

SOIL STABILIZATION SYSTEM

YICHEN



SOIL STABILIZATION SYSTEM

TECHNICAL SCHEME AND CASES

ALL ENVIRONMENTAL ENGINEERING
EQUIPMENT SOLUTION SERVICE PROVIDER

COMPANY PROFILE

Ningbo Yichen Environment Tech Co., Ltd. is a high-tech enterprise specializing in R&D and manufacturing of excavator attachments and environmental engineering equipment. Its main products are drum cutters, rock saws, crusher buckets, screening buckets, earth drills, and soil stabilization systems. The in-situ solidifying and repair technology of the soil stabilization system has the world leading level. It provides solutions for soft foundation solidification and contaminated soil remediation for civil engineering construction.



BUSINESS PHILOSOPHY

WIN-WIN COOPERATION
INNOVATION AND BREAKTHROUGH
PROFESSIONAL ENTHUSIASM



Our predecessor is Ningbo Ant Heavy Industry. The company has continued more than 20 years of experience, integrating scientific research, design and manufacturing. Our products are exported to dozens of countries such as the United States, Australia, Britain and Southeast Asia, and are widely used in the fields of new and reconstructed highways, airports, tunnels, bridges, heavy engineering infrastructure and so on. At present, it is a well-known cooperation unit of top 500 enterprises such as State Grid Corporation of China, China Communications Construction, China Railway Construction Corporation, China Railway Group, XuGong Group and Sany group, and has provided products and technical services for a long time to provide strong support for urban construction, municipal administration, transportation and water conservancy.

Ningbo Yichen Environment Tech Co., Ltd. is a member of China engineering machinery, and a member of China Engineering Machinery Industry Association. While creating social and economic value, Yichen has reached a consensus with customers to reduce pollution and reduce public hazards and leave a beautiful environment to the next generation.

MOVE TOWARDS THE GOAL

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SYSTEM INTRODUCTION

Soil stabilization system we also call it as soft soil in situ solidification and remediation system is a new construction scheme that uses soil solidifying agent to directly act on soft soil (such as sludge, sludge, beach, swamp, etc.) to solidify soft soil in situ to form a composite stable base.



Solidification of Soft Soil

Natural environment sludge solidification, Soft clay hardening of building foundation

The system is composed of storage bins, an control center and one or two power mixers. Combined with large and medium-sized excavators, the soil solidifying agent is directly transported to the soft soil which need to be solidified, evenly mixed and stirred to form a semi-rigid stabilized soil material.

Soil solidifying agent usually takes cement, lime, fly ash, gypsum and steel slag as the main raw materials. After compounding with other components to produce superposition effect, it can bond with foundation soil particles through direct mixing at room temperature, so as to enhance soil strength and reduce soil permeability. It has the characteristics of low-carbon, environmental protection, high efficiency, economy and direct substitution.



Remediation of Contaminated Soil

Treatment and restoration of contaminated damaged soil

In addition to the solidification function, the system also has the remediation function. By changing the raw materials and ratio of solidifying agent and adding appropriate remediation materials according to the soil pollution, the soil pollution properties can be changed, and the remediated soil can be used to grow crops. Common remediation scenarios include: soil acid-base neutralization, soil heavy metal pollution remediation, etc.



APPLICATION FIELD

Soil stabilization system of soft soil has a wide range of application scenarios, and has excellent performance in the solidification of soft foundation of subgrade, swamp, landfill, beach coating, river, engineering mud, etc. The system is widely used in the base construction of new / reconstructed roads, airports, tunnels, bridges and heavy factory projects. It also has good application prospects in municipal, transportation, water conservancy and other projects.



ADVANTAGES INTRODUCTION



High performance.

The solidifying capacity of a single system can reach 1600 cubic meters per day. The depth of solidification operation can reach 10 meters.



Efficient accessories.

Different mixing blades can be selected to achieve efficient mixing of soft soil with different water contents.



Intelligent control.

The transportation of solidifying agent is controlled by a fully automatic computer.



Advanced solidifying agent technology.

Compared with the construction technology of dry powder solidifying agent, Yichen Soil Stabilization System adopts the slurry solidifying agent construction technology, which has advantages such as no flying dust, more uniform mixing, better permeability, and more accurate measurement of the effective amount of solidifying agent.



Environmental protection construction.

In situ solidification can solve problems such as soft soil excavation, transportation, and stacking, avoid secondary pollution, and is beneficial for environmental protection.



Cost savings.

In situ solidification of soft soil can reduce the amount of commonly used inorganic bonding materials such as sand and gravel, thereby reducing project costs and saving resources and energy.



Short solidifying period.

After mixing the solidifying agent with soft soil for 3-5 hours, the soft soil can form a stable foundation, which is convenient for the rapid progress of the construction project.



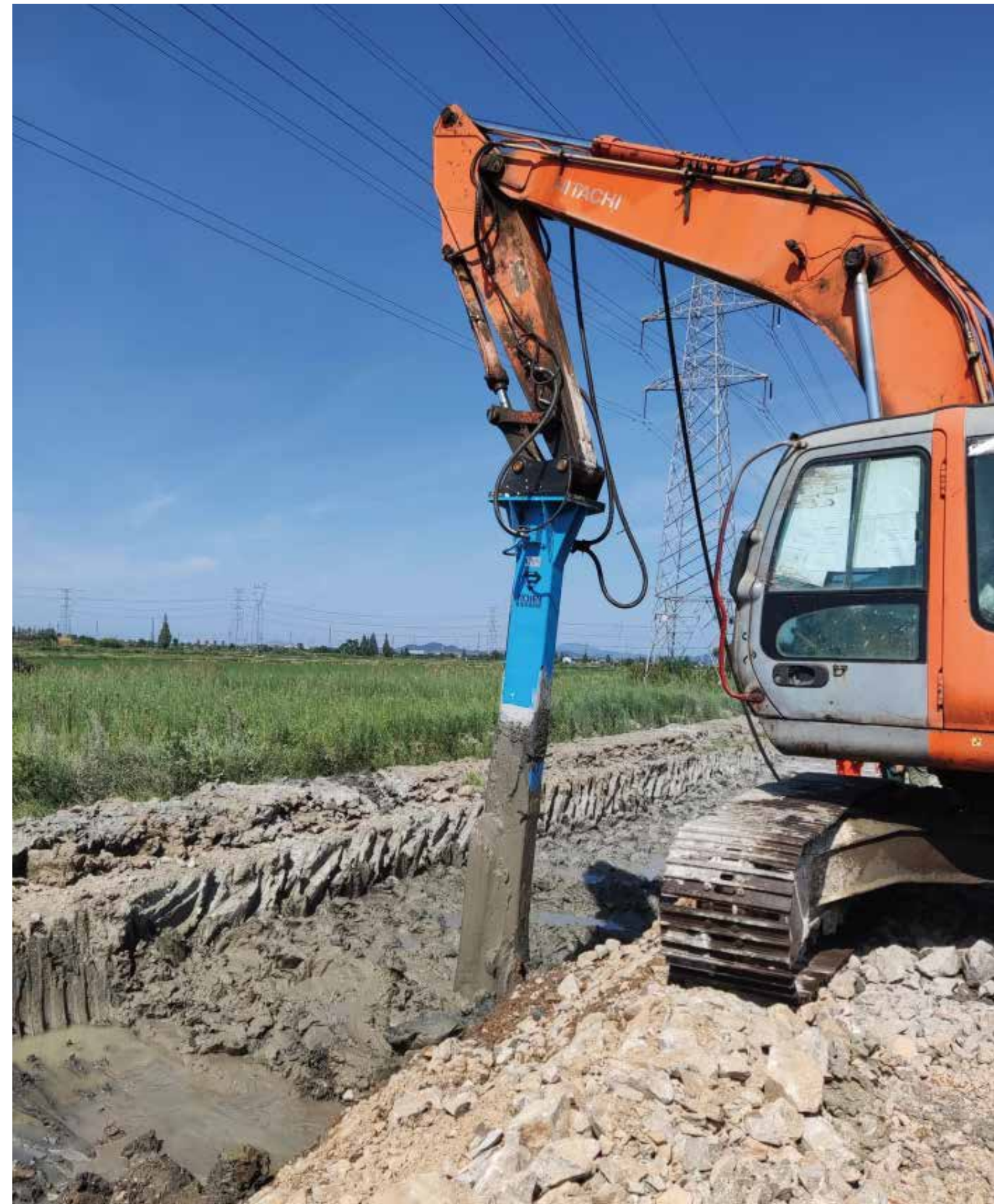
Excellent solidifying effect.

After mixing the solidifying agent with soft soil for 3-5 hours, the soft soil can form a stable foundation, which is convenient for the rapid progress of the construction project.



Remediation of contaminated soil.

By changing the composition, ratio, and dosage of the solidifying agent, soil solidification and remediation can be carried out simultaneously, reducing the processing steps. Using environmentally friendly remediation agents to solve soil pollution problems and improve the ecological environment.



The traditional soft soil treatment equipment usually adopts the way of dehydration and drying to separate the water from the soft soil, so as to reduce the water content. In this process, there are some problems, such as difficult excavation of soft soil, high transportation cost and secondary pollution caused by stacking. And because of the limitation of the volume of traditional equipment, it appears to be very weak and the processing efficiency is very low when dealing with large area soft soil.

The soil stabilization system developed by Yichen has created a new concept, overturned the requirements of traditional equipment for the jobsite, realized in-situ treatment, reduced the difficulty of engineering construction, and improved the treatment efficiency and effect. The composite stabilized soil formed after in-situ solidification of soft soil can obtain local materials and turn waste into treasure,

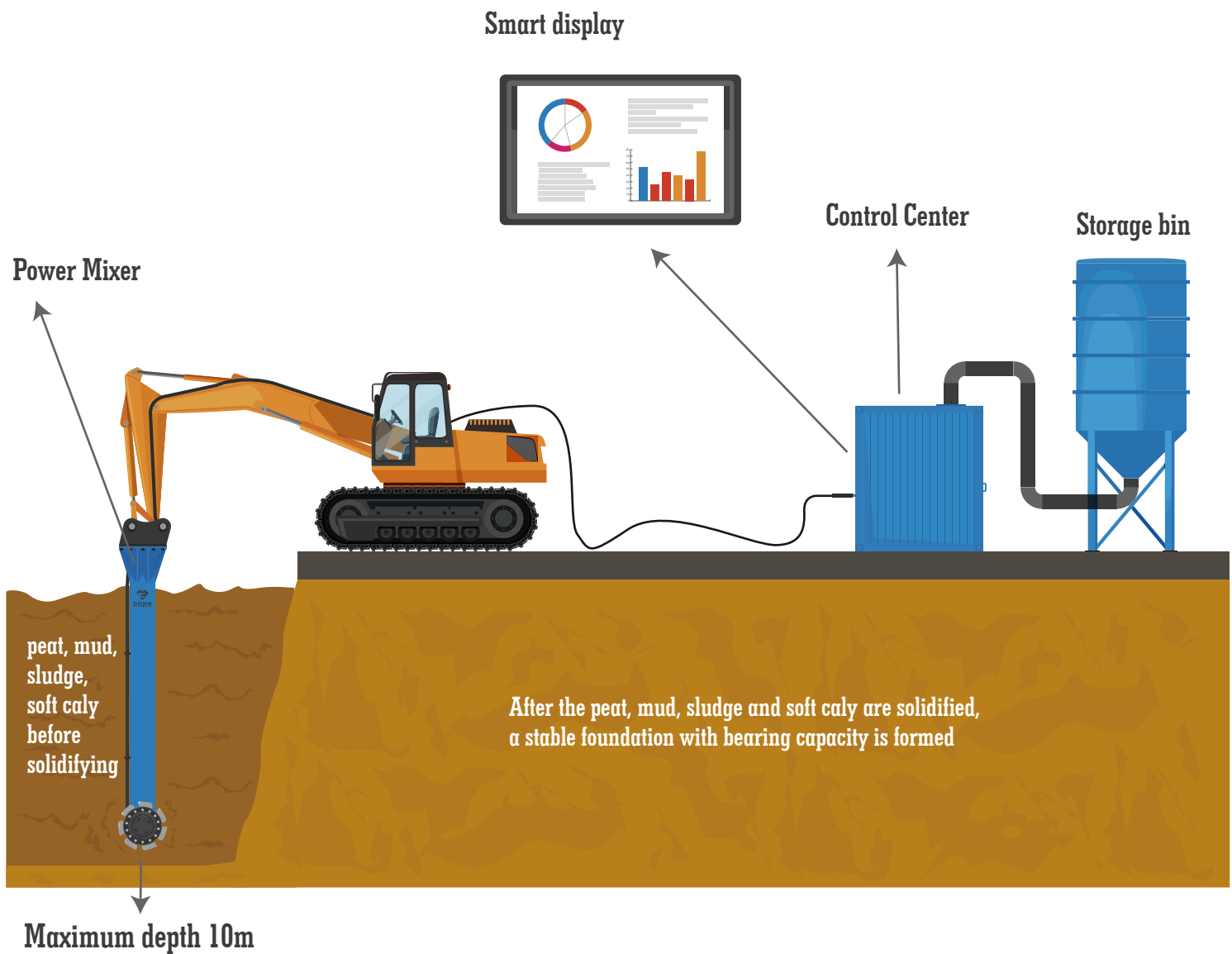


WORKING PRINCIPLE

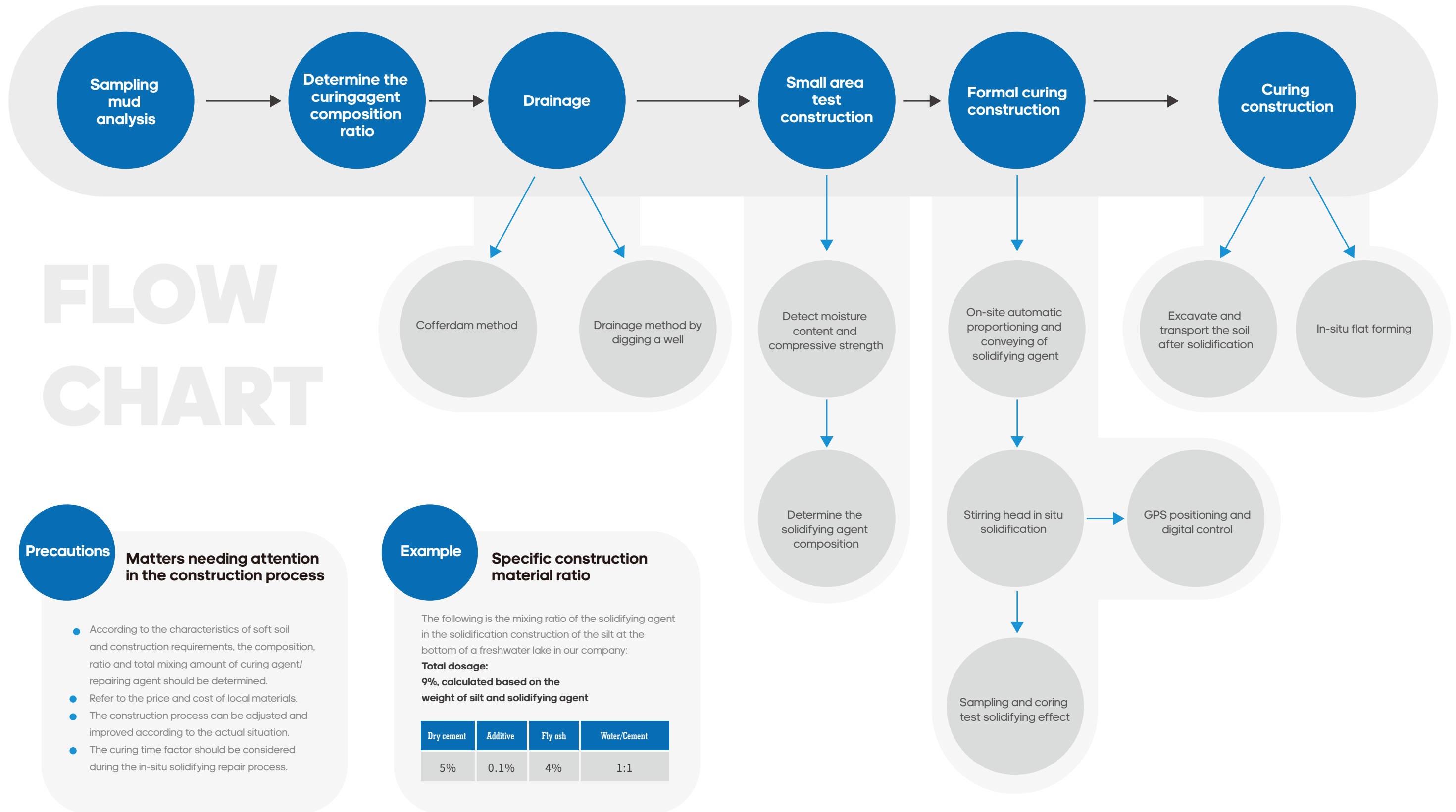


Soil Stabilization System achieves the effect of solidification and remediation through the physical and chemical reaction between solidifying agent and soft soil. The storage bin is stocked with solidifying agent raw materials, such as dry powder cement, ore powder, fly ash, slag, etc. The control center is responsible for mixing and stirring the solidifying agent according to the set proportion and delivering it to the power mixer at the front end of the excavator at a certain pressure and rate.

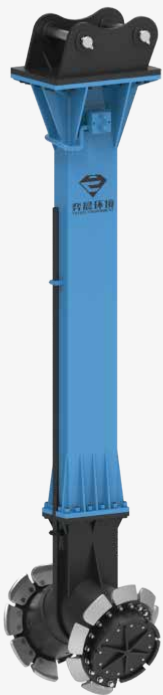
The power mixer causes the solidifying agent to mix and combine with the soft soil at a certain rotation speed and temperature to fix a large amount of free water in the soil in the form of crystalline water. After the soil solidifying agent is mixed with the soft soil, the engineering properties of the soil are changed through a series of physical and chemical reactions, the particles tend to agglomerate, the electrolyte concentration is enhanced, and the volume expands to further fill the soil pores. Under the action of compaction, the overall structure is formed, so that the solidified soil is easy to compact and stable, reaches the compactness that can not be achieved by conventional methods, improves its strength, shear strength and other properties, and meets the technical requirements of road construction.



GENERAL CONSTRUCTION PROCESS



EQUIPMENT INTRODUCTION AND OPERATION



POWER MIXER



STORAGE BIN



CONTROL CENTER



EXCAVATOR



POWER MIXER

According to different shapes, the power mixers have two models of YM-VF and YM-TF. In addition to the difference in shape, the mixing depth is also different. See the technical parameter table for details.

The power mixer is the executive device of the whole Soil stabilization system. It adopts streamlined frame design and quality steel. It has lighter self weight and higher strength. The power mixer is powered by the hydraulic system of the excavator. Using the flexible mobility of the excavator, it can enter various difficult or soft sites for operation. Yichen power mixer can mix anywhere the excavator can drive.

The two hydraulic motors in the power mixer are equipped with automatic torque regulating valves, which can be used to adjust the power output of the roller. The excavator driver can improve the mixing efficiency by controlling the rotation direction and speed of the power mixer. The body is equipped with sensors for detecting roller speed, main component temperature and oil leakage warning. These sensors will transmit the detected data to the display screen located in the cab of the excavator. We are also equipped with an extension rod with a general length of 2-6m for the power mixer, which can be customized according to the soft soil depth of the construction site.




Item	Power Mixer				Unit
	YM-TF200	YM-TF300	YM-VF200	YM-VF300	
Excavator	20-30	30-40	20-36	25-40	ton
Mixing Width	880	880	1280	1280	mm
Mixing Depth	0-7	0-10	0-10	0-11	m
Mixer Extensions	2-5	2-6	2-5	2-6	m
Total Power	125	210	160	210	kw
Rotation Feedback	yes	yes	yes	yes	/
Weight	2300	2500	2300	2600	kg
Oil Flow	200-300	250-400	200-350	250-400	lpm
Oil Pressure	180-300	180-350	180-350	180-350	bar

Technical parameters of power mixer

The blades installed on the power mixer are divided into type1 and type 2. The type1 blade is used for soft soil, the type 2 blade is used for watery mud.

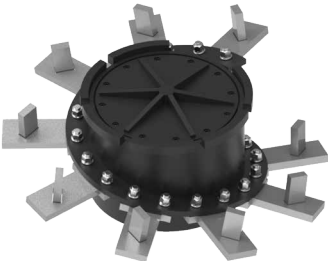
During the solidification process, the solidifying agent or remediation agent can be directly transported to the nozzle between the mixing drums through the material conveying hose. The power mixer shall keep moving vertically up and down, and stay for a certain time every time it rises or sinks. The temperature shall be determined according to the practical conditions.

The power mixer rotates clockwise when moving downward and counterclockwise when moving upward. When moving downward, ensure that the rotating blade at the mixing nozzle can empty the soft soil at the left and right ends of the nozzle to form a vacuum, so as to facilitate the smooth injection of solidifying agent. For details, refer to the operation and maintenance manual of the power mixer.



Type 1 Blade

Suitable For Soft Soil



Type 2 Blade

For Watery Mud

EXCAVATOR

The Soil stabilization system does not provide available excavators and needs to be equipped by customers. When selecting The Soil stabilization system equipment for construction, the customer need to consult Yichen for the selection of excavator.

Generally, when selecting an excavator, the weight of the power mixer and the excavator, the suction of soft soil shall be comprehensively considered. If the excavator is too light and the suction of soft soil is too large, the power mixer may be firmly absorbed by the soft soil and cannot be raised. If the excavator is too heavy, the construction site may not be able to bear its weight, resulting in safety accidents.

According to the historical project experience and professional theoretical data, when solidifying the shallow layer with a depth of more than 1m, an excavator of more than 20t shall be selected.



STORAGE BIN

Storage bin is the equipment for storing solidifying agent raw materials. A set of equipment usually includes one or two storage bins to load different solidifying agent raw materials respectively. The solidifying agent raw materials are automatically transported to the control center through the conveying pipeline from the lower funnel for configuration. The shape of the storage bin can be vertical or horizontal. The common specifications are 50t and 80t. If the customer has other size requirements, it can be customized. The bin body and support are made of high-quality steel, with stable structure, firm welding and long service life.

A material level alarm is set in the warehouse. When the internal solidified materials (cement, fly ash, lime, slag micro powder, etc.) are higher or lower than a certain value, it will automatically alarm and stop the system, so as to realize full-automatic control.

Capacity	Diameter	Height	Note
50T	2.8m	9m	Could be customized
80T	3.2m	12m	

Technical parameters of storage bin



CONTROL CENTER

The control center is a container type device controlled by computer full-automatic PLC (programmable logic controller) to configure and mix the solidifying agent according to a certain proportion, and at the same time, the solidifying agent is transmitted to the power mixer.

The device is made of quality steel, with a long square style and installed with a door. You can enter the control center to check the working status of the control panel and mixer. The shell helps to protect the internal device from the influence of the environment, improve the mixing efficiency and prolong the service life.

The control center is composed of controller, upper stirrer, lower stirrer and water tank. It has two operation modes, automatic and manual. In automatic mode, you can start and stop with one button by inputting various values in the control panel, such as solidifying agent ratio, pressure, conveying rate, etc. the operation is simple. In manual mode, various values still need to be input, but can be adjusted at any time according to the solidification situation, which has greater flexibility and is conducive to better solidification effect.

The controller is the core part of the control center, which is used to control the mixing and transportation of solidifying agent. The controller works according to the preset solidifying agent ratio, pressure and conveying rate. The material ratio is obtained according to the pre-test results, and the conveying rate is selected according to the size of the excavator and the rotating speed, temperature and volume of the power mixer. The pressure setting is selected according to the depth of the power mixer. Generally, the deeper the power mixer reaches, the greater the back pressure will be, the greater the transmission pressure setting. Refer to the instructions of user instruction and Yichen's specialist for details.

In the construction process, after the controller is started with one key, the control center starts to work. The solidifying agent raw material and water enter the upper stirrer through the transmission pipeline according to the preset ratio to mix and stir to form a mixture. The mixture enters the lower stirrer through the pipeline for further mixing, and finally forms a solidifying agent with good solidification effect, which is transmitted to the front power mixer through the hose pressure and acts on the sludge.



The control center is also equipped with a monitoring system to monitor the actual weight of solidifying agent raw materials and water, the weight of upper stirrer and lower stirrer, the switching state of each pump and the mixing countdown in real time. The engineer can know the working status and adjust it at any time to ensure the normal operation of the equipment.

Specification	WFMS- 01	WFMS- 02	DFMS- 01
Solidifying agent form	slurry	slurry	powder
Total power	75kw	90kw	100kw
Voltage	380V	380V	380V
pressure	0- 8mpa	0- 8mpa	10mpa
Maximum conveying distance	1000m	1000m	400m
8~10 hours capacity	800m³	1600m³	800m³

Technical parameters of control center



APPLICATION FIELDS

SOLIDIFICATION APPLICATION



Roadbed construction

When the roadbed appears settlement and deformation. Repair by excavating its surface and hardening the soft soil about 1m deep.



Jobsite hardening

Hardening treatment of parking lot, stockyard, drilling well site, production and processing plant, etc.



Anti-subsidence and solidification of pipe trench and ditch

When the pipeline passes through the sludge ground during construction, there is no need to excavate and transport the sludge outside. Solidified the sludge first and then excavation and backfill it.



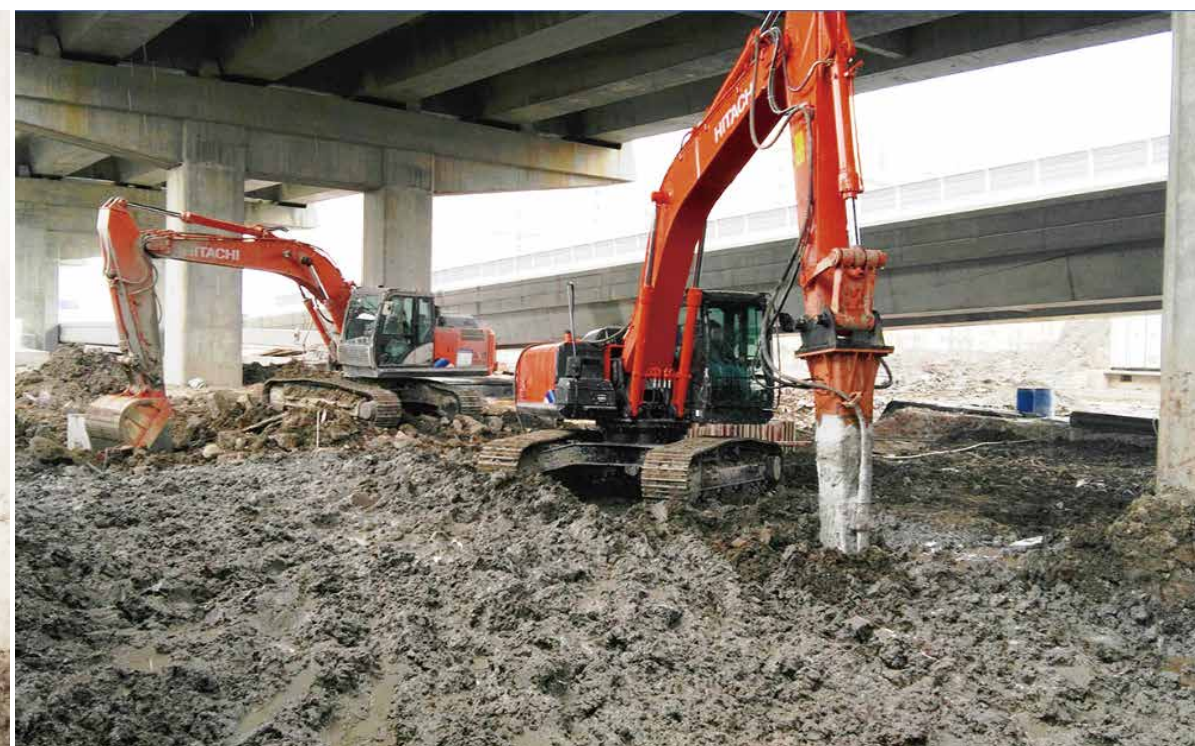
River bed solidification

Optimize river condition by solidifying and leveling the river bed.



Marshland solidification

The marshland is solidified for building large factories. There is no need to excavate, transport and stake the sludge elsewhere, then backfill with other materials. Just solidify and utilize the sludge on site by our soil stabilization system.



Solidification of Bridge and Tunnel

The foundation soil shall be solidified before the bridge is built. After the tunnel soft mud is solidified, it is excavated and then used as filling material.

REMEDIATION APPLICATION



Remediation and improvement of heavy metal contaminated soil

Stabilization and remediation of heavy metals in soil, engineering treatment of polluted soil and vegetation restoration, so as to reduce the potential danger of heavy metals in polluted soil to ecological environment and human health.





Contaminated soil remediation and acid-base neutralization

The content of heavy metals in the soil exceeds the standard and is alkaline. Acid and alkali neutralization is carried out through our soil stabilization system equipment.



INTRODUCTION TO TYPICAL CASES

Lianyungang Xuwei

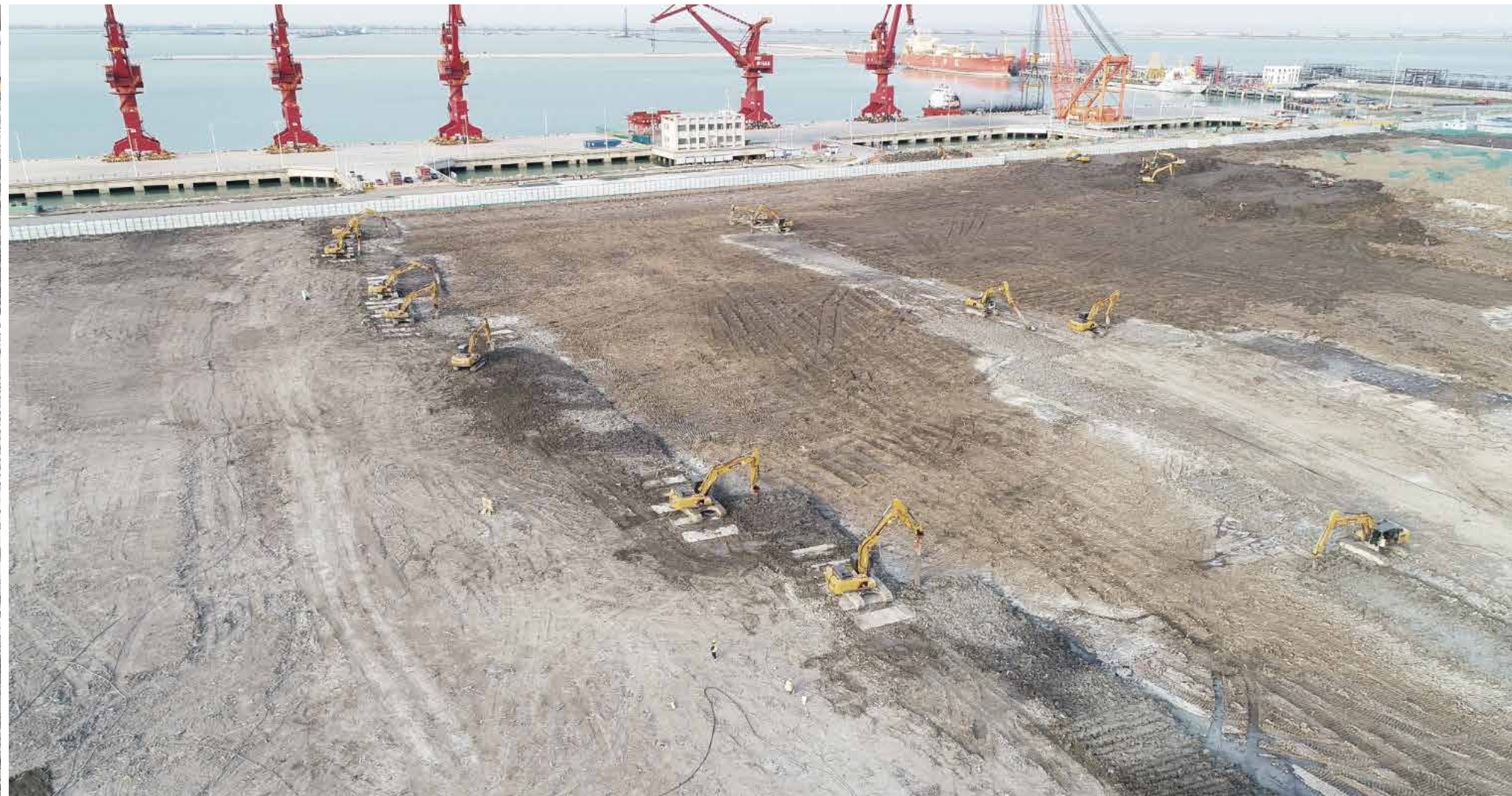
District dry bulk cargo transportation trestle beach solidification phase I project

Construction volume: 800,000 cubic meters

Construction equipment: 10 sets of soil stabilization
system equipment (20 power mixers)

Length of power mixer: 4m, 5m and 6m (3m extension rod is
customized, and the maximum solidifying depth reaches 9m)

Project Overview: the solidification project is a part of the
construction of Lianyungang port. The construction site is a
beach area with thick soil layer and soft soil. After completion,
it is used for the stacking and transportation of large containers.
Therefore, it has very high requirements for the stability of the
foundation.



Hangzhou Bay

Expressway beach soft
soil in-situ solidification
phase I project

Construction volume: 400,000 cubic meters

Construction equipment: 9 sets of soil stabilization system equipment
(18 power mixers)

Power mixer length: 4m

Project Overview: the construction area of Hangzhou Bay expressway is located in the beach. The soil is soft, which can not ensure the mobilization of heavy equipment such as excavators. It is necessary to solidify the surrounding beach to ensure the subsequent highway construction.

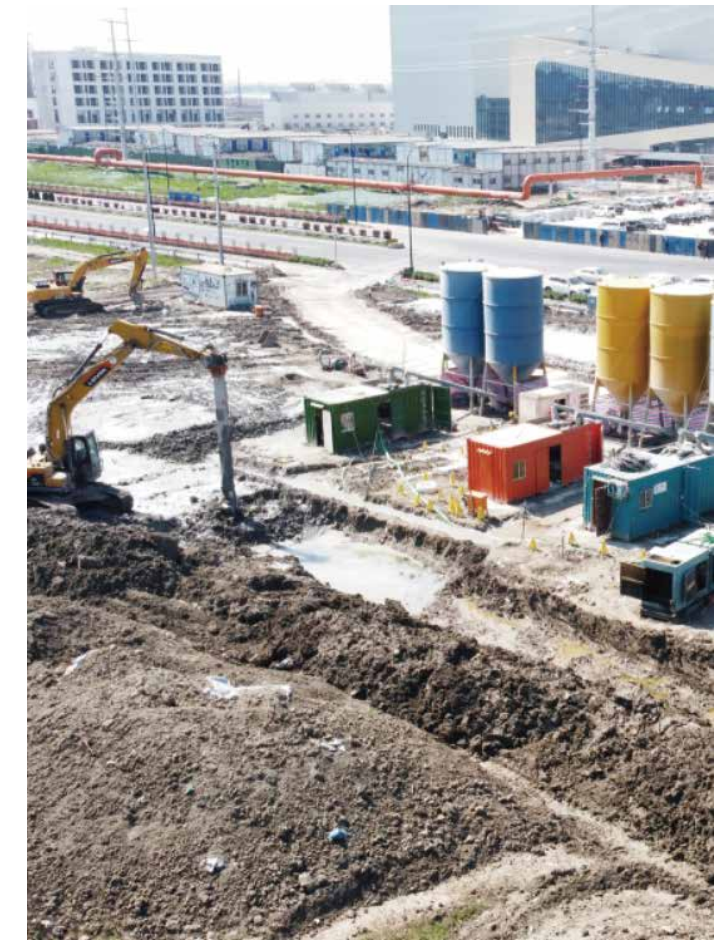
Hangzhou Bay before solidification



Hangzhou Bay after solidification



Shaoxing glass factory before solidification



Shaoxing glass factory after solidification

Shaoxing

Foundation solidification project of Shaoxing glass factory

Construction volume: 200,000 cubic meters

Construction equipment: 5 sets of soil stabilization system equipment (10 power mixers)

power mixer length: 6m (customized 2m extension rod, maximum solidifying depth up to 8m)

Project Overview: Shaoxing glass factory is located in the beach area beside the Qiantang River, which is very close to the river embankment and has high soil moisture content. It is impossible to build plants on this foundation. In order to ensure the construction safety, the foundation needs to be solidified first to make it a stable foundation with certain bearing capacity that meets the construction requirements.



Xinji Mazhuang
Village Sludge Soil Remediation Project

Construction volume: 300,000 cubic meters
Construction equipment: 1 set of one-to-two equipment and 2 mixing heads are used
Power mixer length: choose 5 meters and 4 meters mixing head (customized 2 meters, 3 meters extension rod, the maximum curing depth reaches 7 meters)
Project Overview: This sludge land in Mazhuang Village not only caused the land in the area to be idle, unable to produce economic benefits, but also seriously polluted the surrounding environment, resulting inThe stench endangers the health of the villagers, and it is urgent to treat the sludge. The future use of this piece of land is for agricultural planting, so the primary goal is to prevent pollution.The mud is repaired to restore soil activity to meet planting standards.

After contaminated soil treatment



Before contaminated soil treatment



Before the foundation of Zhongshan, Guangdong is solidified



Guangdong Zhongshan

Foundation Solidification Project

Construction volume: 100,000 cubic meters

Construction equipment: 1 equipment

Power mixer length: curing depth is 2 meters

Project Overview: Most of the areas passed by this highway in Zhongshan, Guangdong are fish ponds and beaches. The construction ground is densely covered with water and the soil is soft.



After the foundation of Zhongshan, Guangdong is solidified



Foundation solidification project of
bingang industrial city

Construction volume: 100,000 cubic meters
Construction equipment: 1 sets of soil stabilization system equipment
(2 power mixers)
Power mixer length: 4m

Project Overview: The area where the solidification project is located is close to the coast, and there are many fish ponds and depressions. The foundation here is mostly cohesive soil, and the bearing capacity is very weak. It can be used as subgrade only after solidifying.



Before solidification of Yuhuan Qianjiang silt foundation





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