The main contents of inspection include measurement and inspection in and out of the industry. In the field inspection, inspection staff should carry out field measurement and comprehensive inspection of the middle line, level and detailed size of the construction project<sup>[3, 4]</sup>. During the internal inspection, the authenticity and accuracy of all kinds of materials should be evaluated, and the inspection standard shall be based on the rules and regulations of construction companies and industrial standards.

### 1.4. Failure to implement safety education

In the construction process of quite a few projects, the safety education of construction personnel is not timely, and the quality of construction personnel is difficult to meet the needs of specific construction. A sound staff training system should be established to regularly organize the construction staff to learn all kinds of knowledge, including the specific operation specifications, inspection standards and work provisions. Strive to achieve all the personnel involved in the construction of the project to understand the basic characteristics of the project. For the key technical personnel of special type of work, the project party should carry out pre-job qualification verification, pre-job training and other work to ensure the project quality and time limit for completion on time.

## 2. Strengthen safety education and training of construction teams

First of all, the safety training of construction team should focus on the automatic monitoring of construction personnel, and should start from the perspective of safety education training, to enhance the overall safety awareness of the construction team. At the same time also need to take effective measures to standardize the construction personnel daily operation, make construction personnel form procedural and standardized work habits, and further implement the current "safety production law", the use of modern media and modern other route of transmission, widely publicised project construction safety production management knowledge.



**Figure 3.** Common metering equipment at gateways.

Through strengthen production safety laws and regulations and safety technical standard, improve the safety of the construction personnel quality, and according to the ministry of construction of "construction worker safety training education regulations" to carry out targeted training, timely and efficient for the construction personnel safety technical training, strengthen the security protection of the worker.

### 2.1. Pay attention to the safety training of employees

The training for construction personnel should focus on key points and carry out safety operation training for employees. We can start with the backbone of the construction personnel of the enterprise, and carry out

systematic safety technology training for the team leaders and safety management personnel, so as to strengthen the whole stage of production operation, and seize the opportunity of regular training to carry out mass popularization of safety skills.

### 2.2. Safety education for special jobs and temporary workers should be emphasized

In the measurement of gateways, if special types of work are needed, systematic pre-job training should be carried out, and only after passing the assessment training can they enter the gateways for measurement. Enterprises should pay attention to the safety education of special types of work and temporary workers.

### 2.3. Adopt diversified ways to improve the safety and technical literacy of employees

Internal safety knowledge contests can be held to enhance employees' awareness of safe operation in a more flexible way.

### 2.4. Strive to create a colorful safety culture

Enterprises can carry out a variety of safety cultural activities, adopt a positive safety course training and other features of automatic monitoring activities combined, effectively strengthen the awareness of safety responsibility.

## 3. Control and management countermeasures of metering accidents at gateways

### 3.1. Accident control

Accident control is a two-stage process. Eliminate safety hazards and reduce accident incidence before accidents occur; Reduce human and economic losses after accidents occur. Accordingly, prior to the occurrence of the accident, the project construction party shall, based on the specific characteristics of the construction project and the actual situation of the building site, standardize and control the measurement of all kinds of gateways, and establish

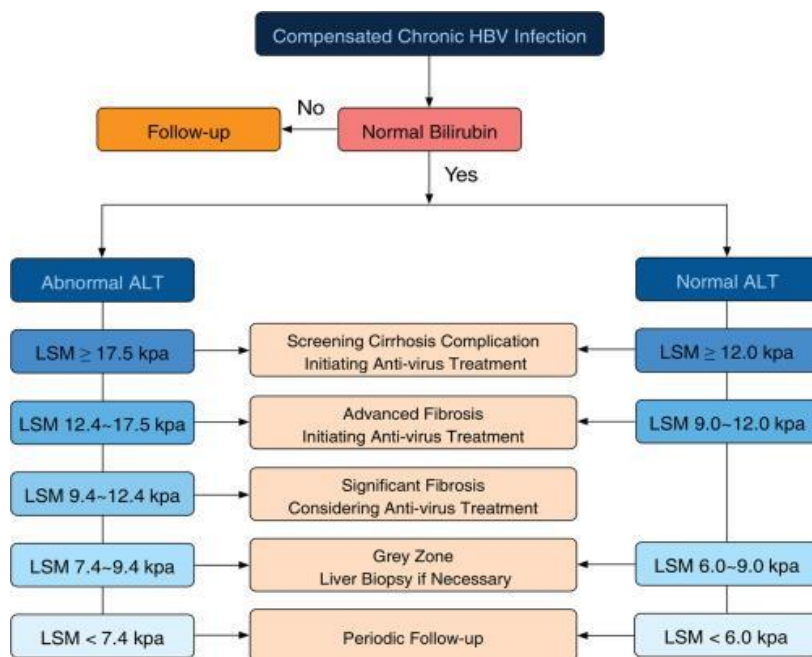


the relevant automatic monitoring system. It includes the safety system for the use of water and electricity, the safety system for construction operations, the safety guarantee system for metering at gateways, the safety system for metering at gateways to prevent fires<sup>[5]</sup>, typhoons and other safety systems. After the occurrence of an accident, it is necessary to reduce the loss as much as possible, and at the same time, it is necessary to establish a safety accident reporting system of gate measurement, which is of great practical significance to control the safety of gate measurement. For example, when a major safety accident occurs at the gate measurement, the person in charge of the project should report it to the business leaders and relevant government departments quickly and should not delay it for more than 24 hours.

The contents of the accident report include the place where the accident happened, the construction unit, the place and time of the accident, the situation of casualties and losses, the preliminary judgment of the cause of the accident, etc.

The prevention of accidents is to use a variety of preventive means to eliminate or reduce the factors that may cause accidents to a large extent before the accident occurs. The prevention of accidents

includes engineering physical law and artificial supervision law. The former is based on Hatton's principle of energy release and focuses on accident prevention from material Angle. The latter standardizes and guides the safe construction behavior of construction personnel through Heinrich's accident causation theory. In the construction process, the construction unit should regard safe construction as the basic requirement, earnestly implement the responsibility system of construction safety post, assign the responsibility of each project in the construction process to specific people, and establish a clear reward and punishment mechanism accordingly. In addition, construction units should also integrate the construction safety awareness into the technical training work. Before the construction technicians take up their posts, the relevant qualifications and professional technology shall be strictly examined, and technical training and safety education shall be conducted. During the formal start of construction and the formulation of the construction task plan, technical disclosure should also be made, and detailed safe operation rules and regulations should be confirmed and implemented in written form, as shown in Figure 4 below:



**Figure 4.**Reference template for automatic detection system of gateway metering.

In addition, when an accident has occurred or ended, accident suppression adopts various means to reduce the corresponding degree of loss, and adopts the corresponding remedy after the accident. Generally speaking, after an accident occurs, the control measures that enterprises can adopt include: preventing the generation of new hazards, reducing hazard factors, and reducing the actual diffusion of known hazards. Some physical ways can be used to isolate hazard sources, to ensure that the project can be efficient and safe construction, standardize the specific construction safety of gateway measurement<sup>[6]</sup>.

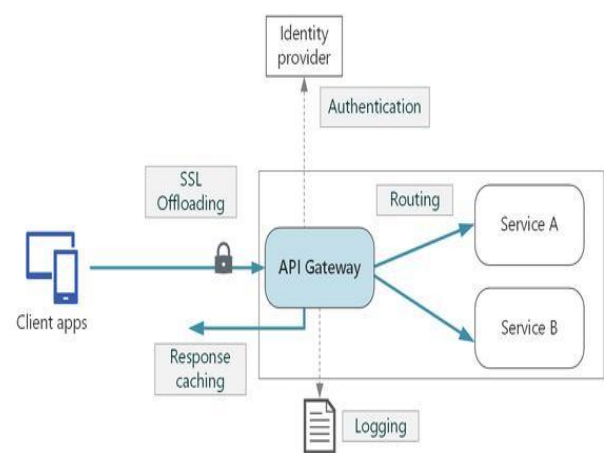
#### 4. Improve the measures for building safety supervision and management

Construction units should establish a real-time construction quality assessment and construction accident reporting system. In the construction process, if there are any construction accidents caused by operational errors or substandard teaching materials, the construction personnel should report the problems through instant communication and submit them to the construction person in charge and supervision supervisor for solution. In case of concealment or delay in handling, the person in charge of the unit shall be punished and the relevant staff shall be held accountable. This can effectively solve the problem of low technical level of safety officers on the site, while ensuring that the overall project is fair and just.

##### 4.1. Solve the problem of test load

In the risk evaluation research of gateway metering safety, governments at all levels should first strictly check the situation of pressure occupation, control the phenomenon of pressure occupation from the source, and ensure the safe and effective operation. The installation of transformer is a very important work in the construction of gage measurement and detection. Before the transformer is installed, it is necessary to be familiar with the design drawings, understand the relevant data in the drawings in detail, purchase the equipment required for installation, and

design the installation mode according to the location of the devices. At the same time of installing the transformer, proper treatment of the mounting surface and erection of the foundation wires are required. Then, relevant staff need to check and confirm the transformer, to ensure that the transformer can be used normally, and all the parameters and data are consistent with the design drawing, so as to proceed with the next step of installation operation.



**Figure 5.** Imagination of "load occupation" of gateway metering based on big data analysis.

In addition, it is also necessary to provide enterprises with more reasonable and effective policy support, more scientific and reasonable layout, and prevent the occurrence of "grabbing areas" with other testing projects. Due to the pressure and testing of the construction of the project often involve more interests, if not properly handled will make the next renovation work difficult to carry out. Therefore, it is necessary to carry out long-term coordination of gateway metering safety based on the actual situation, and take into account the interests of multiple parties through the discussion of professionals, so as to adopt a more practical and effective way to deal with the pressure occupying situation of detection.

##### 4.2. Improve the metering safety protection system at gateways

The main structure of the test is determined according to the internal main wiring of the substation. The

main wiring of the test structurally indicates the number of transformer, bus and circuit breaker and the corresponding interconnecting mode. These testing equipment, the design of main structure to detect a has great effect on the running safety of equipment, to detect a equipment flexibility has a significant role in regulating control, which is related to the overall stability of the whole power system transformer substation and security, and the efficiency of the power system, and the corresponding equipment flexibility.

From the above point of view, the main wiring of the testing equipment needs to be set up correctly and reasonably. At the same time, the overall structure of the equipment should be reasonably planned and the wiring of the equipment should be adjusted correctly according to the function and purpose of the power system and the actual situation of the substation. Correctly handle the connection relationship between the related equipment, from the equipment's economical application, combined with the technical conditions to determine the installation of equipment and other issues. By establishing an effective responsibility protection system and a performance reward and punishment system, the protection of safe transmission of gateways measurement can be implemented on individuals, and the work situation can be linked to the salary, so as to motivate the staff to be more active and active in operation.

#### *4.3. Extend the overall service life of gateway metering*

While improving the protection system, the competent government departments should also focus on the protection and publicity of the measurement safety technology at the gateways, while enterprises should focus on the publicity and education of the corresponding knowledge to the residents along the routes, so that the public can understand the importance of the measurement and detection at the gateways and its hidden safety risks. This paper emphasizes the consequences and

responsibilities of blocking the safe application of gateway metering, and makes the awareness of testing application deeply rooted in people's mind through the publicity of testing on the Internet and newspapers.

From the current metering testing equipment installation situation to analyze, energy metering testing a device bus bar installation is a very complicated and complex work, but the work is very important, will directly affect the energy metering testing a service life of the equipment after the installation is complete and the security situation, need the installation personnel focus on bus bar installation problem. In test a metering device of bus bar installation process, the need to group the corresponding tool for correction, the regulation of standard values for the corresponding market cannot batch supply bus bar installation tools, installation personnel shall be prepared in advance, the finished the installation tools, so you can make the installation process runs smoothly, not affect the proceeding of the bus bar installation work. At the same time, during the substation busbar equipment procurement, distributors send busbar equipment to the substation through a variety of transportation channels, in this transportation project, busbar equipment will inevitably appear deformation or bending and other conditions. According to the bending situation of this kind of bus equipment, if a few buses are bent, the way of manual correction can be used to modify the bus. If the number of bent buses is relatively large, the bus bar correction machine can be used to correct the bending part, so as to ensure the work efficiency and the service life of the bus, extend the overall service life of the gate measurement.

#### *4.4. Reward for promoting information-based control system of metering and detection at gateways*

At present in the metering of safety management of professional talents are scarce, therefore to build a

more perfect system of enterprise talent construction, through innovative talent management system to encourage innovation engineering personnel in engineering management, and continually establish and improve the energy metering safety system of energy metering security technology, strengthen the management of safety skills training also should strive to work for the safe and smooth resource protection.

In the detection and application process of gateway metering security enterprises, the corresponding information of transmission intermediaries is imported according to the unified template, and the management system of gateway metering security transmission intermediaries is summarized and calculated, so as to realize the overall docking of the process control system and gateway metering security management network system. In addition, personnel related to the test application process control can also query the control information with different identities and permissions. Planners and testers can query the plan and the security contract of gateway metering respectively, so as to control the security process of gateway metering in an all-round and multi-angle way.

## 5. Conclusion

The construction project should adhere to the principle of safety in production, combine the policies and countermeasures of prevention and management as a whole, and comprehensively optimize the process of safe construction of the enterprise, which is also an important link in the process of socialism in China. In recent years, China's production safety and work are facing certain challenges and opportunities. We should maintain the principle of safety first, advocate the concept of production safety and automatic monitoring, and carry out all-round implementation from the perspective of enterprise management.

## Acknowledgments

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