

High-voltage transmission line tower (hereinafter referred to as high-voltage tower) is an important part of the Chinese power grid construction. Its safety is related to electric power security and the people's livelihood of the country. Currently, the traditional method of high-voltage tower inspection cannot monitor and respond in real time to accidents such as tilting and landslides of high-voltage tower bases caused by sudden geological disasters. Therefore, adopting automatic monitoring means to monitor high-voltage towers is an effective way to ensure the safe operation of transmission lines.

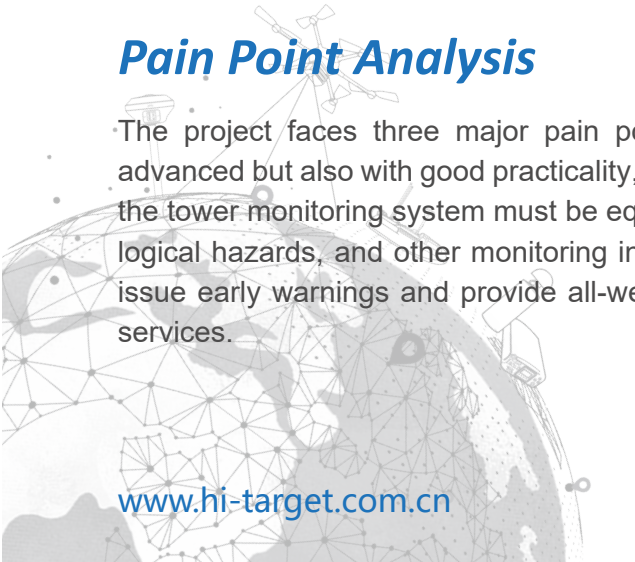


Application of tower Monitoring System in the power grid

Project Background

Affected by the heavy rain, there have been two small landslides under the base of the high-voltage pole tower in a certain place in Guangdong Province. The longitudinal length of the sliding body is about 25m, and the lateral width of the sliding body is about 10m. If there are unfavorable conditions such as rainy season and earthquake, there is a possibility of secondary deformation and sliding, which may cause the collapse of power towers. On behalf of the client, Hi-Target provides a tower monitoring system to monitor and detect high voltage tower tilting, landslide displacement and vibration in real time, to alert the supervisory staff at the early stage of the disaster, and remind them to eliminate the hidden dangers in time, so as to accurately guarantee the stability and safety of the transmission line operation.

Pain Point Analysis



The project faces three major pain points: First, the tower monitoring system should not only be advanced but also with good practicality, operability, and scalability with invest-friendly features. Second, the tower monitoring system must be equipped with the settlement, displacement, tilt, deformation, geological hazards, and other monitoring indicators. Third, the tower monitoring system should be able to issue early warnings and provide all-weather real-time safety management at all levels of information services.

Implementation Program

Hi-Target tower monitoring system uses universal monitoring equipment such as GNSS receiver, wireless crack meter, integrated tilt and acceleration monitoring station, integrated crack displacement monitoring station, sound and light alarm, integrated rainfall monitoring station, water content monitoring station, etc., to carry out round-the-clock real-time monitoring of high-voltage tower settlement, displacement, tilt, deformation and geohazard monitoring. The system facilitates the establishment of a combined monitoring and early warning system for geological hazards, providing all-weather, real-time information services for production safety management at all levels.



GNSS Receiver FIG1



Inclination accelerometers FIG2

Workflow

Through the site survey of the high-voltage tower landslide disaster site, Hi-Target technician determines the universal monitoring equipment and deployment location required for this monitoring. The universal monitoring equipment mainly includes GNSS receiver, inclination accelerometer, soil moisture content meter and rain gauge, in which, GNSS receiver is installed on the high-voltage tower, inclination accelerometer is installed on both sides of the landslide disaster site, soil moisture content meter is installed on the left side of the landslide disaster site, and rain gauge is installed on the right side of the landslide disaster site.



Rain gauges and GNSS receivers FIG3

Then, Hi-Target technician installes all the pervasive monitoring equipment. During the period, all the equipment take grounding protection and lightning protection safety technical measures. After the installation of the equipment, Hi-Target technicians debug the equipment to ensure that all equipment functioned normally.



Soil moisture content meter GNSS receiver inclination accelerometer equipment installation FIG4

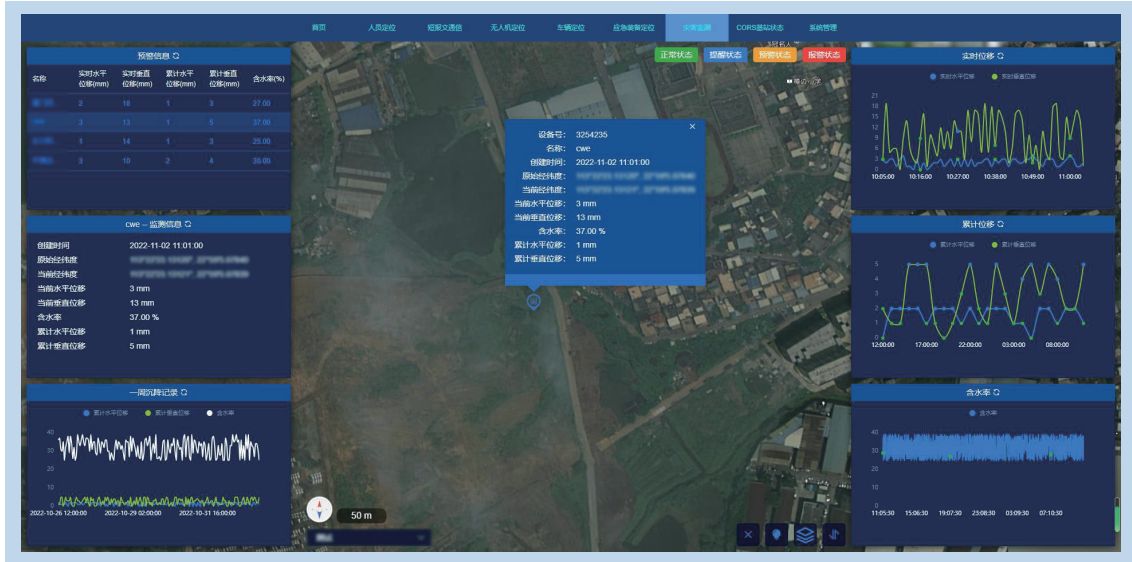
Result

Data collection: Hi-Target tower monitoring system can automatically collect, store and send monitoring data such as rainfall, crack displacement, GNSS displacement, etc. in real time, which can be displayed and read on site, and can be transmitted to monitoring center and other users respectively according to requirements, and supports mixed network of three working systems: self-reporting, regular answering and answering. Meanwhile, based on the monitoring platform, the monitoring center and other users can remotely set the collection parameters of each data collection terminal, including fixed point, fixed interval, incremental settings, etc., as well as wake up, management and data call measurement of all monitoring equipment, so as to realize monitoring equipment on demand.



Hi-Target tower monitoring system equipment mounted on towers FIG5

Data transmission: Hi-Target tower monitoring system is based on GPRS/SMS/BDS communication method, realizing two-way data transmission between monitoring center and monitoring equipment, helping monitoring center and other users to grasp and read the operation status and monitoring data of monitoring equipment in time, and realizing all-weather safety monitoring and early warning of high-voltage towers.



Monitoring platform interface display FIG6

Project Summary

Compared with the traditional manual inspection, Hi-Target tower monitoring system has three major advantages.

First, the accuracy of high-voltage tower displacement monitoring reaches millimeter level: displacement accuracy 8~15mm, tilt monitoring accuracy 0.01°.

Second, real-time monitoring of the data status of multiple monitoring points to form a real-time early warning analysis system with full coverage around the clock.

Third, establish multi-threshold warning model, according to the warning level of attention level, warning level, alert level, alarm level to different objects through SMS, email, platform warning and other ways to send early warning information to ensure that the relevant personnel can be found at the first time and take countermeasures as soon as possible to avoid the occurrence of catastrophic accidents of high-voltage towers.

In summary, Hi-Target tower monitoring system can grasp the health condition of high-voltage towers around the clock, keeping them in a real-time controllable safe state, and ensuring the safe and stable operation of transmission lines.



More information at <https://en.hi-target.com.cn/become-our-partner/>

About Hi-Target

Established in 1999, Hi-Target is the first professional high-precision surveying and mapping instrument brand to be successfully listed in China.

Hi-Target provides a wide range of surveying equipment including GNSS receivers, CORS stations, Total Stations, 3D Laser Scanners, GIS Data Collectors, UAV/UAS, and Hydrographic products to offer complete commercial solutions for various industries.

As the leading brand in the geospatial industry, Hi-Target invests heavily in research and development, on top of collaborating with more than 100 universities globally to bring the latest positioning technology and innovation for product development.

For over 20 years, Hi-Target has approximately 2,500+ employees worldwide, with an established network of 20+ subsidiaries, 28 branches and more than 200 partners in 100+ countries / regions to service and support our customers.

Visit us at: www.hi-target.com.cn

E-mail: sales@hi-target.com.cn

Phone: +86 20 2868 8296