



The settlement monitoring system employs advanced GNSS Receivers strategically positioned at precise locations to meticulously observe and analyze continuous, prolonged alterations in ground settlement. This cutting-edge technology proves particularly well-suited for the comprehensive assessment of settlement patterns in a diverse range of critical infrastructures, including dams, bridges, intricate architectural formations, and roadbeds.

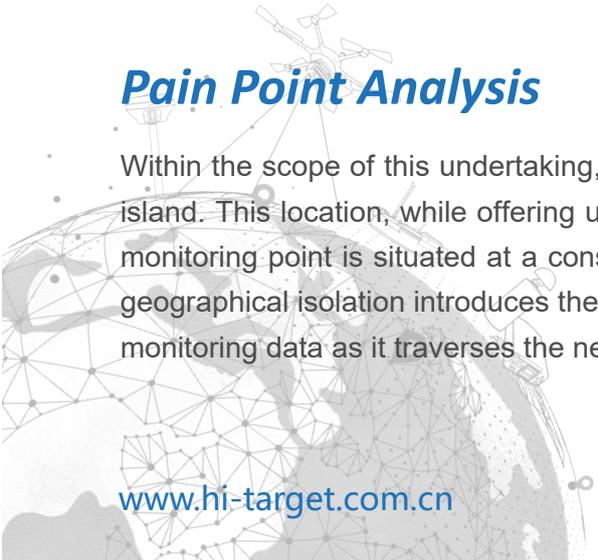


Application of MS302 GNSS Receiver in Hong Kong Reclamation Settlement Monitoring

Project Background

The Hong Kong Government has built artificial floating islands through reclamation, where important power generation facilities are constructed. The distinctive geographical context of the floating islands area accentuates the criticality of promptly addressing ground settlement and displacement occurrences. The potential consequences of such events extend beyond mere inconvenience, as they pose a direct and imminent threat to the safety of individuals and the integrity of essential facilities. The vulnerability of this environment becomes even more pronounced when considering the pivotal role that power generation facilities play in sustaining various operations.

Pain Point Analysis



Within the scope of this undertaking, a monitoring station has been established on a reclaimed floating island. This location, while offering unique advantages, presents certain logistical hurdles. Notably, the monitoring point is situated at a considerable distance from the nearest 4G network base station. This geographical isolation introduces the potential for data transmission issues, leading to the loss of crucial monitoring data as it traverses the network.

Compounding this challenge is the presence of a pivotal governmental facility on the island. Given the critical nature of this establishment, it is imperative to ensure the utmost accuracy in detecting even the slightest displacements. Moreover, the need for rapid and effective early warning responses to such deviations is of paramount importance to safeguard both personnel and resources.

In addressing these complex issues, Hi-Target's compact Split-type GNSS receiver emerges as a robust and reliable solution.

Implementation Program

The Hong Kong government has enlisted the specialized expertise of Hi-Target to oversee and ensure the continuous operation of its artificial floating island power generation facilities. Central to this endeavor is Hi-Target's compact Split-type MS302 GNSS receiver, a professional-grade monitoring instrument distinguished by its low power consumption, exceptional performance, and unparalleled precision. This sophisticated equipment is designed to meticulously track both horizontal and vertical displacements of the power generation station by capturing and analyzing the relative variance between its absolute and real-time coordinates.



Hi-Target MS302 GNSS Receiver FIG1

The integration of the MS302 GNSS receiver is seamlessly complemented by the "monitoring cloud" platform, an innovative system that provides a visual representation of the data collected. This platform employs graphical illustrations to depict real-time resolution results with astonishing millimeter-level accuracy. After a comprehensive evaluation, the project department concluded that the implementation of the Hi-Target GNSS Receiver is the optimal solution. Its exceptional monitoring accuracy, straightforward installation process, and expansive monitoring range make it an ideal choice for overseeing the intricacies of the artificial floating islands.

Workflow

Within the framework of this project, the entirety of the artificial floating island serves as a comprehensive monitoring zone. In line with this overarching approach, a strategically positioned GNSS Receiver base station is established within the designated survey area. This pivotal installation is carefully orchestrated to yield optimal results in the endeavor's monitoring objectives.

To attain the highest degree of effectiveness, technicians judiciously select a location for the base station that is deliberately distanced from significant water bodies and thoroughfares. This deliberate placement strategy is rooted in the pursuit of creating an environment conducive to precise and reliable monitoring outcomes.

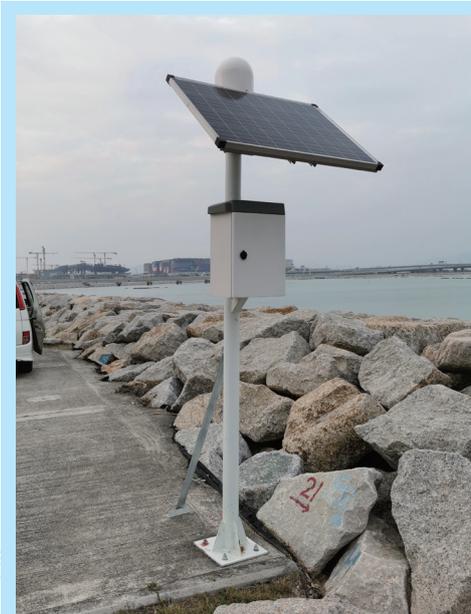


Station 1 (FIG2)



Station 2 (FIG3)

Deploying a monitoring station within the same vicinity necessitates a prudent approach to avoid expansive water bodies and roadways. Despite harsh conditions, the compact size and easy installation of the base station offer flexibility in location selection and quick setup due to its integrated antenna and receiver design.



Station 3 (FIG4)



Station 4 (FIG5)

Station ID	Station Name	Station Type	Station Status	Device SN number	Statement	CoordinateX	CoordinateY	CoordinateZ	Operating
1571	15956425	GNSS surface displacement monitoring station	Enable	15956425	Normal	X: -2412819.1394m N: 2457425.9572m L: 114.1607°	Y: 5392389.6413m E: 511032.4584m B: 22.2132°	Z: 2396369.0139m U: 24.1651m H: 24.1651m	Detail Edit Delete Task
1569	15957770	GNSS surface displacement monitoring station	Enable	15957770	Normal	X: -2429898.0692m N: 2483714.1916m L: 114.2778°	Y: 5383182.9520m E: 526529.2653m B: 22.2550°	Z: 2481683.8009m U: 15.7714m H: 15.7714m	Detail Edit Delete Task
1568	15956233	GNSS surface displacement monitoring station	Enable	15956233	Normal	X: -2412766.2523m N: 2457241.9323m L: 114.1951°	Y: 5392516.7625m E: 519837.4656m B: 22.2117°	Z: 2396133.7915m U: 15.5230m H: 15.5230m	Detail Edit Delete Task
1567	15956240	GNSS surface displacement monitoring station	Enable	15956240	Normal	X: -2412791.0024m N: 2457241.1321m L: 114.1954°	Y: 5392506.1109m E: 519864.4115m B: 22.2117°	Z: 2396132.7843m U: 15.4992m H: 15.4992m	Detail Edit Delete Task
1566	15956331	GNSS surface displacement monitoring station	Enable	15956331	Normal	X: -2412784.3794m N: 2457241.9323m L: 114.1954°	Y: 5392492.1746m E: 519864.4295m B: 22.2120°	Z: 2396170.5553m U: 15.4966m H: 15.4966m	Detail Edit Delete Task
1560	15956417	GNSS surface displacement monitoring station	Enable	15956417	Normal	X: -2412811.0109m N: 2457311.9603m L: 114.1945°	Y: 5392526.0355m E: 519755.8240m B: 22.2122°	Z: 2396190.4535m U: 15.5743m H: 15.5743m	Detail Edit Delete Task
1559	15956457	GNSS surface displacement monitoring station	Enable	15956457	Normal	X: -2412762.4974m N: 2457425.0023m L: 114.1607°	Y: 5392441.1127m E: 519864.4106m B: 22.2132°	Z: 2396340.4122m U: 15.8266m H: 15.8266m	Detail Edit Delete Task

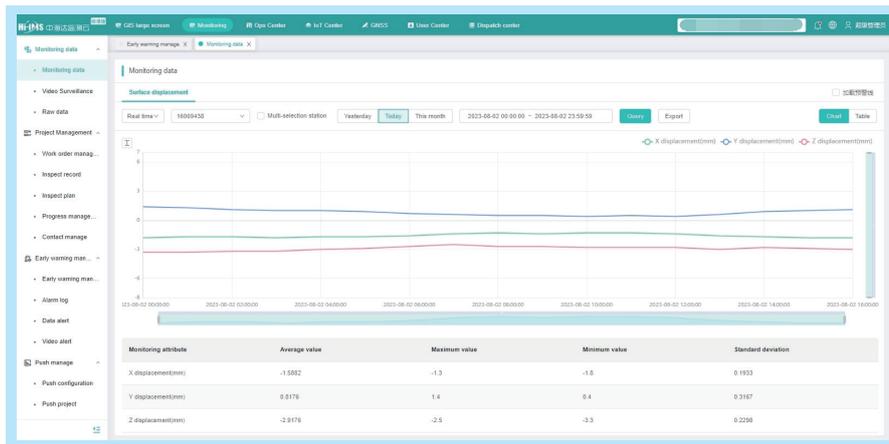
Station Manage FIG6

Project Number	Project Name	Region	Station Name	Station Type	Station working status	Reasons for abnormalities	First monitoring	Final monitoring	Device name	Device SN number	Device working status	Device Model	Firmware version	Operating
	HK_GD_Pb ver_Station_Project	广东省广州市番禺区	15956229	GNSS ground displacement reference station	Normal				15956229	15956229	Normal	MS3X2		Detail
	HK_GD_Pb ver_Station_Project	广东省广州市番禺区	15956241	GNSS surface displacement monitoring station	Normal		2022-10-21 11:03:00	2023-05-02 15:00:39	15956241	15956241	Normal	MS3X2		Detail
	HK_GD_Pb ver_Station_Project	广东省广州市番禺区	15956258	GNSS surface displacement monitoring station	Normal		2022-10-21 11:02:44	2023-05-02 15:00:40	15956258	15956258	Normal	MS3X2		Detail

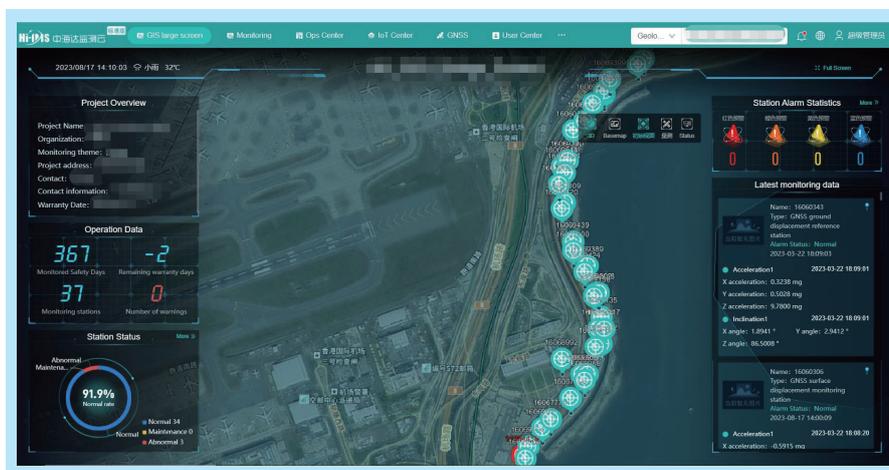
Station monitoring FIG7

Result

The project employs a comprehensive "station monitoring cloud" infrastructure, which is anchored in a monitoring IoT platform, a monitoring operation and maintenance platform, a general data processing engine, and a monitoring and early warning system. This integrated architecture platform is specifically designed to cater to the industry's safety monitoring needs. Enhanced by the inclusion of high-precision GNSS positioning equipment, the platform offers an array of services encompassing data collection, transmission, auditing, querying, statistics, management, professional data analysis, and WebGIS display through a SAAS cloud platform. The system not only provides automatic warnings, but also enables the remote release of warning information.



Result FIG8



Result 2 FIG9

Project Summary

The application of Hi-Target's GNSS Receiver monitoring and warning solution addresses the safety monitoring needs of Hong Kong's artificial floating islands. It delivers high precision and rapid response monitoring and warning capabilities, even in the most challenging environments. The system offers remote automatic control, ensuring easy operation, and reliable data. It provides early warnings for deformations, settlements, and device data anomalies, among other changes, through rapid alarms.

Furthermore, it supports visualization management, enabling the visual scheduling of personnel, inspections, maintenance, repairs, and other emergency commands. High-precision maps of railroads are configured to enable quick queries, emergency management, and statistical analysis of monitoring points.

Leveraging the advanced capabilities of the Hi-Target GNSS Receiver monitoring and early warning solution, the Hong Kong government has successfully enhanced its early warning and prevention system within critical hazardous areas. This strategic implementation has yielded remarkable advancements in ensuring the comprehensive safety of the artificial floating islands. By seamlessly integrating monitoring, identification, alert mechanisms, and intelligent risk control, the solution effectively mitigates potential hazards inherent to the artificial floating islands.



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.

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