

Construction Case



SUNWARD
Underground Engineering
Equipment Construction Case

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INNOVATION LEADS TO VALUE



Sunward Intelligent Equipment Group started with the revolutionary and innovative hydraulic static pile driver and later expanded its business scope from piling machinery to building foundation equipment. Then Professor He Qinghua of the Central South University put forward the concept of "underground construction equipment" for the first time in the industry. By adhering to the concept of "pilot innovation", Sunward defined that the "underground construction equipment" shall include two branches of "building foundation equipment" which focuses on building foundation construction and "underground space equipment" which focuses on underground space development and construction. After 17 years of accumulation and development, Sunward has established a featured supporting system meeting the requirements of "multi-varieties, small batch, focusing on construction method and plan" of underground construction equipment, and creatively researched and developed nearly 100 kinds of products by focusing on solving the technical coupling problems of "engineering, construction method and equipment". Now its overall level of technology is in the forefront of the world, and it has the widest product series scope and can provide package solutions for all types of underground construction projects.

Building Foundation Equipment

At present, building foundation equipment and technologies of Sunward Intelligent Equipment Group fully covers the foundation piles, foundation pit support and foundation treatment, and includes more than 70 construction technologies such as hole drilling method, wall method, static pressure method, pile planting method, mixing method, percussion and grabbing method, screw expansion method, inject method, vibroflotation method, etc., meeting the requirements of mountain (rock), underground (soil) and undersea (water) construction, of which:
Hydraulic static pile driver owns 15 patents, has won the second prize of National Scientific and Technological Progress Award, covers the full range of 60-1200t, and owns highest share in the domestic and international market. Products like tube-sinking cast-in-situ pile driver, hole leading pile driver and sheet pile driver are quite popular in the market.

Rotary drilling rig owns more than 20 patents in hole-machine structure, parts and other aspects, covers the full range of 40-680kN·m series, has largest drilling diameter of 3.5m and maximum drilling depth of 130m, is listed as national major equipment and belongs to premium brands of China. It has more than 20 varieties of varied products and is multi-functional.

Double Rotary Head Strength Multifunctional Drilling Rig owns 15 patents and can systematically solve a variety of underground construction problems under complex geological conditions. Sunward is the only manufacturer for such equipment in China.

High-performance hydraulic crawler pile frame contains a full range of products with height of 24-60m, and can be equipped with dozens of machines such as hydraulic hammer and multi-axis drill. Sunward is the only manufacturer for the full range of products in China.

Sunward products are exported to dozens of countries and regions around the world. Especially they are leading in the high-end markets in Singapore, Macao, South Korea, Malaysia, etc. after harsh and intense competition!

Underground Space Equipment

Sunward Intelligent Equipment Group has accumulated many years of product and technology experience in hydraulic rock drilling equipment and cantilever boring machine used in underground tunnel and mine roadway construction. In particular, it owns the most complete series of product lines and technologies used in underground space construction under various geological conditions such as shield method, TBM method, drilling and blasting method, support, pipe jacking, etc. after the joint venture China Railway Sunward Group is established through win-win cooperation with China Railway Engineering Equipment Group and China Railway No. 5 Engineering Group. Large high-end products such as the shield series, TBM, multi-boom rock drilling jumbo, wet spray machine, etc. are widely used in fast-developing construction areas such as subway, tunnel, utility pipe rack, national defence projects, air-raid shelters, underground expressway, underground garage, etc.

SWDM Series Multi-functional Rotary Drilling Rig



New record of hole forming depth of Sunward rotary drilling rig

118_m

Project Site: Yellow River Crossing Bridge of Mongolia-China Railway in Sanmenxia City in 2016

Involved Machine Model: SWDM45

Project Overview: The construction site is located in the river bank, and geological conditions refer to: silt, silty sand, sand layer and mudstone, with maximum hole diameter of 2m and maximum hole depth of 118m. The drum height will be customized and increased to 2m and the bucket drill bit will be adopted for drilling construction; the advancing depth each time exceeds 1.2m, and the soil taking and hole forming duration for 110m hole is about 20h, which owns obvious advantages compared with numerous domestic large-sized rotary drilling rig of domestic famous brand on the site.





Project Name: Dongting Lake Bridge in Yueyang in 2014

Involved Machine Model: SWDM42

Project Overview: The maximum construction pile diameter is 2m, and the maximum drilling depth is about 90m. Main geological conditions refer to sludge and mucky clay overburden layer, and the bedrock refers to argillaceous slate and sandy slate, and the drilling and hole forming duration for each hole is about 9h.



Project Name: Vanke Financial Center Plaza in Guangdong Province in 2016

Involved Machine Model: SWDM36

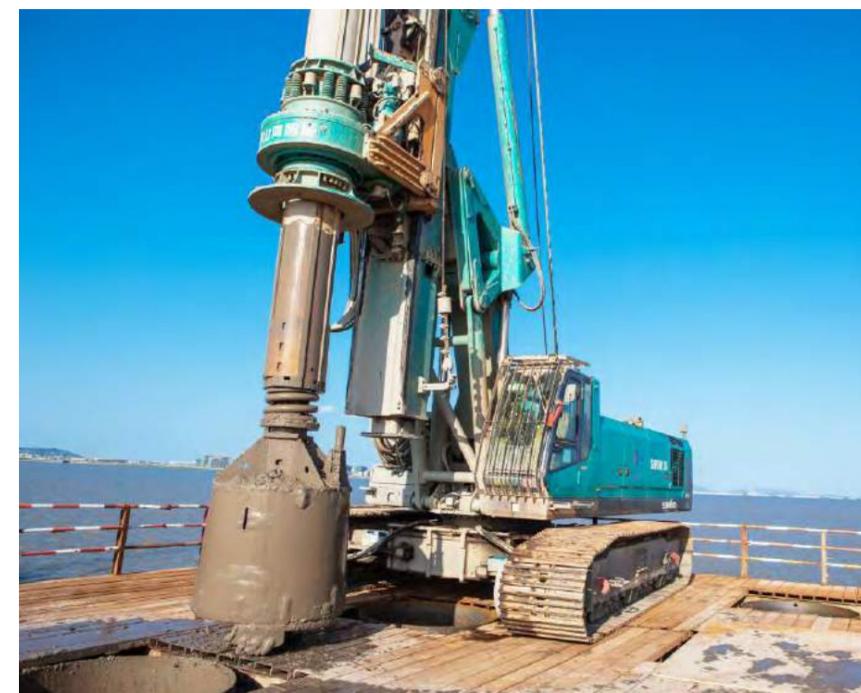
Project Overview: Pile diameters include 2.5m and 3m, and hole depths are within 27-35m; this place is characterized by complicated geological conditions, with 0-8m back filling and sand layer, 8-26m moderately weathered, and 26m below weakly weathered.



Setting A New Record Again

Depth into sea

90_m

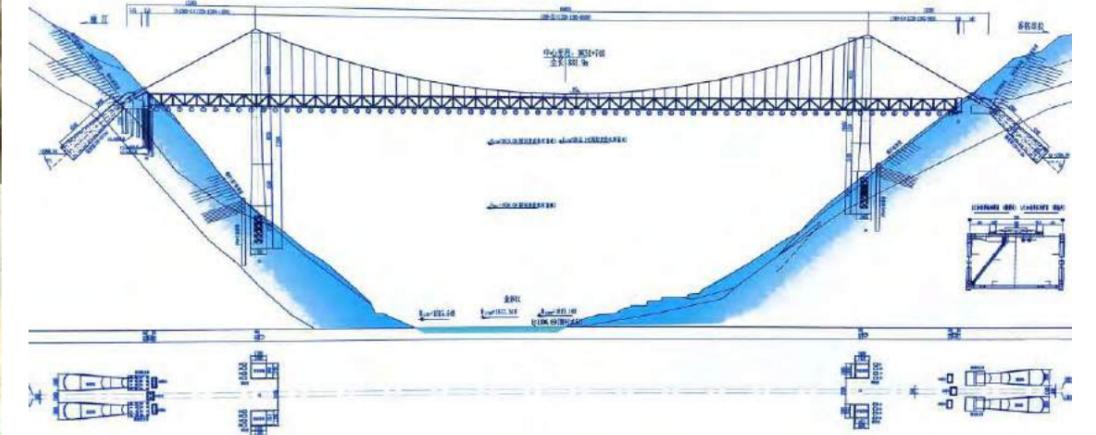


Project Site: Feiyun River Sea-crossing Bridge in Wenzhou City in 2016

Involved Machine Model: SWDM36\SWDM42

Project Overview: In this Project, totaling 4 sets of Sunward large-sized rotary drilling rigs are adopted in the construction; 3 sets of them refer to SWDM36, and 1 set refers to SWDM42; the construction hole diameter is 2.2m, the hole depth is about 98m, and the depth below water level is about 90m; the scope of 0~60m below the sea bottom refers to sludge layer and mucky clay layer; the scope of 60m below refers to gravel layer; the drilling and hole forming duration of single hole is about 7h;

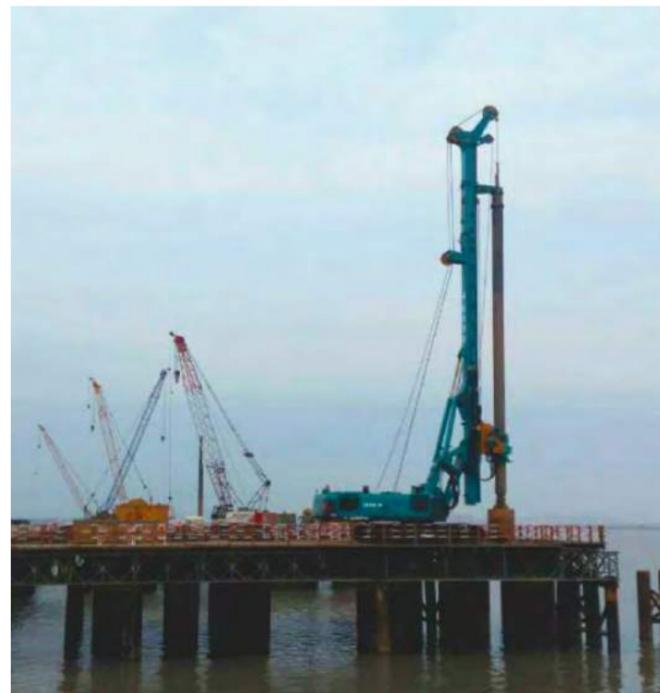




Project Site: Lijiang-Shangrila Railway Suspension Bridge in 2016

Involved Machine Model: SWDM45

Project Overview: The Project is characterized by high construction difficulty and high safety risk; the anchor pile refers to a square cross section of 4.1m \times 5.1m, and the pile depth is 65-73m, with 60MPa whole rock construction and square hole; through a series of complicated construction processes, SWDM45 rotary drilling rig has been accepted by customers by virtue of outstanding performance.



Drilling hole
under water
80 m

Project Site: Huaihua-Shaoyang-Hengyang High-speed Rail Super Large Bridge in Shaoyang City in 2016

Involved Machine Model: SWDM36

Project Overview: The super large bridge has totaling 31 cushion caps, and 3 of them refer to cushion caps on water, with single cushion cap provided with 10 pieces of piles; the maximum hole diameter is 2.2m, the maximum hole depth is about 80m, and the drilling depth into water bottom is about 62m; main special geology refers to karst stratum, the rock stratum refers to high hardness and the depth into rock is large; in addition, it is necessary to complete drilling rig construction prior to flood season, the construction period is short, with extremely high requirements for efficient and stable construction of equipment; by virtue of strong rock drilling capability and construction stability of SWDM36, the Project has been completed efficiently with top quality.



Stable chassis
Barge lateral
direction Drilling
construction

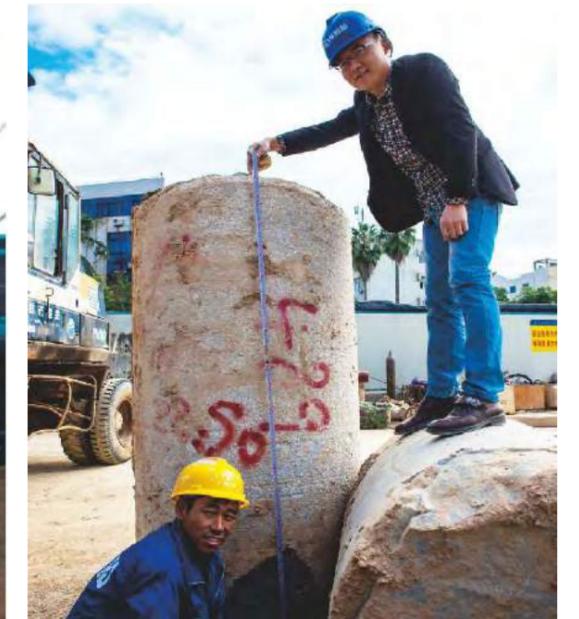
Project Site: Pufeisideng Lake in Canada

Involved Machine Model: SWDM22

Project Overview: The equipment is placed on barge for lateral drilling construction, and this is benefited by extremely good stability provided by the chassis which is developed independently, so the project construction has been completed in a safe and efficient way.

For the first one,
take out the
whole-core rock of

1.95_m



Project Site: Xiamen Metro in 2014

Involved Machine Model: SWDM36\SWDM42

Project Overview: The Project refers to support pile of Metro foundation pit, and main geological situation refers to coastal granite geology. The rotary drilling equipment is working for 24h continuously, and the rotary drill coring process is adopted; the rock core which is taken out has the maximum length of 1.95m and diameter of 1.2m. Compared with construction efficiencies of various brands of rotary drills constructing on the site, the construction efficiency of tapping into rock of Sunward drilling rig is the highest.



Project Site: Xiamen, 2017
Involved Machine Model: SWDM42 SWDM520
Project Overview: Sunward rotary drilling rig can overcome over 180MPa rock hardness, which has successfully complete the challenge that takes out 2m rock core from a 82m to 84m hole bottom, which refreshed the domestic rock drilling record of rotary drilling rigs.



Project Site: Yulong Haiwan of Dongshan Island in Fujian in 2011
Involved Machine Model: SWDM25A
Project Overview: The project site is on the seaside, and the geological exploration shows that there is a great amount of slightly weathered to non-weathered compact granite of quartz, mica and calcite, and there is almost no fissure; the saturated uniaxial compressive strength is about 120MPa, with design hole diameter of 1m, tapping into rock for 7m, and the rock cores which are taken out are all about 1.4m in length, with the maximum length of 1.6m, and the core diameter is 760mm.



Project Site: Playground Reconstruction of Xiamen University in 2015

Involved Machine Model: SWDM22/28/32

Project Overview: The Project mainly refers to support pile construction, with pile diameters including 1m and 1.2m, and with construction period of 3 months. The construction site is close to mountain and sea, with complicated geological conditions; the geological situation refers to back filling, sludge, sand layer, soil layer and rock layer. The rock stratum is buried shallowly, and the support pile is required to be tapped into rock with large depth; the construction period of this Project is short, and the Construction Party adopts about 10 sets of Sunward rotary drilling rigs once for all, and the local branch office of Sunward is required to arrange operators with relatively rich operation experience, thus making sure that the Project is completed as scheduled smoothly.



Project Site: Machine Group Construction for Rock Cutting Pile of T201 Project in Singapore in 2014

Involved Machine Model: SWDM25A/28A/36

Project Overview: Seven sets of rotary drilling rigs of Sunward constitute a machine group, and the Sunward technical team participates in management and construction, and the Project becomes the sole project which is completed as scheduled in the contract on this path. In this Project, the maximum rock compressive strength exceeds 200MPa. During construction, the ultra strong tapping into rock capability and operation stability of Sunward equipment are key reasons for that the Project is completed as scheduled, and Land Transport Authority (LTA) of Singapore has paid high attention to this Project; in addition, the Sunward technical team is organized for special technology promotion.





Project Site: Rural Application in Fujian Province
Involved Machine Model: SWDM04/06/10/12/15C

Project Overview: Since the reform and opening-up, the China rural construction also has been developed rapidly; more and more western buildings and villas appear in rural and suburb regions all over the country constantly, and small-sized pile construction equipment also emerge at the right moment. The foundation of civil construction in rural region is mainly characterized by the following points:

The quantity of work of single project is small, and the site transfer is frequent; the road transport conditions are poor; the construction site is limited; Sunward has developed multiple types of equipment constructing in various special narrow and confined space targeting above situations; the equipment is small-sized, flexible, with strong maneuverability, and the whole machine may drive the drilling pipe transport.





Project Site: Switzerland

Involved Machine Model: SWDM28B rotary drilling rig with CFA working conditions

Brief Introduction to Process: The CFA process of rotary drilling rig adopts long spiral drilling pipe for drilling and continuous soil displacement, and after drilling to design depth and during the drilling rig lifting, the CFA process will realize rapid pile forming through concrete grouting into drilling pipe center.



Project Site: Italy 2010

Involved Machine Model: SWDM22

Brief Introduction to Process: In case of adopting rotary drilling rig and being matched with pile casing drive to drive operation of casing pile, the hole-forming retaining wall of about 10m will be completed effectively, thus reducing slurry discharge; in regions of field construction and where slurry is controlled strictly, this function is especially practical.



Project Site: Ankara Metro Station Project in Turkey in 2015

Involved Machine Model: SWDM28A

ZYJ series static pile driver



Construction site of multiple static pile drivers on Daqing Oilfield



8 static pile drivers are constructing in Nanhai District, Guangdong Province



5 static pile drivers are constructing in Haifang



Project Site: Huixing Commercial Square Project in Guangzhou
Involved Machine Model: ZYJ960\ ZYJ1060



Samsung construction site in Bac Ninh Province, Vietnam

Involved Machine Model: ZYJ260, ZYJ360, ZYJ420, ZYJ460,

Project Overview: This Project is invested and constructed by South Korea, with total quantity of driven piles of about 300,000 pieces, and precast pile specifications include 300-500mm square piles and 300-600mm pipe piles; about 30 sets of pile machines constructing on the site include 26 Sunward static pile drivers.



Project Site: Driven Cast-in-place Pile Machine Group Case in Xiamen in 2010
Involved Machine Model: ZYJ1000F(D) Driven (Ram-compaction) cast-in-place pile driver
Brief Introduction to Process: The static pressure method is adopted for cast-in-place construction. In this case, there will be no hole collapse risk during the hole forming construction process, no slurry retaining wall is required, and there will be no sediment; the ram-compaction function which the equipment owns can not only form composite expansion head on the pile end, but help to penetrate thick sand layer and relatively hard rock stratum during the tube sinking, thus enhancing bearing force of pile end and making the pile more suitable for high-rise building foundation.



Project Site: Shanghai
Involved Machine Model: ZYW240 fender pile driver
Project Overview: The Project adopts SCPW construction method (implanting precast I-type pile enclosure wall) for construction of support structure of foundation pit, and after adopting multi-axial drilling rigs to mix cement soil in situ, the Project adopts customized fender pile driver to drive I-type precast pile and finally forms a pass of continuous wall with water stop and seepage prevention capability and relatively good structural strength.

SWSD series strong multi-functional drilling rigs with double power heads

1 drilling rig \geq 8 drilling rigs

SMW/CDM deep mixing drilling rig

Medium-deep drilling rig
Pile driver

Oscillator
All-casing drilling rig

Steel pipe composite
pile drilling rig

Long spiral drilling rig

SWSD series drilling rigs
with double power heads



SWSD series drilling rigs with double power heads



Long spiral drilling rig



Steel pipe composite pile drilling rig



Oscillator All-casing drilling rig



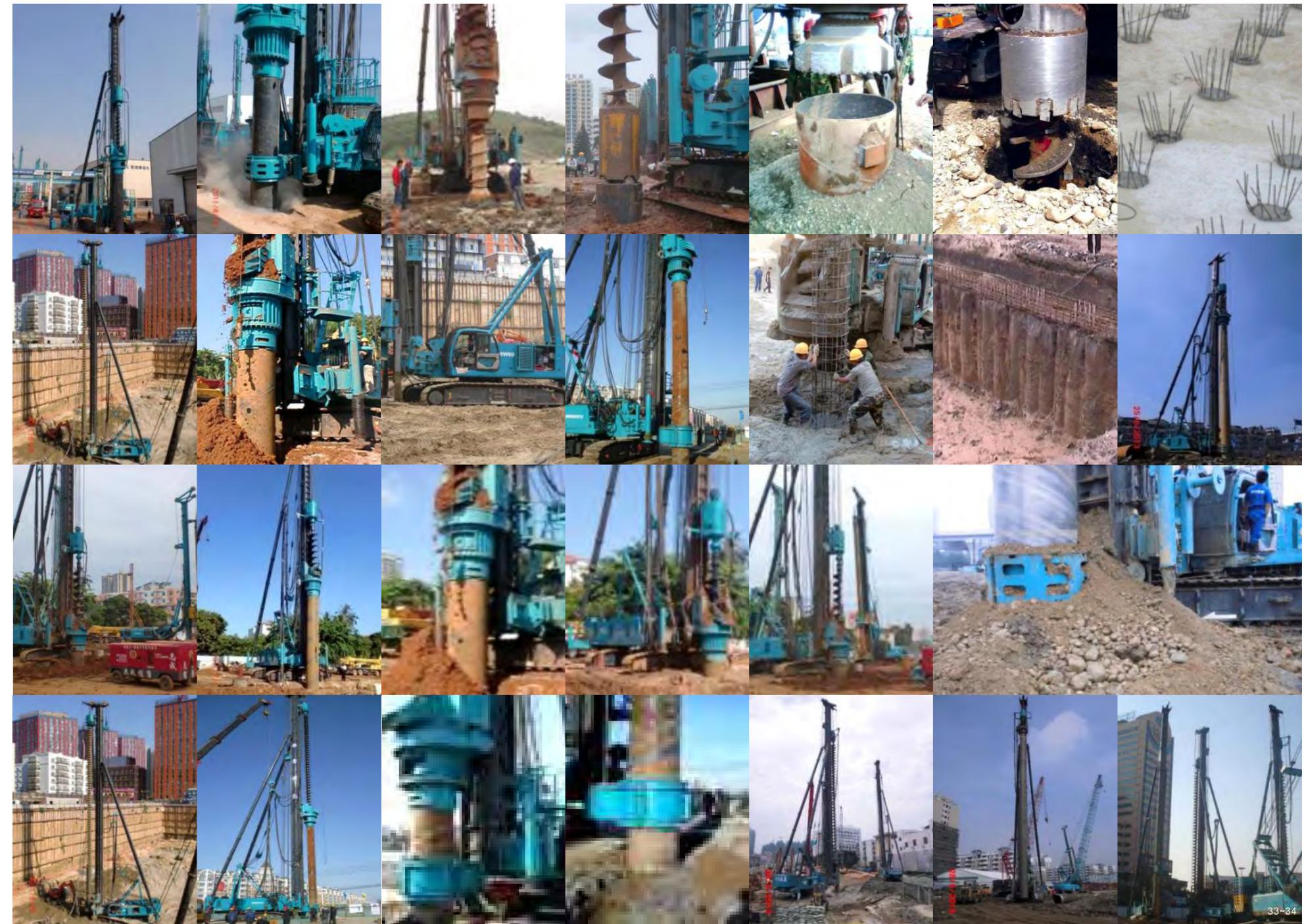
Medium-deep driving drilling rig

Scope of application:

1. Applicable pile type: Bored pile, secant pile, CFG, CFA pile, steel pipe pile, steel pipe + concrete composite pile, waste and old pile removal and treatment, underground residual waste and old foundation drilling, etc.
2. Applicable strata: Various kinds of soil, sand layers, gravel layers and boulders, and various kinds of rock strata (including inclined bedrock), underground residual foundation substances and other complicated strata
3. Applicable pile diameter and hole diameter: $\phi 500$ mm- $\phi 1,500$ mm (when constructing with casing)

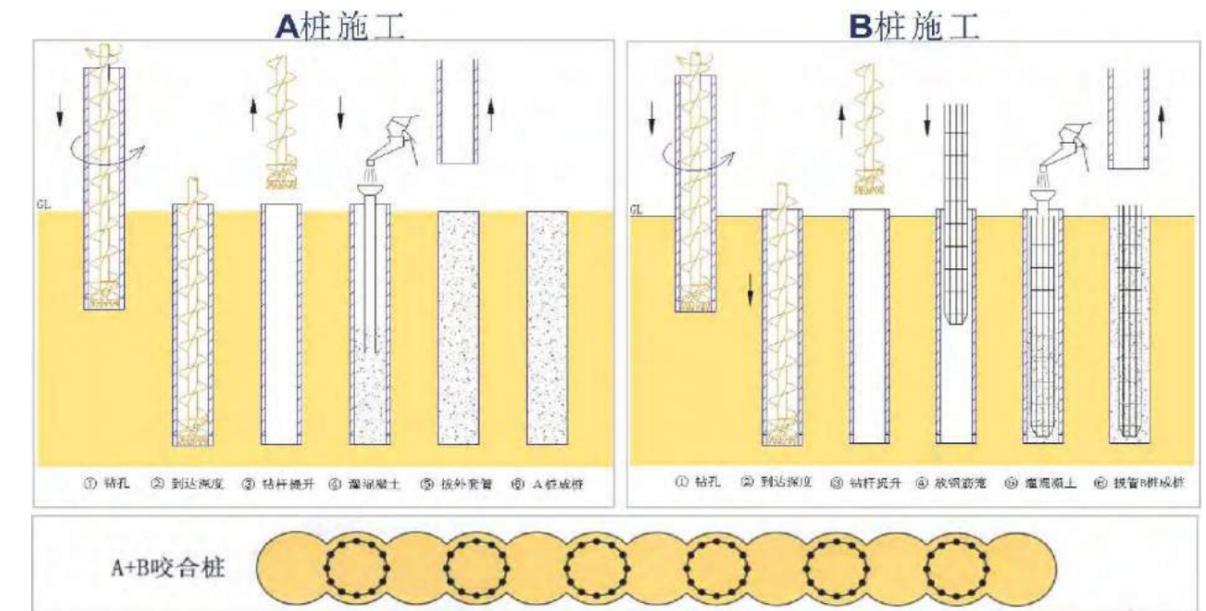
Effective solution:

1. Efficient "tapping into rock" of large-diameter pile;
2. The pollution of slurry on pile hole retaining wall to the environment;





Project Site: Harbin in 2012
Involved Machine Model: SWSD2512
Project Overview: This Project refers to secant pile construction, and the construction process of secant pile gives full play to the feature that the equipment with double power heads adopts long spiral continuous dumping and drilling for efficient construction and its capability of being able to conduct secant construction by cutting plain pile synchronously via outer casing. Compared with traditional oscillator and impact grab process for secant pile construction, the equipment with double power heads has obvious advantages in construction efficiency within the scope of 25m secant depth.

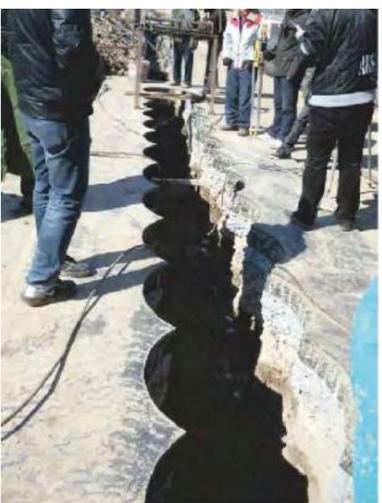




Project Site: Xuzhou Metro Station in 2015

Involved Machine Model: SWSD2512

Project Overview: This Project refers to secant pile construction of Metro station, and the geological situation is complicated, including mucky clay overburden layer and karst developing; the strong multi-functional drilling rig with double power heads may complete about 4-6 pieces of secant piles each day. Compared with structural continuous wall, the support type of secant pile is characterized by relatively simple construction process and lower total construction cost.



Project Site: Harbin

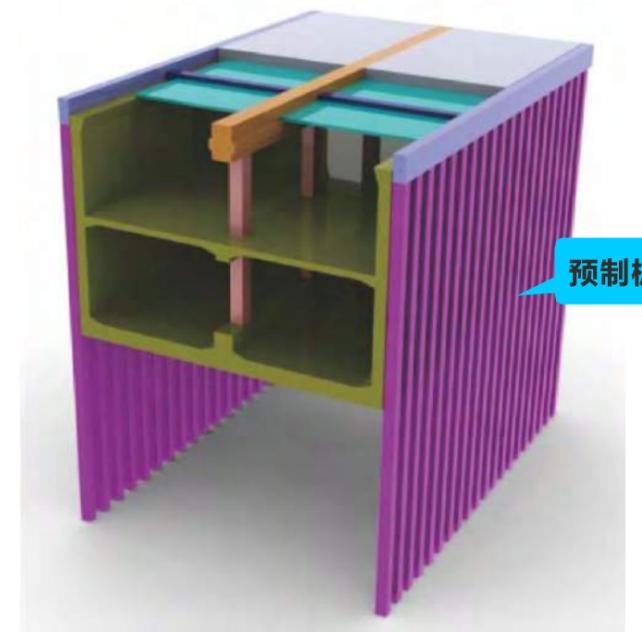
Involved Machine Model: SWSD2512

Project Overview: The installation height of equipment standing column is 36m, and in this Project, the design pile diameter is 1m, the hole depth is about 30m, with pure soil layer construction, and with single-pile hole forming and grouting duration of about 40 minutes. The Project adopts hydraulic drive power head and highly stable electro-hydraulic pile frame, which possesses obvious advantages in construction capability compared with common long spiral equipment on the market.



Project Site: Jinan Metro Project in 2016
Involved Machine Model: SWSD3618

Project Overview: This Project adopts strong multi-functional drilling rig with double power heads for large-dimension (700*700) precast square pile driving construction. The design hole depth is about 27m, all-casing retaining wall, without slurry pollution; during the lifting of drilling rig, grout the cement-soil mixed slurry, and after lifting the drilling pipe out of the hole, place the precast square pile into the hole through pile follower platform. This equipment is suitable for construction of this process under special geological conditions such as stratum with easy hole collapse, boulder stratum and weathered rock stratum, with obvious advantages.



预制桩

Project Site: Large-diameter precipitation well construction in Tongshan Road Station, Xuzhou Metro in 2015

Involved Machine Model: SWSD2512

Project Overview: The construction hole diameter is 1,000mm, moderately weathered to slightly weathered limestone, with rock hardness reaching 80-120MPa, with many karst caves, design hole depth of 28.5m and 4 daily formed holes.



Project Site: Samsung Laemian Apartment complex in Gangnam-gu, Seoul, South Korea in 2016

Involved Machine Model: SWCH588-100M fully hydraulic crawler-type pile driver

Project Overview: The installation height of standing column is 30m; drive H-type steel and insert breast board for foundation pit support and soil retaining; the hole depth is 20m, and the hole diameter is 400mm; 25 pieces of piles are driven each day.





Project Site: E-land Construction Site in Cheonan-si, Chungcheongnam-do, South Korea in 2015
Involved Machine Model: SWCH598-115M fully hydraulic crawler-type pile driver
Project Overview: D.R.A construction method (long spiral, casing, grouting, tamping)
The installation height of equipment standing column is 36m;
The hole diameter is 600mm, and the hole depth is 15m; 45 pieces of piles are driven each day;

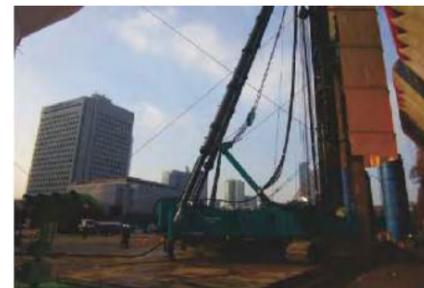


Project Site: Repair Plant Construction Site of Asiana Airlines, Yeongjongdo Island beside Incheon International Airport in 2015
Involved Machine Model: SWCH880-180M fully hydraulic crawler-type pile driver
Project Overview: D.R.A construction method (long spiral, casing, grouting, tamping)
The installation height of equipment standing column is 48m;
The hole diameter is 500mm, and the hole depth is 41m; the hole will be formed in 19 minutes and 15 pieces of piles are driven each day;





Project Site: Hyundai Construction Site in Seoul, South Korea
Involved Machine Model: SWCH880-181M fully hydraulic crawler-type pile driver
Project Overview: P.R.D construction method (long spiral, casing, DTH hammer, grouting, tamping)
 The installation height of equipment standing column is 36m;
 The hole diameter is 1m, and the hole depth is 26m; the Project refers to DTH hammer drilling during the whole course, tapping into rock for 8m.



Project Site: Hillstate Construction Site beside KINTEX Exhibition Center in Goyang-si, Gyeonggi, South Korea in 2015
Involved Machine Model: SWCH880-180M fully hydraulic crawler-type pile driver
Project Overview: P.R.D construction method (long spiral, casing, DTH hammer, grouting, tamping)
 The installation height of equipment standing column is 48m;
 The hole diameter is 1.2m, and the hole depth is 40m;
 The whole course refers to DTH hammer drilling, tapping into rock for 10m (with strength of 70-100Mpa), and the hole will be formed in about 4h.



SWDP large-diameter drilling rig of drilling with PHC pipe cased



Project Site: Guangzhou
Involved Machine Model: SWDP100
Brief Introduction to Process: The pipe pile is precast in factory, so there are outstanding advantages in pile body quality and material utilization efficiency. However, domestic routine pile driving process (hammering and static driving) will generate obvious soil squeezing effect, and is limited in regions with high density of buildings; the construction capability is limited in construction pile diameter and stratum suitability. In order to give better play to advantages of precast pipe pile, adopting drilling rig of drilling with PHC pipe cased may drive large-dimension (above 800mm) precast pipe pile into strong weathered to moderately weathered rock stratum. The single pile is of large bearing force, the pile body is of reliable quality, and the construction process is of environmental protection, which will effectively promote the scope of application of precast pipe pile.

SWDSM Series Deep Mixing Outfits



Project Site: T27 Project Foundation Treatment in Singapore in 2015

Involved Machine Model: SWDSM1202

Project Overview: 2 sets of Sunward dual-axial deep-hole mixing drilling rigs and multiple sets of rotary drilling rigs are conducting foundation reinforcement construction at a dock in Singapore.

This section mainly refers to marine reclamation land, and in case of building Metro on it, it is necessary to solidify the foundation firstly. Sunward dual-axial deep mixing equipment competes with brands from Japan and South Korea, and the result is that SWDSM1202 completes depth of 30m, the uniaxial diameter is 1.2m, and completes deep foundation reinforcement project with secant length of 0.2m, and constructs 10 pieces of piles each day; its efficient and high-quality construction has won high appraisal of the Construction Party.



SWWT series crawler-type tri-axial continuous wall drilling rig

Project Site: Metro Project (SMPW) in Nanchang in 2015

Involved Machine Model: SWWT85

Project Overview: The project geology mainly refers to back filling layer, sludge, muck clay layer and clay layer, with high underground water level and abundant stagnant water at the upper layer. During the drilling process, the two-spraying two-mixing mode is adopted, and the drilling and mixing duration of single drilling rig is about 30 minutes, and after the foundation pit excavation, the water stop effect of continuous wall is good.



SWMD series multi-functional jumbolter



High-pressure rotary jet grouting drilling rig

Project Site: Singapore Financial Street Metro T225 Project 2015
Involved Machine Model: High-pressure rotary jet grouting drilling rig (customized product)



Project Site: International Finance Square (IFS) in Changsha in 2012

Involved Machine Model: SWMD97

Project Overview: This Project refers to the highest building under construction in Changsha, with heavy load foundation pit project of 453m in height, and excavation depth of foundation pit of 42m. The anchor cable support construction of foundation adopts SWMD97 jumbolter; compared with common relatively simple jumbolters on the market, this kind of equipment is characterized by high construction automation degree, low labor strength during operation, and more reliable construction quality.

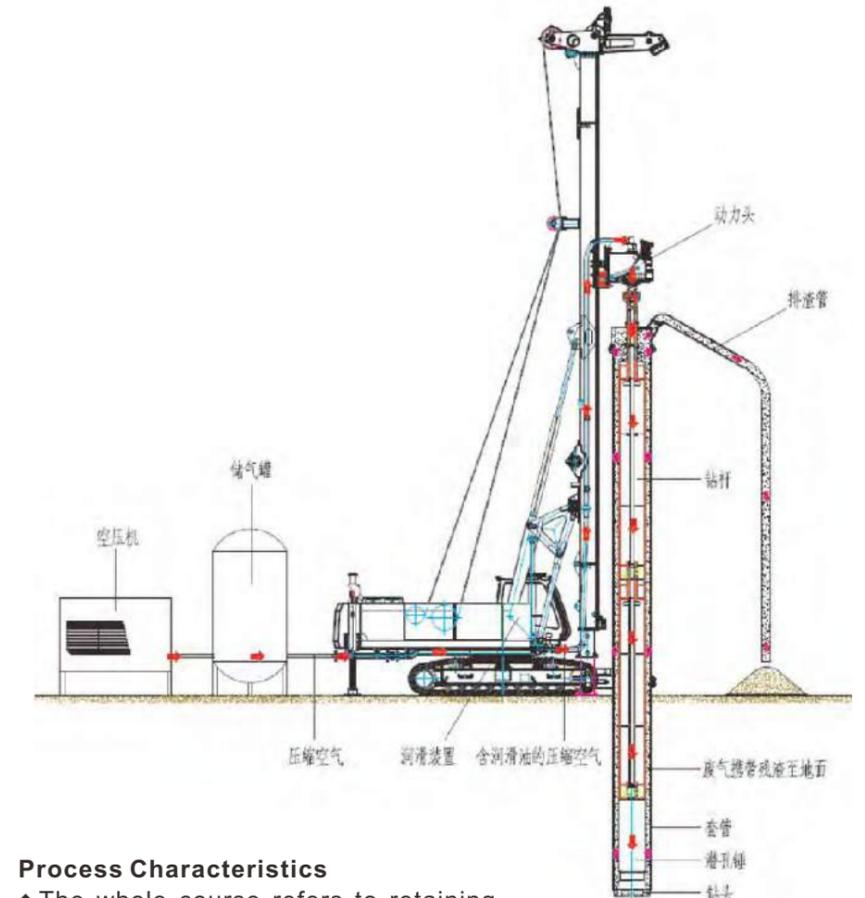


SWDTH Large-diameter Down-hole Hammer Drilling Rig

Project Site: City of Dreams in Macao in 2014

Involved Machine Model: SWDTH100H

Project Overview: The project geology refers to 0-30m soil layer, 30-70m conglomerate and granite, hole diameter of 600mm; and when the rock hardness is 150MPa, the rock will be tapped into for 1m every 6 minutes.

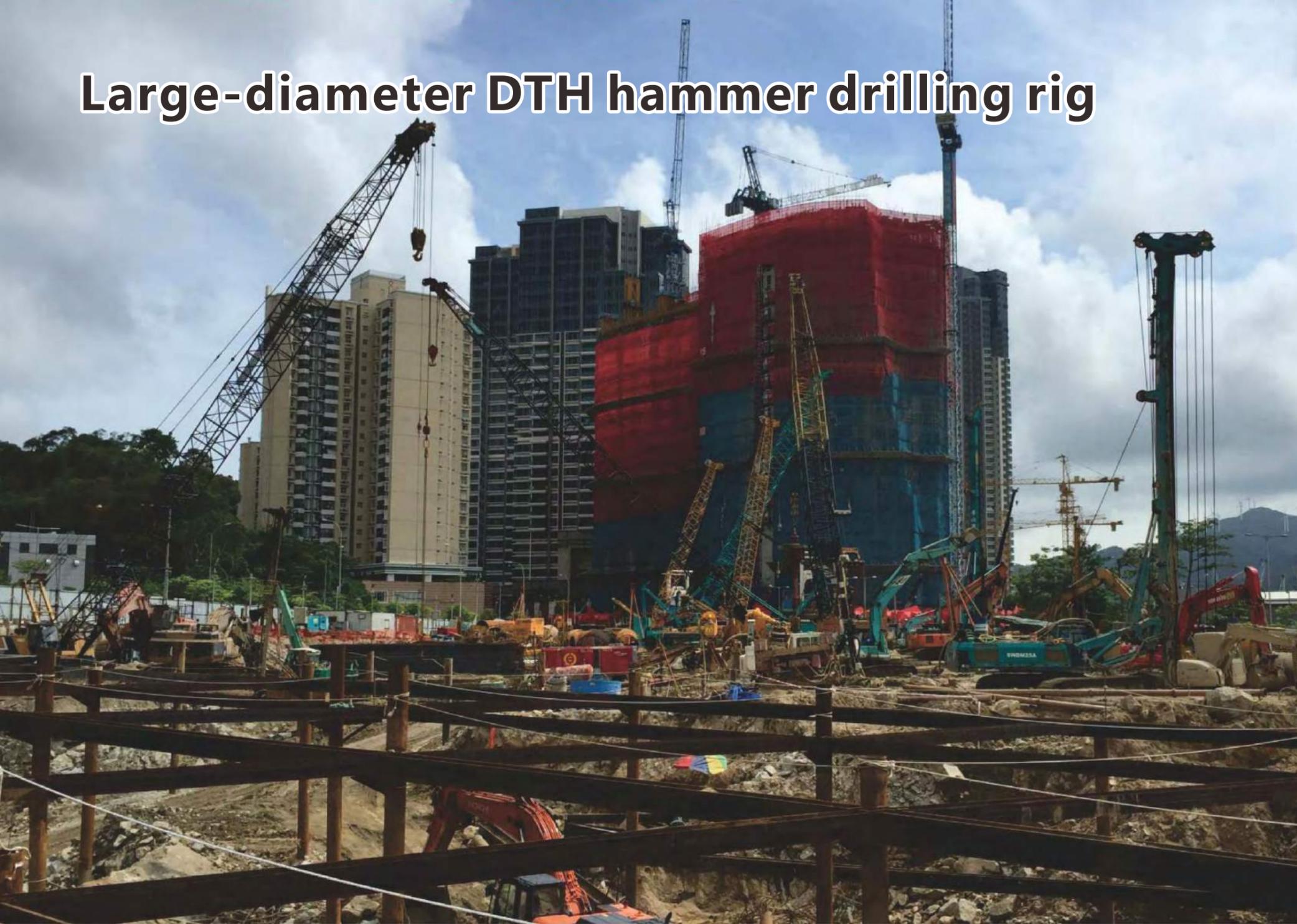


Process Characteristics

- ◆ The whole course refers to retaining wall of concentric simultaneous casing;
- ◆ The normal circulation slugging constrains slugging air flow inside casing, thus making sure construction safety;
- ◆ The process adopts large-diameter DTH hammer construction scheme, suitable for both soft and hard strata.
- ◆ The maximum hole diameter is 1m, the maximum hole depth is 100m, and the rock stratum driving efficient is as high as 10m/h;



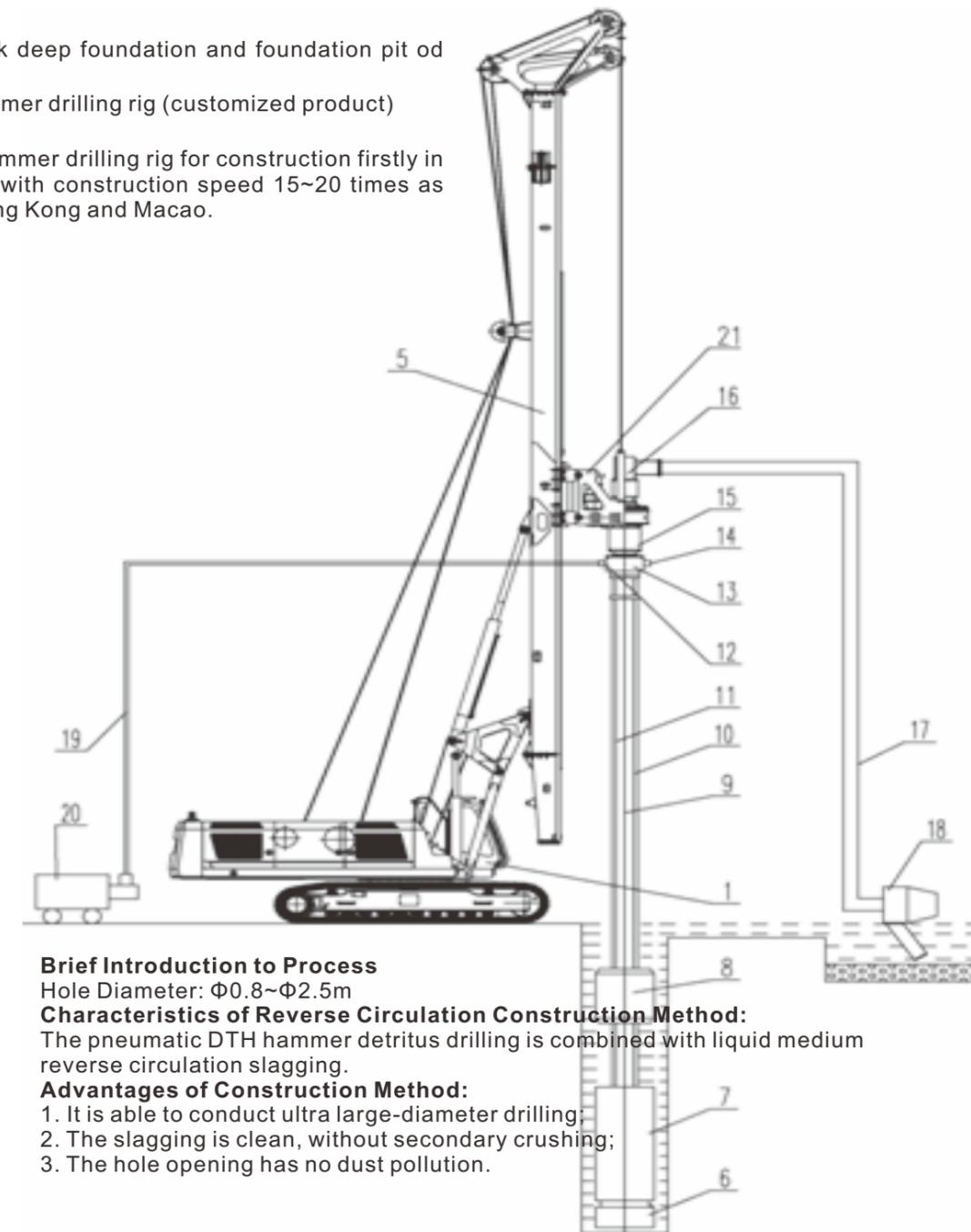
Large-diameter DTH hammer drilling rig



Project Site: Rapid construction of large-diameter tapping-into-rock deep foundation and foundation pit of Shipaiwan in Macao in 2015

Involved Machine Model: Large-diameter reverse circulation hammer drilling rig (customized product) SWDM28/36/42 rotary drilling rig

Project Overview: This Project adopts ultra large-diameter DTH hammer drilling rig for construction firstly in the industry, tapping into 250MPa slightly weathered granite bedrock, with construction speed 15~20 times as high as that of large-diameter pile routine construction technology in Hong Kong and Macao.



Brief Introduction to Process

Hole Diameter: $\Phi 0.8 \sim \Phi 2.5\text{m}$

Characteristics of Reverse Circulation Construction Method:

The pneumatic DTH hammer detritus drilling is combined with liquid medium reverse circulation slagging.

Advantages of Construction Method:

1. It is able to conduct ultra large-diameter drilling;
2. The slagging is clean, without secondary crushing;
3. The hole opening has no dust pollution.

Rotary enlarging drilling rig



Project Site: 600,000m² building foundation construction of Huaxiang Manjing Community in Kunming City in 2014

Involved Machine Model: Rotary enlarging drilling rig (customized product)
SWDM15/20/22 rotary drilling rig

Project Overview: The total building area of this Project is about 600,000m², includes 26 main buildings and two-storey basement of the whole land block; the original design scheme refers to adopting about 100 million pieces of long spiral bored piles with diameter of 600mm with effective pile length reaching 30m. In case of adopting Sunward construction technical scheme, adopting three-fork bidirectional squeezing-enlarging cast-in-place piles, the total quantity of piles will be reduced to 4,980 pieces, with average effective pile length of 23m, which greatly reduces total quantity of work, shortens construction period, and brings huge economic benefits for the Owner. After the project completion, the total sinking of foundation is only 10mm.



SWRC fully rotary all-casing drilling rig

Project Site: Changsha

Involved Machine Model: SWRC170

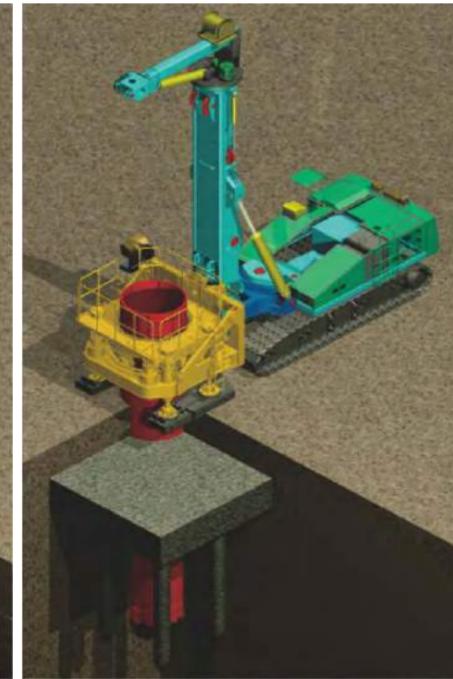
Project Overview: Sunward SWRC170 fully rotary all-casing drilling rig combines power system and working device in a creative way, with compact structure. Compared with common fully rotary all-casing construction equipment on the market, SWRC170 needs an independent power station, a set of fully rotary main engine and a set of crawler crane for cooperating with construction, which can greatly enhance the construction efficiency.



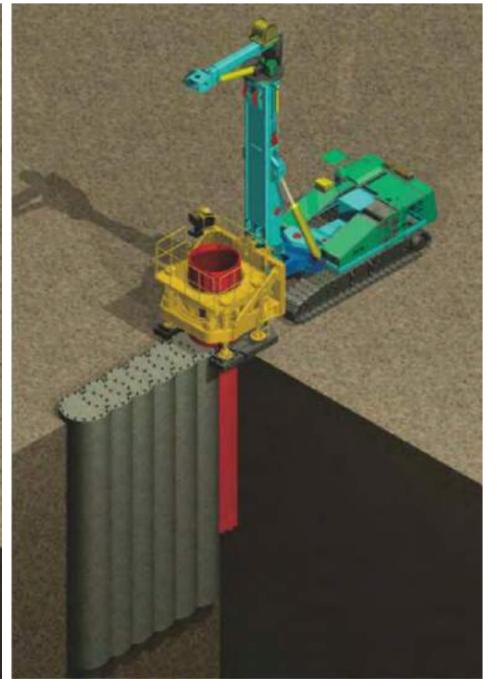
Cutting boulders and crossing karst caves



Cutting rock stratum



Removing underground barrier



Foundation pile, continuous wall construction



SWTM500/320A crawler-type dynamic compactor



SWTM1880B crawler-type dynamic compactor



Brief Introduction to Equipment: SWTM1880B dynamic compactor is a new kind of foundation treatment equipment, integrating mechanical technology and new process of modern pile construction, adopting dedicated crawler-type traveling mechanism for dynamic compactor, with good machine stability and large compacting energy (dynamic compactor with the largest compacting energy in our country). This machine is characterized by low using cost, rapid construction speed, good construction quality, and is widely applied into soft foundation treatment construction including sea reclamation, airport runway and highway.



Efficient construction case of typical machine group adopting multiple construction methods



Project Site: Want Want Hospital in Changsha

Involved Machine Model: SWHG42 hydraulic grab bucket
SWDM22 rotary drilling rig
SWWT85 crawler-type tri-axial continuous wall drilling rig

Project Overview: This Project refers to the first underground 6-storey fully reverse construction project in Central and Southern China region. The excavation depth of foundation pit reaches 39m, and the construction depth of continuous wall reaches 41m. The continuous wall is 1m in thickness, with its depth reaching 41m; the strata of 13m above refer to back filling, sludge, pebble and building waste strata. Prior to construction of continuous wall, adopt tri-axial continuous wall for foundation treatment on both sides of groove wall, thus reinforcing the groove wall; and then, build the guide wall of continuous wall. The strata 13m below the ground refer to strong weathered to moderately weathered argillaceous siltstone; the construction of continuous wall adopts rotary drilling to guide hole, and adopts the scheme of two drilling rigs with one grab bucket.





Project Site: 201 Project of Penang machine group construction in Malaysia in 2015

Construction Unit: Jiehua Foundation

Involved Machine Model: SWDM25/28/36 rotary drilling rig

SWSD2512 strong multi-functional drilling rig with double power heads

Rotary enlarging drilling rig (customized product)

SWCFG32B long spiral drilling rig

Telescopic boom crawler crane

Project Overview: At present, Sunward has two construction projects in Malaysia, directly undertaken by Datuk. The project refers to complicated geological conditions, and has extremely high requirements for the construction capability of tapping into rock of drilling rig. Especially, the multi-functional drilling rig with double power heads matched with large-diameter DTH hammer can deal with various complicated working conditions, thus guaranteeing construction period and quality effectively, and bringing huge economic benefits for the Owner.



Project Site: Xintian City Plaza (5 buildings of 150m high-rise foundation construction) in Quanzhou in 2012

Construction Unit: Huaan Foundation

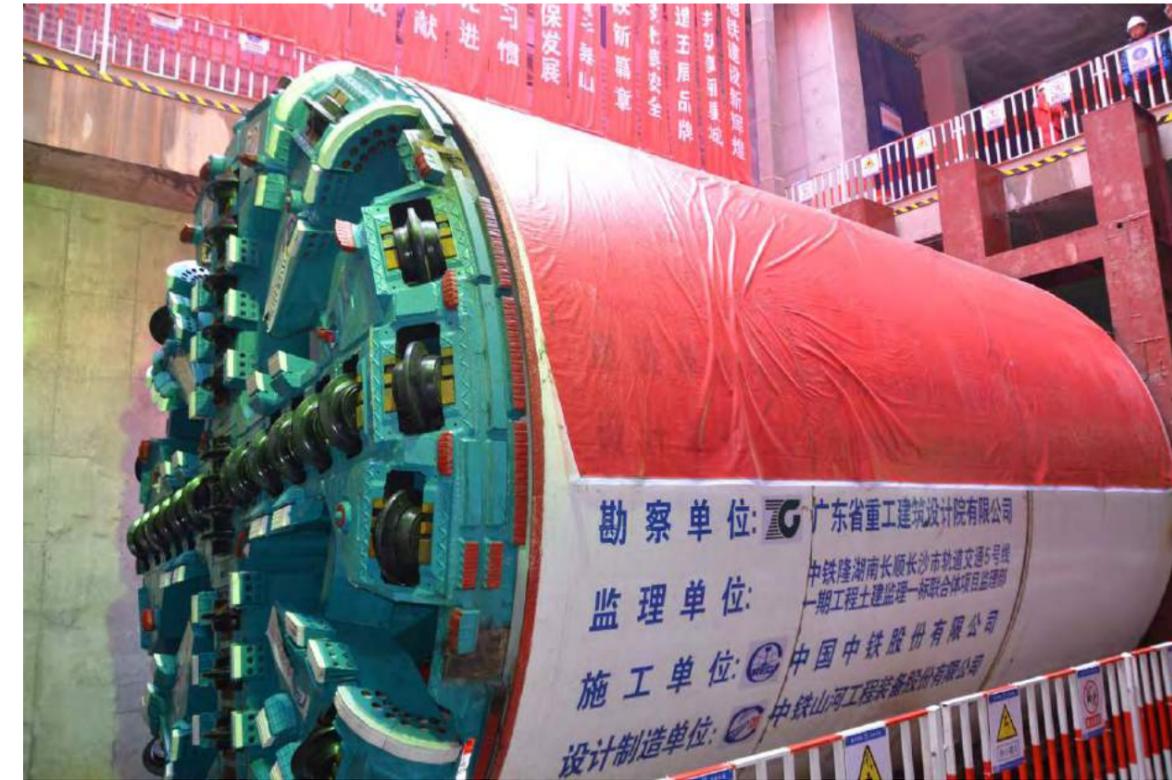
Involved Machine Model: SWDM25A/28A rotary drilling rig

Rotary enlarging drilling rig

SWSD2512 strong multi-functional drilling rig with double power heads

Project Overview: Seven sets of rotary drilling rigs of Sunward constitute a machine group, and the Sunward technical team participates in management and construction, and the Project becomes the sole project which is completed as scheduled in the contract on this path. In this Project, the maximum rock compressive strength exceeds 200MPa. During construction, the ultra strong tapping into rock capability and operation stability of Sunward equipment are key reasons for that the Project is completed as scheduled, and Land Transport Authority (LTA) of Singapore has paid high attention to this Project; in addition, the Sunward technical team is organized for special technology promotion.





Changsha Metro Line 5



Baicheng Tunnel of Inner Mongolia
Western and Central China Railway



Zhengzhou Metro Project



Chengdu Metro Project



Singapore Thomson Line T209 Project