

## Research on Automatic Acceptance Technology of OCS Main Station Based on Artificial Intelligence

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**Abstract:** With the continuous expansion of the scale of modern power grid and the upgrading of equipment management requirements, monitoring specialty is facing greater challenges. Substation automation system acceptance workload is also gradually expanding. When a large number of signals need to be checked and accepted, the workload of checking signals will naturally increase. When the substation data monitored by the dispatching control center increases, there are too many signals to be checked and accepted. This leads to some problems in the normal monitoring of power grid. The signal in the acceptance is analyzed, and the signal is identified according to the frequency of transmission of the signal and the relevant grid time. Substation automation is based on the user terminal project, and the acceptance requirements will be based on the operation, coordination, scheduling, measurement and maintenance. To cut the passage of the old automation system to the new automation system, care must be taken to prevent data jumps and channel interruptions during the cutting process. The automation system operation technology is constantly developing, and the demand for automation personnel is constantly improving.

### 1. Introduction

Monitoring information directly reflects the status of field operation equipment. The existing research results can effectively grasp the operation of power grid by utilizing the comprehensive evaluation function of monitoring information. In the process of expanding the scale of electric power, projects such as technological renovation and base are also increasing [1]. Substation automation system acceptance workload is also gradually expanding. In the process of expanding the power scale, projects such as technological renovation and base are also increasing, and the workload of substation automation system acceptance is also gradually expanding [2]. In this process, dispatching automation personnel, monitoring personnel and field substation construction and debugging personnel are required to carry out multiple checking and monitoring of signals [3]. The traditional monitoring and acceptance of monitoring information is mainly based on manual debugging, with low work efficiency and high security risks. When there are a large number of signals that need to be accepted, the workload of the check signal will naturally increase [4]. When the substation data monitored by the dispatch control center increases, there are too many signals to be accepted. Some problems have arisen in the normal monitoring of the power grid.

Substation automation information is collected according to unattended mode, with a large amount of information and acceptance. Install servers, workstations, network devices, etc. in the dispatching automation main station computer room. Install and debug the corresponding operating system, database and application software on each hardware device [5]. Substation automation is based on the user terminal project, and the acceptance requirements will be based on the operation, coordination, scheduling, measurement and maintenance. In order to meet the needs of the public life, substations need to continue to expand and rebuild [6]. Each of the regulating substations has a backup circuit breaker for protection transmission and remote control test, and the remaining circuit breakers are used for remote control back-test. The automation system operation technology is constantly developing, and the demand for automation personnel is constantly improving [7]. During the trial run of the new system, parallel connection and relatively independent access of the

old and new automation system channels are adopted. The automation master station system is newly built, so the factory and station with new channels can not be built. In order to cut the channel of the old automation system into the operation of the new automation system, attention should be paid to preventing data jump and channel interruption during the cutting process.

## 2. Supporting System of Automatic Acceptance System for Monitoring Information

The substation monitoring information automatic acceptance system transforms the routine acceptance work into three automatic acceptance systems, which are the automatic acceptance systems for the main station. Substation automation monitoring system mainly Baikuo information processing, communication transmission, data collection, computer protection and automatic control technology. The staff must first select their own username and password, and log in after the real name to start the program normally. If any of them is not met, the program will not start properly. Substation monitoring information acceptance work is to use the corresponding inspection and test methods. It is the main process of whether the data is complete, the normality of the work and whether it can fully demonstrate the end-use effect of the user's demand [8]. The construction process of substation monitoring system is to make the internal and external equipment of the monitoring system realize physical installation wiring by the construction unit according to the design data and site requirements. The system will automatically generate all the tele-signal sequence numbers so as to arrange the signal sequence according to different needs, so that it can better adapt to different needs. Data comparison and system function test run are carried out, and problems existing in the test run are dealt with in time.

In order to make the substation connect to the new automatic master station system smoothly, the debugging work can be carried out in an orderly manner. All substations, customer transformers and power plants can be put into operation as soon as possible in the new automation master station system. Telemetry automatic acceptance checks whether the data uploaded on site is consistent with the pre-set telemetry values. To judge whether the acceptance is passed or not, it needs to be carried out after the on-site telemetry verification is passed. This operation is valid for all signals that have not passed the acceptance. After repeatedly checking the database and the graphics are consistent with the site, the substation is tested for comprehensive functions. The duty personnel and automation personnel shall do all the matters and data verification work of the substation on the new automation main station system. The automatic acceptance of the remote signal is carried out after the on-site background and the remote communication device are qualified, and the automatic acceptance procedure at the station end is in the order of the point number. In the actual work at the substation site, the staff must be negotiated by both parties, and the order of the signals to be accepted should be verified flexibly according to the actual situation.

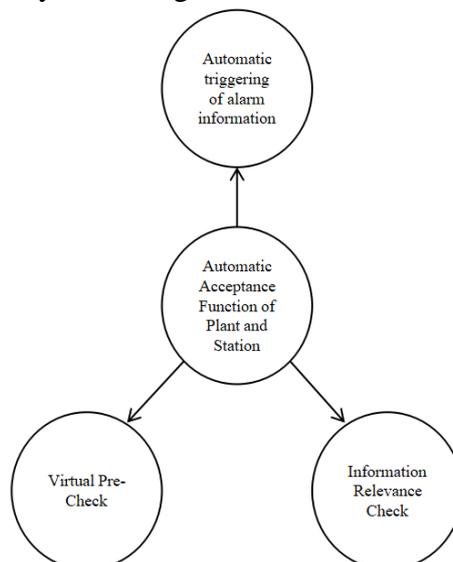


Fig.1. Master station end information automatic acceptance system

For the process of setting parameters inside and outside the monitoring system and the computer, if there is a problem in a certain link, the system will be different. To re-accept the signal that has not passed the acceptance, you can click the verification button to perform multiple verifications. Figure 1 shows the structure of the automatic acceptance system for the main station.

After entering the main interface of the system, you should prepare the remote letter reference Table in Excel format before entering the program, and import it into the program specification for later use. Channel cutting, the communication professional cuts the substation channels to the new automation master station system. The automatic acceptance of remote signal has all the remote signaling functions of resetting the front-end system of the main station and the telecontrol communication device of the station [9]. Automation personnel in the workstation operation process to achieve the information point check and acceptance. The monitoring center can monitor the substation normally, and the cutting substation is on duty again. At least one substation professional will accompany the commissioning work until the signal checking is completed. In the remote control sequence Table, the switch to be accepted can be selected manually. The remote control sequence is determined in turn, which can distinguish the operation switches and ensure that no misselection is made. The acceptance personnel can check the signal of the imported program one by one, and set the time interval of the program accessing the database in a standardized way. Staff click the validation button behind each signal to verify. The program automatically displays the results according to the operation of the staff.

### **3. Problems Encountered in the Implementation of Automatic Acceptance System**

It is assumed that when the normal channel, devices on both sides and the system are in normal operation, the motion forwarding data are consistent with the main station side. In addition, it realizes the consistency of sending and receiving messages and the front-end messages of the main station on the motor side. In addition to setting the time interval between Cheng Xun's access to the database, the acceptance personnel should also make a choice of the starting and ending serial numbers of the acceptance signals, and then conduct batch acceptance. Because each function module of high software is used specially in dispatching, mode and relay. During debugging, the basic data of power grid should be improved in the system. In the process of acceptance, the result of remote control can be judged automatically. It can interfere with the acceptance process manually or restart the interrupted remote control acceptance. The monitoring system shall complete the second construction operation before the test is completed, and the equipment in each panel shall be installed. The staff needs to export the currently completed acceptance records from the system and properly boot them safely. These acceptance records are an important basis for demonstrating the reliability of the entire acceptance work. The basic data needs to be provided by relay professionals. The dispatching group has a dedicated person to participate in the entry of the basic data, and each professional group participates in the debugging.

The telemetry link corrects the checksum, and the acceptance content is the correspondence between the telemetry value and the associated interval. The remote control automatic acceptance uses the actual control operation according to the acceptance criteria. Use the acceptance program to remotely combine and share the position of the field device. The acceptance personnel can selectively accept the data and perform batch acceptance. This not only makes the operation of the acceptance work more convenient and quick, but also improves the reliability of the acceptance result. After the batch is sent, the data is sent and the monitor manually checks the data location to determine whether the telemetry link is correct. The virtual plant system simulates the function of the remote telecom communication device through a computer program, and is responsible for the joint debugging of the information between the main station and the plant station [10]. According to the order of information Table, the alarm information is automatically triggered. The transfer logic part of the full information loop diagram is the device specification, which is to realize input simulation by technical means. Observing the output results can quickly monitor the spacer devices. Traditional signal acceptance results are only qualified or not, which can not show the detailed time of signal reception.

The new automatic master station system integrates dispatching, centralized control and distribution network functions. Supporting three-level operation management system of dispatching center, substation monitoring center and centralized control center. Virtual pre-system and virtual factory-station system are the special equipment of the automatic acceptance system of information at the factory-station end. Realize the function of receiving and uploading field device information. Check the system and equipment before commissioning. The main station end information automatic acceptance system is an advanced application based on the smart grid dispatching technical support system. Thereby ensuring the smooth development of subsequent commissioning work, the regression experiment rate and defect rate are reduced. Providing the acceptance record to the relevant personnel in the form of a report fundamentally reduces the troubles caused by repeated acceptance and improves the existing acceptance system.

#### 4. Conclusion

Substation monitoring information automatic acceptance has passed the actual test of substation, and the acceptance effect is good. The automatic debugging system of substation monitoring based on message parsing can realize precise joint debugging of remote signal and telemetry change value. The work efficiency of automated acceptance staff has been effectively improved and the burden of staff has been reduced. Compared with the existing technology, it can obtain better economic and social benefits. It solves the defect of intelligent troubleshooting caused by inconsistent operation mode of primary and secondary systems in intelligent substations. The full information loop diagram is an electronic drawing of all logical and physical information created using the unified information standard. The monitoring system shall complete the second construction operation before the test is completed, and the equipment in each panel shall be installed. The signal in the acceptance is analyzed, and the signal is identified according to the frequency of transmission of the signal and the relevant grid time. Identify abnormal signals and events, and make early warnings of equipment anomalies, reducing the risk of emergencies. The errors and omissions of manual subjective judgment are avoided, and the operation and maintenance level of the intelligent substation is effectively improved.

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