

DIGITAL CONSTRUCTION COMPREHENSIVE SOLUTION PLAN

DIGITAL EMPOWERMENT, ASSIST ENGINEERING CONSTRUCTION

MAJOR SOLUTION

PILING FOUNDATION CONSTUCTION PLAN

1.PILING FOUNDATION CONSTUCTION PRODUCT PLAN
2.COMPOSITE FOUNDATION ENGINEERING QUALITY CONTROL PLAN
3.DIGITAL CONSTRUCTION MANAGEMENT PLAN FOR FOUNDATION CONSTRUCTION ENTERPISE

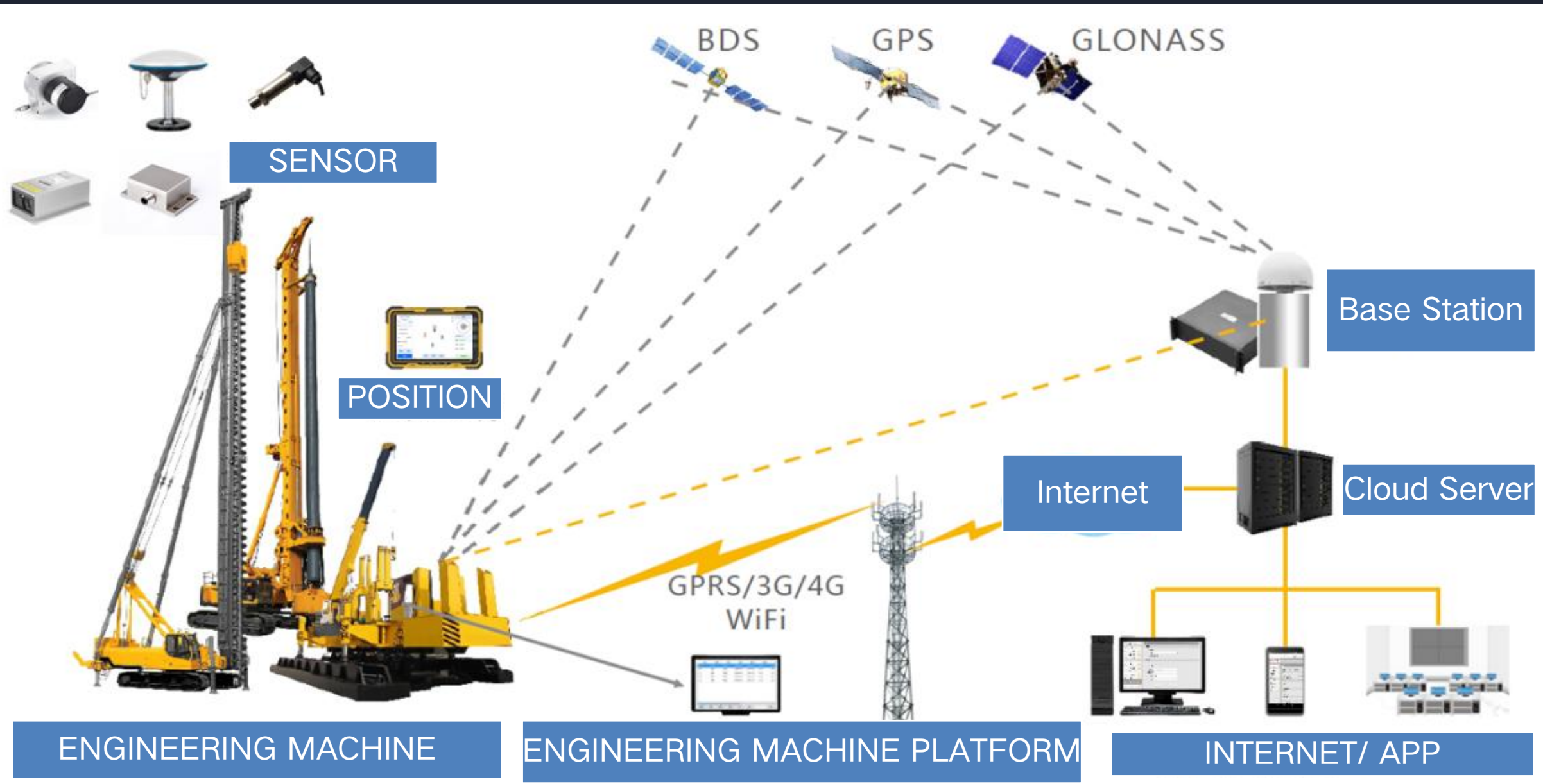
ROAD INFORMATIZATION PLAN

1. COMPACTION SYSTEM
2.PAVING SYSTEM
3. MIXING PILING STATION MONITOR & TRANSPORTATION

EARTHWORK CONSTRUCTION PLAN

1. COMPACTOR
2. BULLDOZER/ GRADER
3. EXCAVATOR SYSTEM

1.1 Core Product- Technical Frame



1.1 Core Prodcut-Hardware



High Precision Mobile Station Screen Pad

- ✓ Supports 250K/500K CAN bus
- ✓ Supports simultaneous online connection of Ethernet and 4G
- ✓ MDM Device Management Platform



BASE STATION

- ✓ 1. Comprehensive upgrade of network module, radio module, and Bluetooth module
- ✓ 2. Supports dual transmission of built-in radio and mobile network.


1.1 DIGITAL PILING ENGINEERING
FOUNDATION CONSTRUCTION

1.1 Piling Foundation Construction Plan

Intelligent Piling System: Based on Chinese GPS，adopting high-precision integrated dual antenna mode, Receive differential correction data from the base station to determine and calculate the coordinates and attitudes of the front and rear antennas, and use professional pile driving software to achieve pile driving layout, realizing the visualization, automation, and intelligence of pile driving, and improving the efficiency of pile driving operations.

Dpeth： Implemented parameter monitoring beyond depth, pressure, verticality, and other positioning.

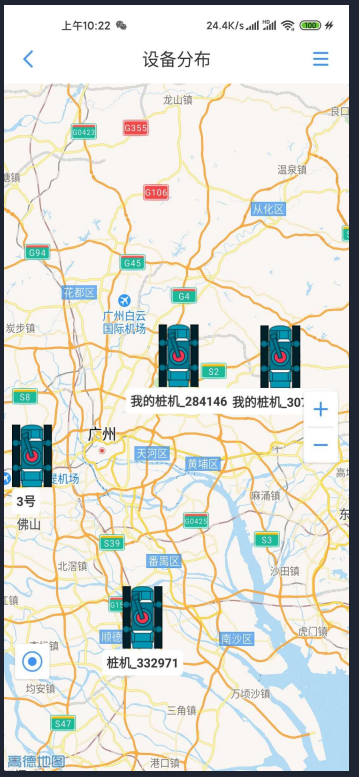
Range： Implemented installation plans for various types of pile drivers such as long spiral, rotary excavator, hammer, etc.



Homepage



Platform



Mobile

1.1 Piling Foundation Construction-Static Pile Driver



Performace: **Ground elevation, pile delivery depth, burial depth, pile top elevation, pile matching record, final pressure value, welding time**

Performace Description:

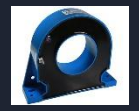
Real time elevation information output through the antenna is used in conjunction with the installed depth monitoring module and pressure monitoring module to monitor key parameters such as elevation, depth, and final pressure values. At the same time, welding current is monitored to obtain welding time。





案例：中铁二局高铁建设植桩机施工监控项目

地面标高、送桩深度、入土深度、桩顶标高 、终压值、焊接时间：











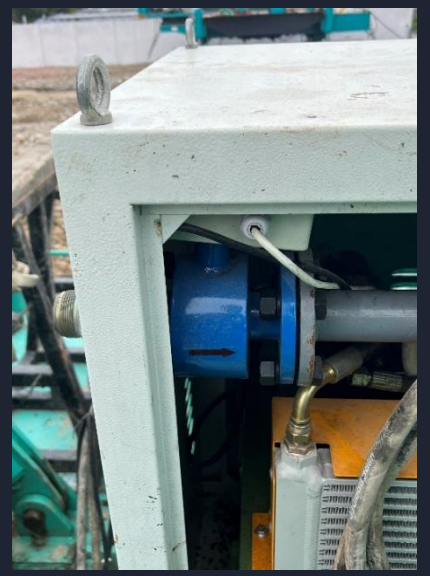


1.1 Pile Foundation Construction-Long Sprial Drilling Machie Quality Mangement System



Function: Positioning and layout, injection volume, depth, verticality, width and bottom condition, bearing layer current













1.1 Pile foundation construction - Rotary Drilling Rig



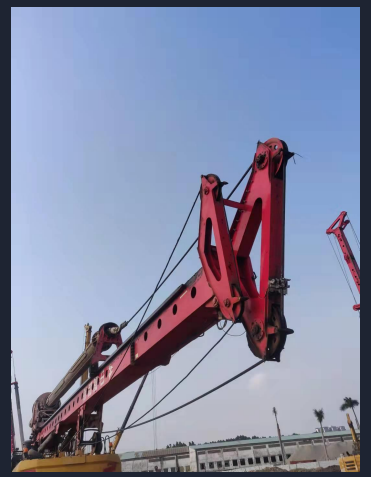
Core functions: positioning, drilling depth, rock sampling and photography

Drilling Depth Solution 1:



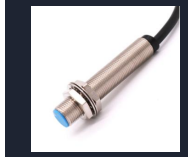
Depth Sensor





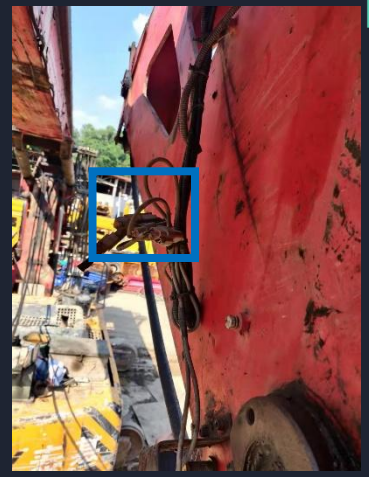


Drilling depth Solutuon 2:



Approch the switch





Rock sampling and photography:

When the rotary excavator drills into the rock layer, it can capture the worker's sampling image through a camera, and record and upload the photo information and corresponding depth information.



摄像头





1.1 Pile Foundation Construction – Safety Monitoring of Long Spiral Drilling Rig



Safety monitoring system: tilt alarm, mechanical position information

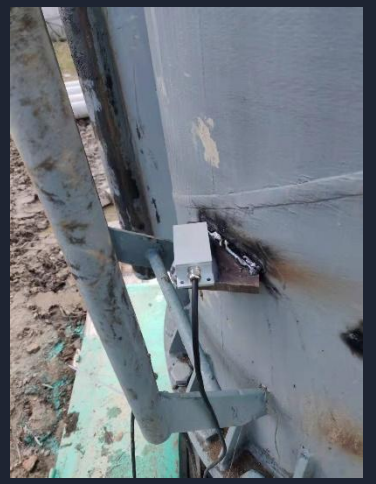
Install the angle sensor on the long spiral mast, and upload the dynamic data of mast tilt angle to the APP and web server network in real time. When the tilt angle is greater than the pre configured alarm value, the alarm on the long spiral will immediately sound, and the alarm information will be immediately uploaded to the platform and APP, and sent to the relevant person in charge via SMS for timely understanding of the on-site situation and handling.





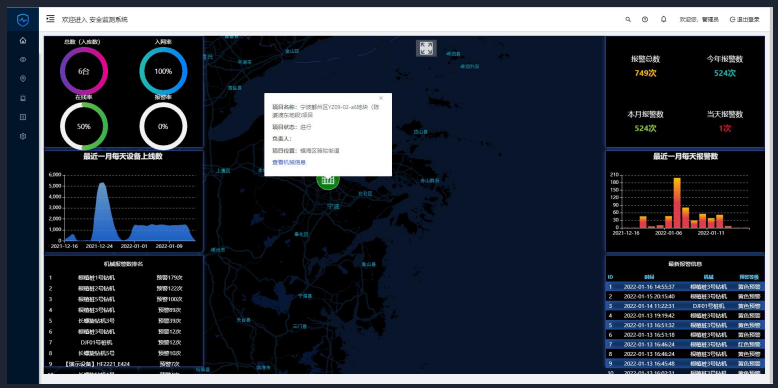




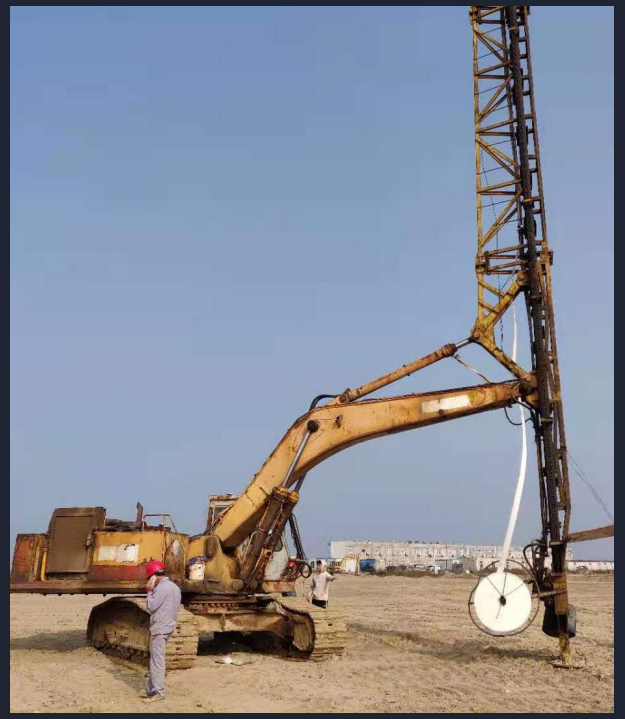








1.1 Pile foundation construction - Wick Drain Stitcher



Function: Drainage belt input depth, verticality, pressure value, construction report





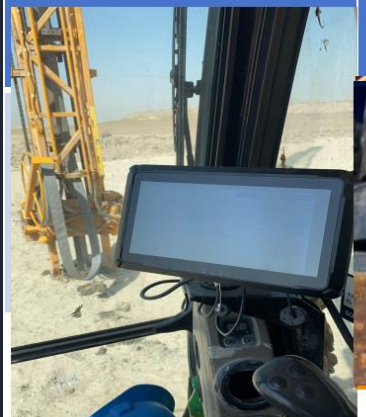




Real time recording of the insertion depth of the drainage belt through a depth sensor is used to calculate material usage. The software collects construction records and can export a construction record table。





Screen Pad Install in Cabin 屏幕显示器	Wire Rope Sensor 液压传感器 Connect to the Drum	Depth & PVD Length Calculator 深度以及排水带长度传感器	Inclination Sensor 倾角传感器	Three Sensors Cable connect to Sensor Connector to place in cabin 所有传感器连接传感控制器，三个传感器的线由外面连接到控制室内
				

1.1 Pile Foundation Construction - Hydraulic Hammer Machine

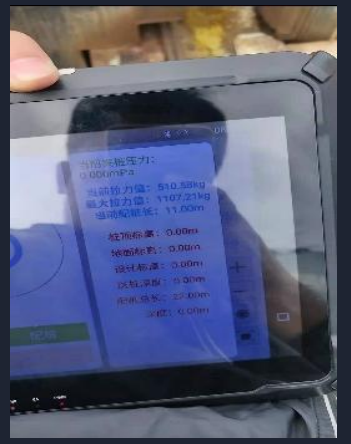


Performace: Pile length, burial depth, pile delivery depth, pile top elevation, pile matching record, verticality

Pile allocation record:

The rope sensor obtains the real-time elevation of the hammer head, and the pile matching record is obtained based on the difference between the hammer head elevation at the start of vibration and the ground elevation (first pile) or the hammer head elevation at the previous stop of vibration (non first pile)





Proximity switch:

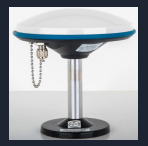
Obtain the status of whether to enable hammering and record the number of hammering in real-time.

Tilt angle sensor:

Real time display of verticality of pile frame.

Laser ranging:

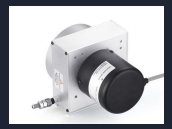
Real time acquisition of the distance from the pile frame to the ground, obtaining the ground elevation, and then calculating the pile delivery depth and pile top elevation.



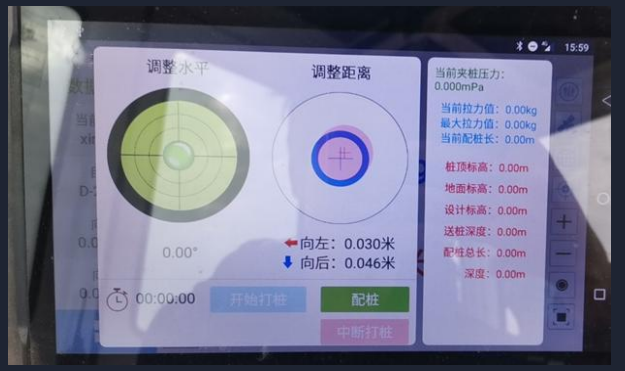












1.1 Pile Foundation Construction



Static pressure pile driver: pile point position, verticality, final pressure load, pile top elevation, pile delivery depth, pile matching record

Dynamic compaction machinery: compaction point position, compaction machine passes, compaction hammer drop distance, compaction settlement

Long spiral: pile point position, pile forming accuracy, drilling depth, construction time, bearing layer current value, pile forming current, injection volume

Rotary excavator: drilling position, verticality of drilling pile, ground elevation, drilling depth

Hammer machine machinery: pile point position, verticality, penetration, pile top elevation, pile delivery depth

1.1 Quality Management System for Composite Foundation Construction (Owners and Regulatory Units)

Composite foundation construction quality management system: specially developed for project owners and industry regulatory units, using Beidou high-precision positioning host as the basic equipment for positioning navigation and attitude monitoring, and equipped with other sensors and auxiliary equipment to meet the needs of construction guidance and monitoring. Through professional various types of foundation treatment software, it realizes the visualization, automation and intelligence of various types of foundation machinery construction such as CFG pile machine, drainage sheet pile machine, gravel pile machine, dynamic compaction machine, cement mixing pile machine, etc., realizing the management of project, progress, quality and equipment of foundation construction, as well as intelligent warning, statistical analysis, intelligent construction and other functions. The system is widely applicable to the construction of highways, railways, housing construction, airports and other engineering projects





1.1 Digital Construction Management System for Basic Construction Enterprises (Construction Unit)

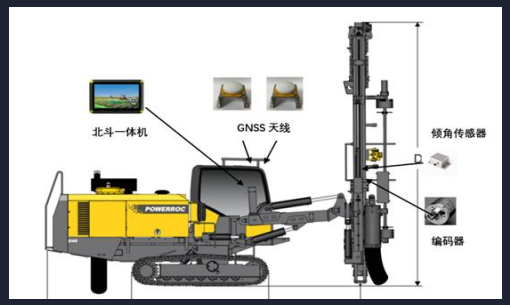
Digital Construction Management System for Basic Construction Enterprises: Specially developed for pile foundation construction units, the system realizes multiple functions such as displaying pile point positions, viewing construction deviations, counting construction quantities, and generating construction record tables for composite foundation treatment machinery equipment. It realizes the information management of construction progress, construction quality, and construction equipment for basic construction, as well as intelligent statistics, intelligent warning, intelligent construction, and other functions, providing remote information management methods for composite foundation construction enterprises. And equipped with the "Construction Cloud Manager" APP, it can remotely view and manage the construction progress of multiple construction projects, provide convenient and timely construction monitoring services, and achieve remote project management.



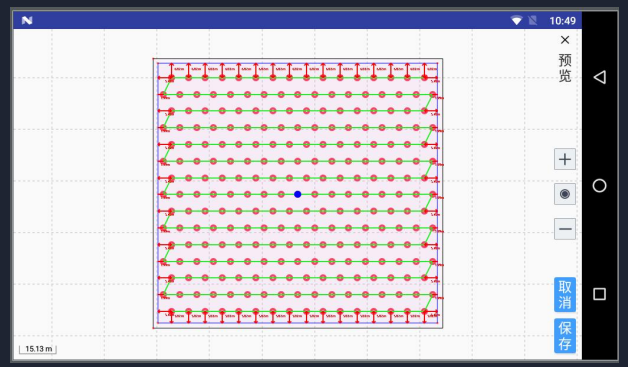


1.1 Mining Rock Drilling Rig

Intelligent rock drilling system: It is a highly intelligent and accurate rock drilling operation guidance system developed based on the quality requirements of construction technology, combined with Beidou high-precision positioning technology, wireless transmission technology, and advanced algorithm models. The system should be able to meet the requirements of real-time monitoring and digitalization of on-site operations from hole layout to blasting. Through the closed-loop management and control of the entire process, from hole design to drilling with a grinding machine, to charge calculation and blasting design and approval, to charge blasting, and finally to blasting quantity statistics, the goal of real-time collection and transparent management of production data can be achieved.











1.2 Informationization of road construction

Informationization Plan for Road Construction

System Introduction:

Road construction information management system: mainly for real-time monitoring of the mixing process, transportation process, and paving and rolling process of asphalt, water stable and other mixtures. The system has established a quality database for key data during road construction, achieving a shift from inefficient post quality inspection to efficient real-time dynamic quality monitoring.



System composition:

Mixing station: realize real-time monitoring of cement dosage, gradation, material dosage, quality, temperature and other parameter data;

Material transportation: realize real-time positioning, access control management, motion route query and playback functions for transportation vehicles;

Road paving: Real time monitoring of paving speed, temperature, thickness, operating mileage and other information;

Road compaction: Real time monitoring of the position, speed, number of passes, trajectory, vibration status, etc. of the road roller;

Construction cloud platform: monitoring information visualization, warning query and processing, statistical analysis, data download and other functions。

Informationization Plan for Road Construction

Solutions Overview

The road construction information management platform can achieve information monitoring of the core quality of the four tasks during the road construction process, including mixing, transportation, paving, and rolling of asphalt mixture. It implements dynamic quality management, strengthens quality control during the construction process, and ensures the stability of construction quality.



GNSS Base Station



GNSS Antenna



LED Screen



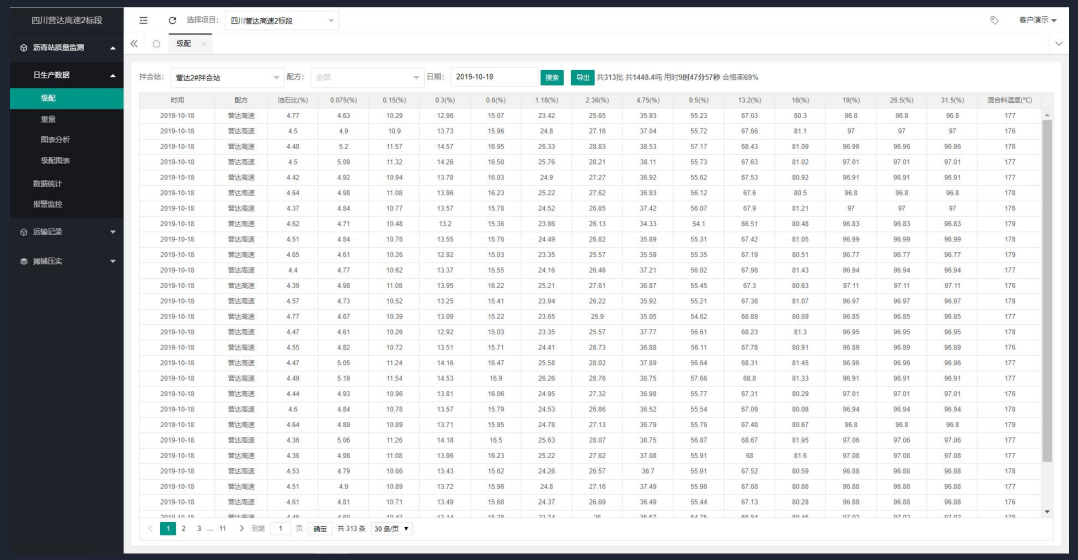
Vehicle positioning terminal



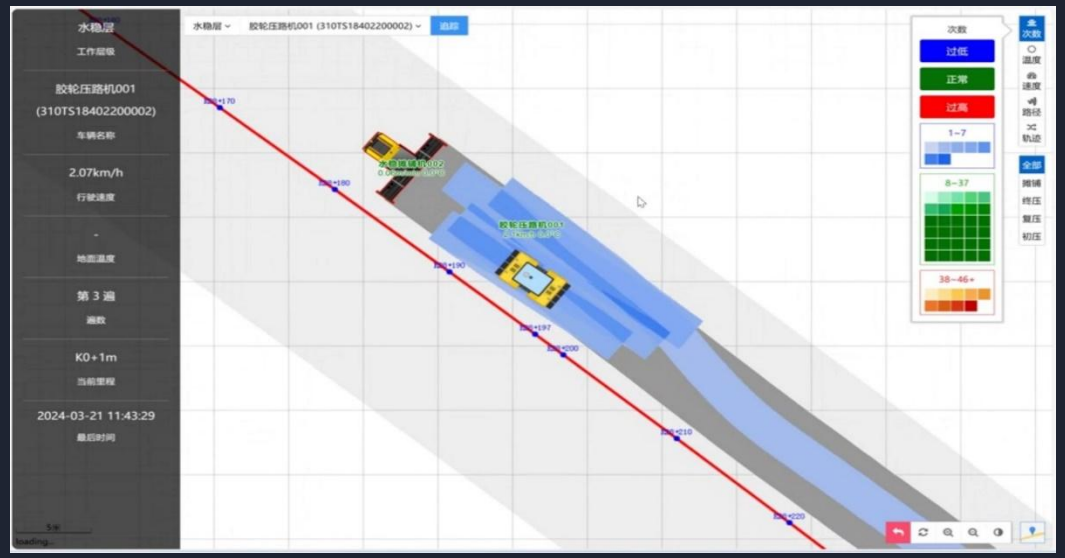
RFID Red & Writing Monitor



Tempeture/ Compaction Sensor



云平台——物料拌合监控



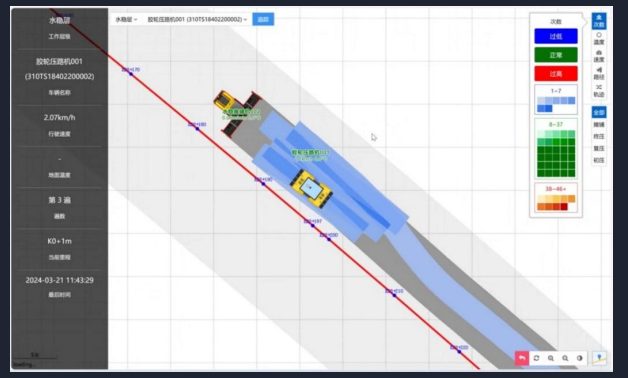
云平台——路面摊铺碾压监控

1.2 Road Rolling Management System

Road Rolling Management System

Construction guidance: The construction process is clear at a glance, and even beginners can easily get started. Based on graphical representation, prevent leakage and overpressure, and provide auxiliary guidance for construction operations.
Construction records: Record the entire construction process, providing data basis for construction quality supervision and traceability.
Quality analysis: Analyze the compaction trajectory, number of passes, speed, vibration, temperature and other information during the operation process, and automatically calculate the compaction quality.
Scientific management: Standardization and normalization of construction management, visualization of construction data, improvement of the traditional management model that relies on experience and personal judgment, and reduction of the impact of human factors on management.





Number of Compaction | Compaction Trajectory | Compaction Speed | Compaction Temputure | Quality of Compaction | Science Management

1.2 Road Paving Management System

Road Paving Management System

Temperature monitoring: By using infrared temperature sensors, the temperature data of the entire pavement is collected to monitor the temperature segregation of asphalt pavement in real time.
Construction positioning: Using the differential calculation between the base station and the mobile station, perform centimeter level positioning on the paver.
Paving speed: Real time collection and monitoring of the paving speed and trajectory of the paver.
Remote monitoring: Real time data is transmitted to the construction intelligent control platform and synchronously displayed on the on-site display terminal.

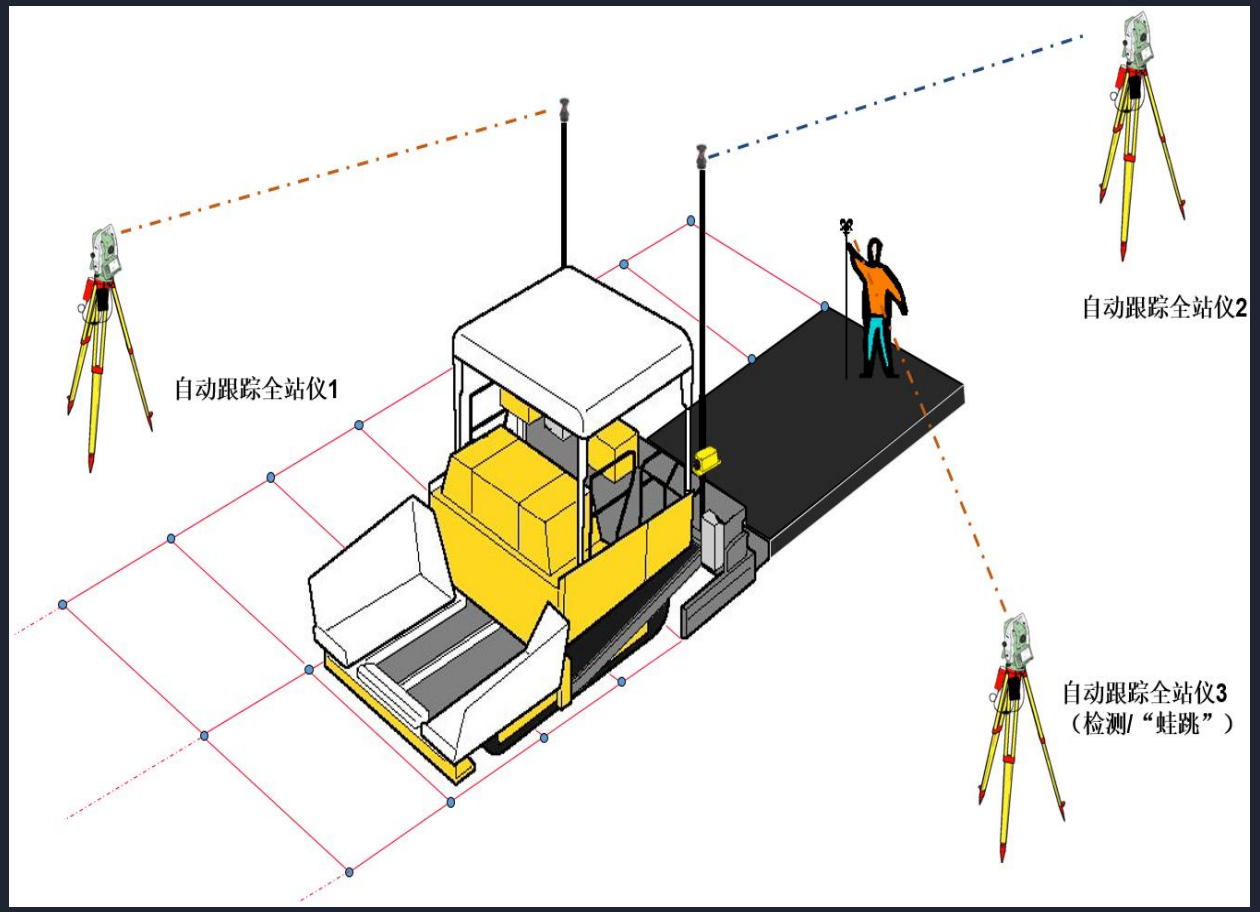




Paving Tempeture | Tempeture Analyse | Data Report | Paving Trajectory | Mileage Station Number | Construction Report

1.2 3D Paving System

Digital 3D paving control system: introduced to improve the quality and efficiency of road paving, the system can achieve fully automatic control of paving height, slope, and direction, without the need for complex and heavy operations such as layout, pile driving, hanging lines/erecting aluminum beams; Liberate paving construction from complex, tedious, and costly tasks such as layout, piling, and hanging lines, and achieve simple, fast, and accurate paving construction.



System Principle

It mainly consists of a measurement robot and a paver control system.

When the system is working, the measuring robot will capture and measure the three-dimensional coordinate data of the 360 ° prism installed on the paver mast, and transmit it in real time to the control box. The control box will compare and calculate the current coordinate information obtained with the three-dimensional design data in the design card, generate corresponding plane and elevation correction information, and transmit it to the left and right side control boxes of the paver.

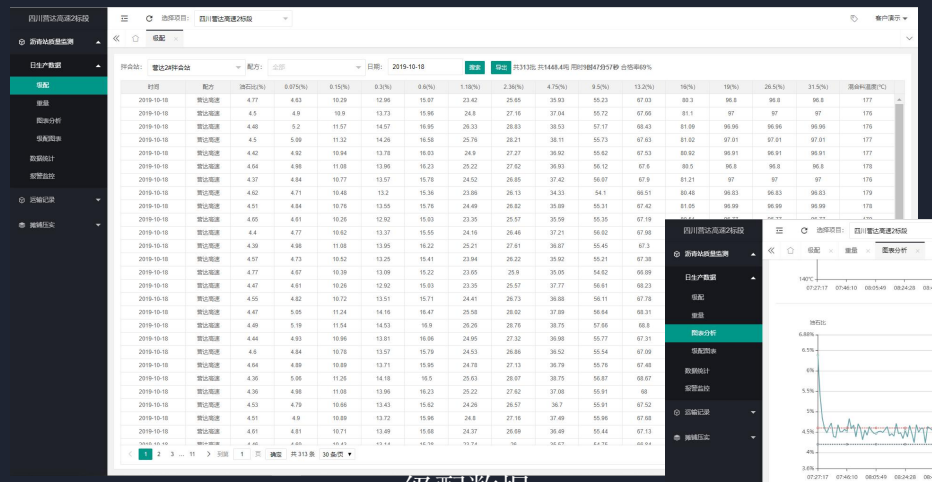
Then, the corresponding proportional driving signals are generated by the edge control box, and the hydraulic solenoid valve is used to drive the traction arm hydraulic cylinder of the paver to adjust and correct the direction and elevation of the leveling plate, thereby causing changes in the slope and elevation of the paving surface, achieving the required road surface smoothness and elevation.

In order to achieve precise control requirements for pavement paving during the specific construction process, another measuring total station is constantly monitoring the pavement paving status, truly realizing process monitoring construction and meeting the paving design requirements.

1.2 Mixing Plant Management System

Mixing Supervision

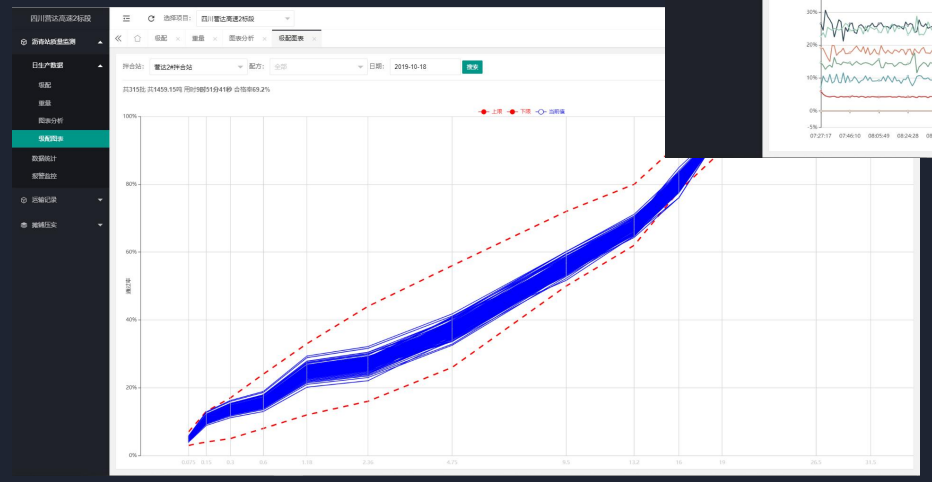
- Comprehensive real-time monitoring: The system comprehensively monitors the steps of raw materials such as cement, sand and gravel, asphalt, mineral powder, etc. in various links such as feeding and production. Display the gradation changes and other processes in the form of charts, which facilitates real-time monitoring of various links such as mixing material feeding and production by operators.
- Discovering problems: Real time transmission of quality inspection and statistical results to project managers through the network, providing reliable and effective basis for identifying problems and making decisions in a timely manner.
- Improving technology: Through real-time monitoring data, staff can analyze and study the data collected during production and construction processes, continuously improving and optimizing road construction technology.



级配数据



图表分析



级配曲线

1.2 Vehicle Transportation Management System

Vehicle Mangement

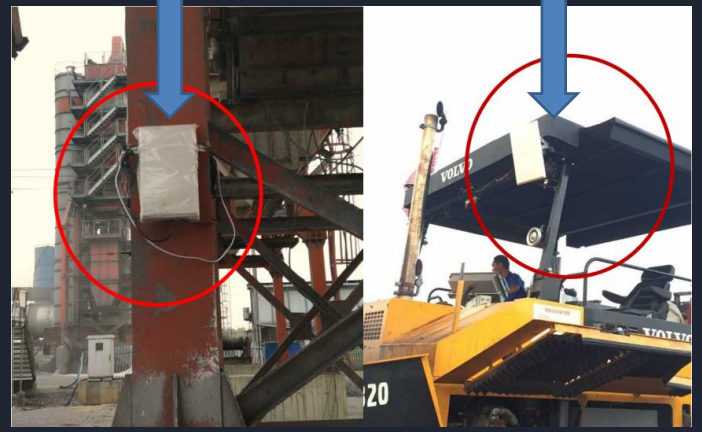


Vehicle online management interface

- Real time location query: mainly includes: time, longitude, latitude, speed, direction, positioning signs, vehicles, alarm signs, etc.
- Access control sensing function: Collecting terminal data through RFID reader/writer board, real-time access control management function, as well as obtaining access control data, entry and exit records, and docking records with paving equipment for material transport vehicles.
- Route process replay: The system will transmit the vehicle's driving trajectory in real time to the platform, enabling the query of the actual situation of the entire process of the vehicle's driving route, as a basis for evaluating and analyzing the construction effect.
- Quality traceability function: It can query the transportation information of any pile number mixture, including the start transportation time, transportation cycle, start and end paving time, and corresponding paving pile number, to calculate the paving quality status.



Sensing and Reading

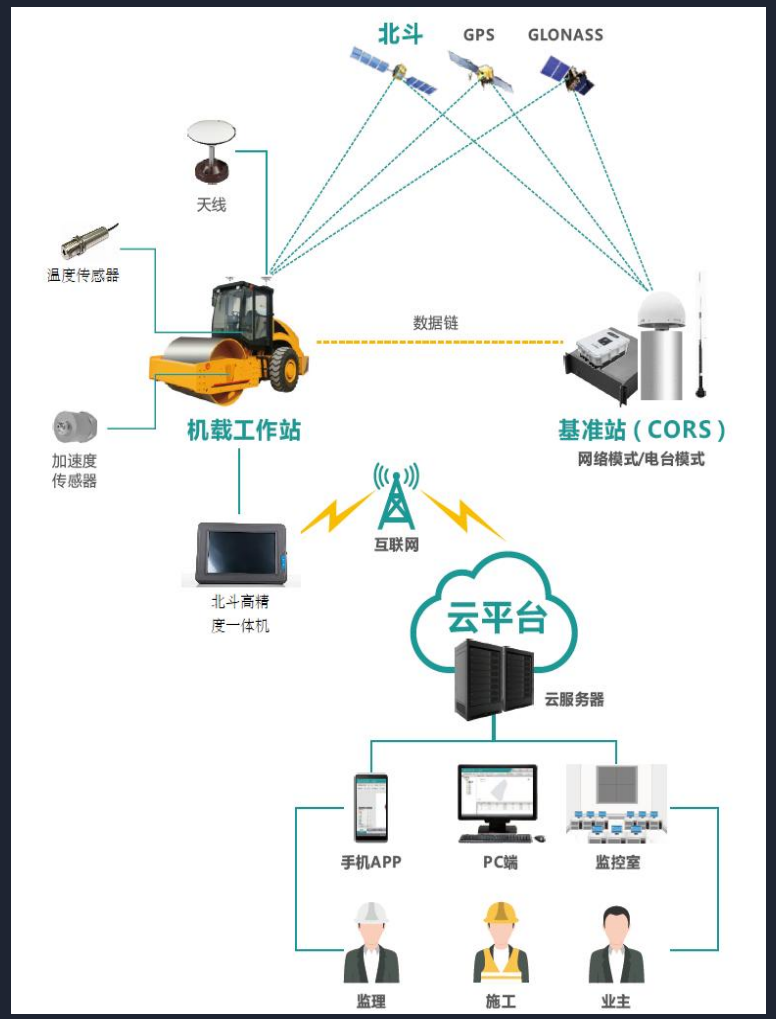




1.3 Digital Construction of Earthwork

1.3 Earthwork Construction Management - Intelligent Compaction System

Compaction system: The system realizes real-time recording and analysis of compaction trajectory, rolling passes, vibration status and other information, continuously monitors the entire process of mechanical compaction in real time, provides efficient, high-quality and fast compaction operation guidance for operators, provides a powerful information management platform for owners and supervisors, and comprehensively assists digital construction.



Intelligent

Real time graphical display of equipment operation status, real-time calculation and analysis of rolling speed, number of passes, etc.

Visualization

By using the compaction state diagram, quickly locate the weak areas of compaction to ensure reliability.

informatization

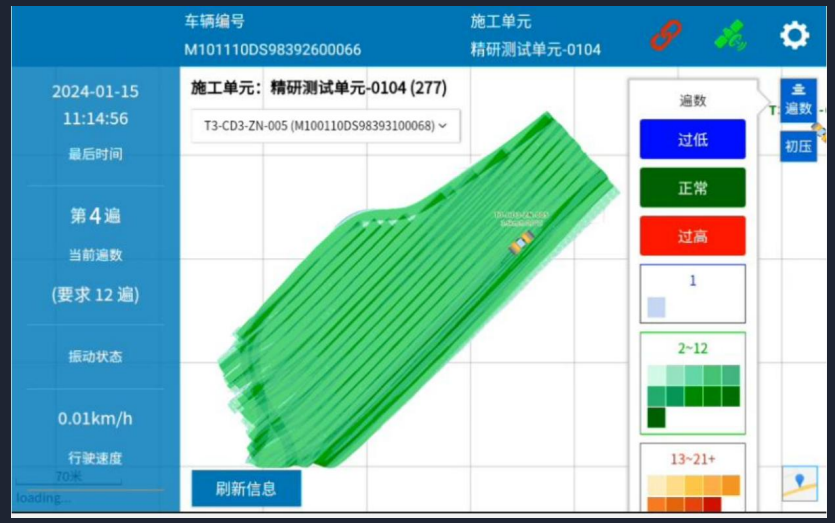
Real time monitoring to prevent overpressure and undervoltage, reduce fuel consumption and waste, and ensure work quality.

cloud platform

Real time monitoring of the construction process by the engineering, construction, and supervision parties to improve project management efficiency.

all-weather

Not affected by time, solve night construction, improve work efficiency, and ensure construction quality.

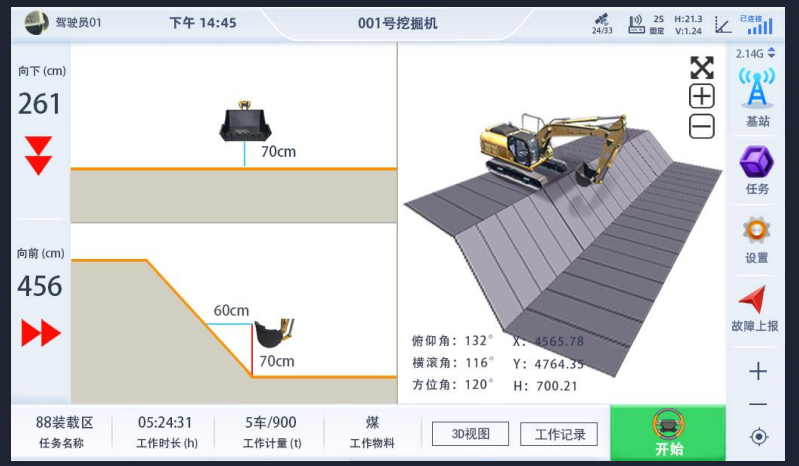




1.3 Earthwork Construction Scheme - Intelligent Excavator System

Intelligent excavator system: composed of G32 Beidou high-precision positioning and orientation integrated machine, 4 high-precision inclination sensors and related accessories. The system utilizes Beidou high-precision positioning to obtain centimeter level positioning values, and combines the excavator mechanical model and sensors located on the vehicle body to calculate the three-dimensional coordinates of the excavator bucket tip in real time. The coordinate information is transmitted to the control box in the cab in real time, compared with the three-dimensional design data, and the height difference between the current construction surface and the design surface is calculated. Various methods such as graphics, numerical values, and light target indications are used to guide the operator to carry out precise construction.





1.3 土方施工类方案-智能推土机/平地机系统

1、松铺厚度可视化显示

根据实时定位数据和铲刀姿态数据，测得当前位置的实际松铺厚度，并和设计松铺厚度进行对比，实时显示对比结果，并根据对比结果的不同，用不同颜色对其进行可视化区分。

2、推土设备信息监控

实现对推土设备的设备型号、松铺厚度等数据信息实施动态监测，并可根据需要进行位置选择并提供相应的坐标信息。

3、操作手三维引导和自动控制

通过实际松铺厚度和设计松铺厚度，对操作手进行三维引导，且可通过液压控制模块进行对铲刀的自动控制。

4、施工单元成果分析报告







1.4 Application Performace

3.1 Digital Construction of Pile Foundation – Intelligent Management System for Static Pressure Machine and Drilling Machine













Hardware

Software

WEB Cloud Platform

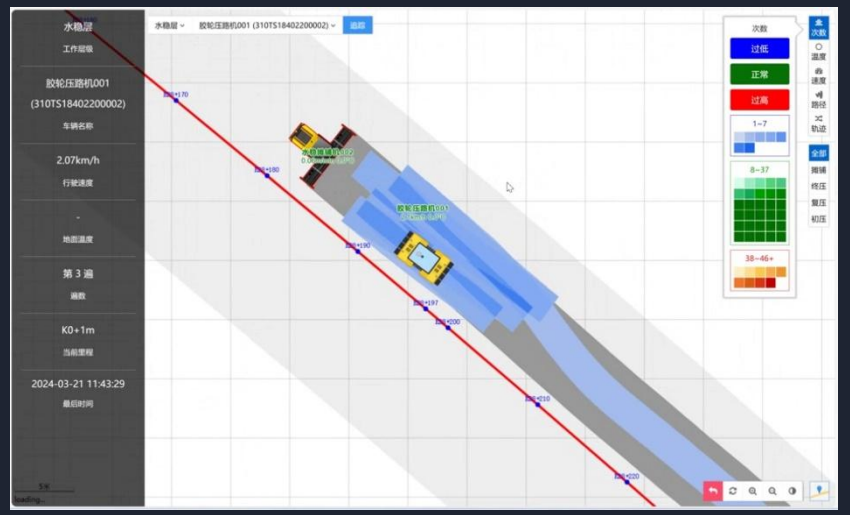
3.2 Informationization Plan for Road Construction





Paving Mangement System





Road paving & Compaction System

3.3 Digital Construction Plan for Earthwork and Stonework





Intelligent compaction system
– Nanning Airport expansion project





Intelligent Bulldozer Guidance System –
Shenzhen Airport Expansion

应用价值



Management Standardization

Improve the previous situation of relying on experience and human management, and promote the standardization and normalization of management processes.
Reduce management costs.
Visualization of construction data to assist decision-making



Improve Construction Efficiency

Based on Beidou high-precision positioning, intelligent guidance for construction
Based on the guidance display device command, there is no need for manual layout, saving manpower
Unrestricted by venue constraints and weather conditions, working 24/7



Ensure Construction Quality

Reduce human error
Real time monitoring and intelligent warning of construction indicators to ensure construction quality



Cost visualization

Reduce management costs
Accurate control of construction material usage
Effectively avoid the situation of using less and reporting more
Dual control of quality and progress to avoid rework and waste


THANKS