Reference

SIMATIC RTLS

Real-Time Locating System safeguards personnel in underground sewage treatment plants

Guiyang, a city sitting at the foot of the mountains, is surrounded by ridges and rivers with breathtaking scenery. The 70 kilometer forest ring around the city has given it the nickname “The Forest City”. The long flowing Nanming River runs through the city like a green ribbon, ornamenting the scenery and nurturing the hardworking residents in Guiyang.

Nanming River is the “mother river” of Guiyang. However, with the rapid advancement of industrialization and urbanization, the water quality of Nanming River has deteriorated and the pollution has become more and more serious, making it a “dying river”. In recent years, the Guiyang municipal government has been making efforts to comprehensively improve the water environment of the Nanming River basin. The river now has a brand new look of clear water, green banks, unblocked flows, and amazing scenery instead of the once-muddy and smelly environment.

To save the mother river, the Guiyang municipal government built 18 new sewage treatment plants. Guiyi Sewage Treatment Plant, the first ultra-large, complex deep foundation pit underground reclaimed water plant in China, is one of them.

Ultra-deep underground reclaimed water plant causes personnel safety issues

Guiyi Sewage Treatment Plant is one of a series of decentralized and coordinated sewage treatment plants. These plants are systematically planned for comprehensive treatment of the Nanming River basin, incorporating China's thousands of years of "terrace wisdom" concept that describes adapting to nature, uniting nature and man, and taking urban river ecological water replenishment needs and urban construction land conditions into consideration.

Guiyi plant is China's first ultra-deep underground reclaimed water plant and also the deepest underground sewage treatment plant in Asia. It organically integrates the underground sewage plant with underground parking lots, underground shopping malls, and the commercial and residential complexes on Yanwu Street, including student apartments and residential buildings on the ground as well as the ground landscape, so as to realize the maximum comprehensive utilization of the above-ground and underground space. Not only is it integrated with the city in harmony, the plant is also China's first ultra-complex sewage treatment plant independently designed with independent intellectual property rights.

Since the Guiyi Sewage Treatment Plant is built on the minus 4th to 5th floors, the foundation pit is as deep as 30 meters, the routes of the karst caves underground are complex, and the site is narrow. Therefore, the 4G and 5G signals from the communication base station cannot reach the site. It's difficult to track the real-time status of maintenance personnel, so the equipment of the sewage treatment plant and the safety of the staff are facing great challenges. Moreover, the current design of management of the underground sewage treatment plant lacks related labor protection, fire protection, safety and health laws and regulations, and design specifications for various professional units. Therefore, a personnel locating system that can realize the locating of the sewage treatment plant operation and maintenance personnel in real-time and can carry out digital visual management has become an inevitable choice.

SIMATIC RTLS always safeguards the personnel underground

After learning of this demand, Siemens inspected the actual working conditions of the underground sewage treatment plant and proposed its unique SIMATIC RTLS real-time locating system solution to realize digital visual management for the operation and maintenance personnel in the sewage treatment plant, contributing to safety management and helping ensure the safety of the inspectors in specific areas.

First of all, RTLS can realize accurate locating of sewage treatment plant personnel in real-time for visual management. Employees wear locating labels and connect them with portable terminal devices (such as work tablets, handheld terminals). The current position of the employee can be monitored in real-time on the operation and maintenance platform from the system and the employees's trajectory can be traced. In this way, not only can the inspection work be intelligently supervised, but early warnings can also be provided when an inspector crosses the boundary, has a retention, or long-time inactivity. Once danger occurs, an inspector can call for help with one click, and the operation and maintenance personnel can also quickly find the precise position of the inspector, thereby protecting the safety of the personnel to the greatest extent.

SIMATIC RTLS gateway which anables two-way communication

Second, operation and maintenance personnel can also flexibly schedule the inspectors through RTLS with work orders assigned to the nearest personnel as well as monitor the work and conduct safety management on-site and hazardous operation process management in specific areas, providing the best basis for audit and verification. Since RTLS can reproduce the inspector trajectory based on the historical data, it can collect the locating information of personnel and equipment for the big data of sewage treatment utilities informatics. So the inspection of the sewage treatment plant can continuously be optimized, the operation efficiency can be improved, and the highly reliable and refined operation can be realized.

In addition, the RTLS locating system can be linked with the video monitoring equipment to realize fast locating of personnel. The traditional method is to manually search for the employees on dozens of monitoring screens, which is time-consuming and laborious. With RTLS linked, an employee's information can be quickly extracted from the information out of dozens of cameras. For example, when an employee moves, the system can refresh and call the camera next to him. If the monitoring room needs to locate and determine the life status of an employee, with just a click on the icon of the employee, the camera next to the employee will extract the image, which is fast and convenient.

SIMATIC RTLS, the best choice for personnel locating in underground sewage treatment plants

The application of real-time personnel locating systems in the industrial field is not uncommon, and the applied technologies also vary, including UWB, Phase, Bluetooth, WIFI, GPS, RFID, 4G, and 5G. But for sewage treatment plants buried deep underground, like Guiyi Sewage Treatment Plant, GPS, 4G, and 5G technologies cannot meet the reliability requirements, while the locating accuracy level of Bluetooth, WLAN, and RFID is not high enough, leaving only UWB and Phase technologies up to the task.

So why is SIMATIC RTLS the best choice for personnel locating in underground sewage treatment plants? What makes it so special that it can achieve precise locating and sampling in ultra-deep underground environments?

The key to these questions is that SIMATIC RTLS uses a unique and innovative wireless technology combination of UWB (Ultra-Wideband Wireless Communication Technology) and 2.4 GHz Phase Modulation, which can achieve accurate people tracking at the level of centimeters or within 1 – 3 meters. It provides great compatibility and reliability, and is especially suitable for industrial environments such as underground sewage treatment plants without the worries about complex electromagnetic working conditions and shielding interference on-site.

The real-time locating system SIMATIC RTLS enables personnel locating in underground sewage treatment plants.

RTLS is implemented by making a badge-sized device with an e-ink display, attaching it to an employee and performing data exchange and real-time locating with the infrastructure of a wireless gateway within a distance of 20 – 30 meters.

Not only can RTLS transmit signals, but also receive signals, achieving two-way communication. Real-time data about the actual exact position of personnel on-site are determined by sending the coordinates to the localization server from which a thermodynamic diagram can be created to determine the area and duration of personnel stay. It is possible to activate the e-ink display, make changes directly on the transponder, and provide guidance to on-site personnel for the next operation as well as help the sewage treatment plant to implement fine management.

In addition, SIMATIC RTLS can also be integrated with various IT systems through ISO standard interfaces to synchronize the positions of personnel, optimize the operation process, and improve the safety of on-site operations.

At present, as the land resources for urban construction decrease greatly, more and more cities have initiated plans for underground sewage treatment plants in order to save the precious ground land resources. Underground sewage plants can treat domestic sewage locally, which is the best way to save urban land resources. With the successful implementation of SIMATIC RTLS in the Guiyi Sewage Treatment Plant, it is believed that more and more underground sewage treatment plants will adopt RTLS. Perhaps future digital sewage treatment utilities will be designed with RTLS as standard.

Siemens AG
Digital Industries
Process Automation
Östliche Rheinbrückenstr. 50
76187 Karlsruhe, Germany

Article No.: 6ZB5330-0CF02-0BA0
Reference
Dispo 26000
BR 1021 PoD 4 En
Produced in Germany