SEMW
上 工 机 械

专业服务 创造价值
Professional Solutions Create More Value

SDP系列静钻根植工法钻机

SDP Series Pre-bored Pre-cast Piling Equipment

上 海 工 程 机 械 厂 有 限 公 司
SHANGHAI ENGINEERING MACHINERY CO.,LTD.

地下基础施工整体解决方案专家

EXPERTISE IN DELIVERING TURNKEY SOLUTIONS TO DEEP FOUNDATION ISSUES

SDP系列
静钻根植工法钻机
SDP Series Pre-bored Pre-cast Piling Equipment

公司简介

上海工程机械厂有限公司（ 以下简称上工机械），成立于1921年。长期以来始终专注于地下基础施工领域，专业为高速公路、高层建筑、桥梁、地铁、机场、码头、电站等大型、特大型工程提供地下基础施工设备和整体解决方案，包括TRD工法机、静钻根植工法钻机、全回转套管钻机、DCM处理系统、双动力头钻机、多轴式连续墙钻机、全液压步履式打桩架、全液压履带式打桩架、筒式柴油打桩锤、电驱振动锤、液压打桩锤等多种产品系列。

上工机械始终坚持自主创新，不断推动地下基础施工行业的发展与进步。公司以技术中心为新产品研发平台，拥有一支专业知识扎实、开发经验丰富的技术研发团队。近年来，公司先后获得了上海市高新技术企业、上海市科技小巨人（培育）企业、上海市专利试点企业、上海市著名商标、上海市名牌产品、上海市科技进步一等奖、国家科技进步二等奖等荣誉称号。

Shanghai Engineering Machinery Co., Ltd. (SEMW)—founded in 1921. SEMW is specialized in design, manufacturing and distribution of pile driving and deep foundation equipment. SEMW currently produces Trench Cutting & Re-mixing Deep Wall Equipments, SDP110 Pre-bored Pre-cast Piling Equipment, CRD-200H Casing Rotator , Deep Cement Mixing System, Dual Power Drilling Rig, Multi-shaft Agitating Augers, Hydraulically driven Pile Driving Rigs, Hydraulic Walking Piling Rigs, D series Diesel Pile Hammers, Vibratory Hammers, Hydraulic Hammers. Our products are widely used on high profile and long term engineering projects, such as, expressways, skyscrapers, bridges, metro stations, airports, deep-water docks, and power stations.

SEMW has been dedicated to deep foundations. With years of independent research and development, specialized piling equipments have been produced and used in many big and Key projects of China. We built up a Research and Develop team of qualified specialists and experienced engineers. In recent years, SEMW products have been awarded "Shanghai New Hi-tech Achievement Transformation Project", "Shanghai Famous Trademark", "First prize of Shanghai Scientific and Technological Progress Award", "Second prize of national science and technology progress", etc.

静钻根植工法简介

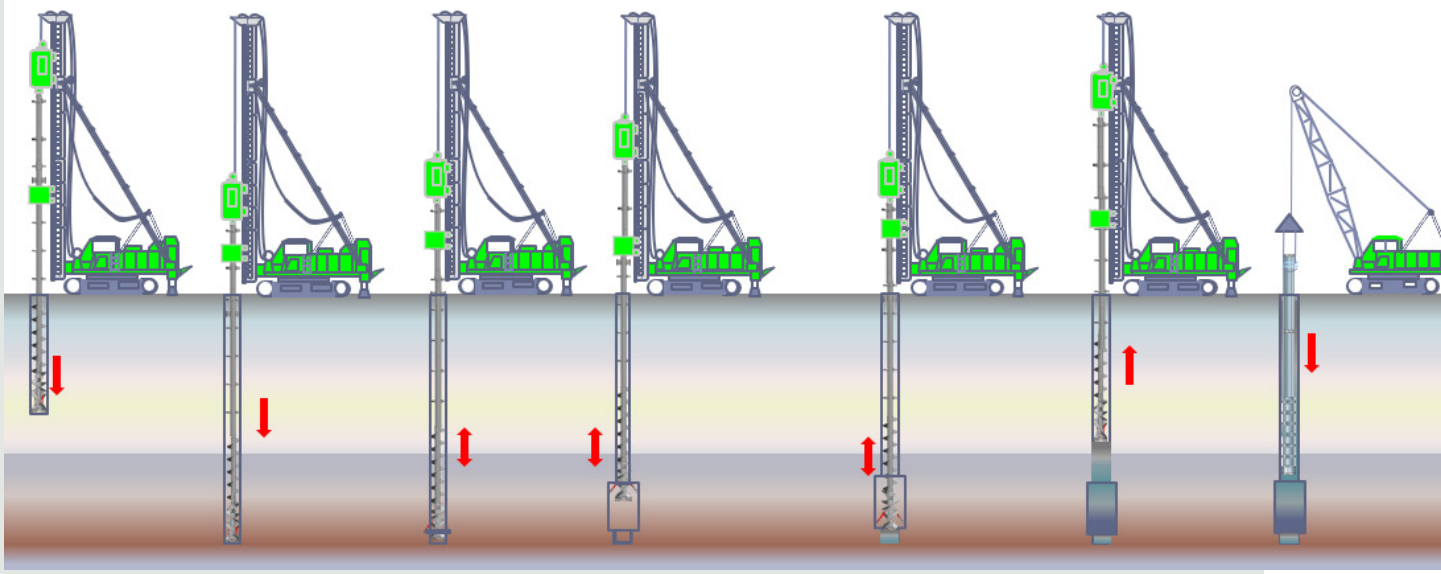
PRE-BORED PRE-CAST CONCRETE PILE METHOD INTRODUCTION

静钻根植工法是利用静钻根植桩工法钻机进行钻孔、深层搅拌和扩底，最后植入预制桩身的，即指将先张法预应力混凝土竹节桩（PHDC）、先张法预应力混凝土管桩（PHC）、复合配筋预应力混凝土管桩（PRHC）的不同规格、型号为满足设计要求进行各种组合，并按钻孔、扩孔、注浆、植入等工艺进行施工的桩基工法。

The pre-bored precast concrete pile construction method is to use pre-bored pre-cast piling equipment for drilling, deep stirring and expanding the bottom, and finally implanting the pre-cast pile body. It's a pile foundation method with various combinations of different types of the prestressed high strength concrete knot diversion pile (PHDC), prestressed high-intensity concrete pile (PHC), prestressed reinforced high strength concrete pile (PRHC) under sequence as pilling, Root-enlarging, Injecting, implanting.

施工流程示意图

CONSTRUCTION PROCESS SCHEMATIC DIAGRAM



<钻孔>
Drilling

<扩底>
Root-enlarging

<桩端、周水泥浆注入及拔钻>
Injecting cement at pile end and around pile and pulling

<植、
Pushir
Implant

特　　点 FEATURES

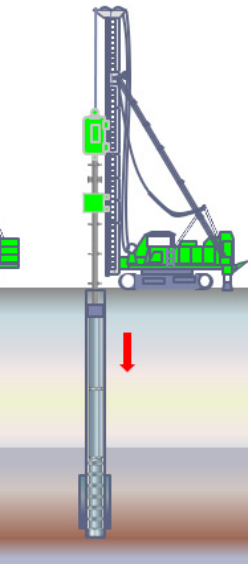
- 无挤土，无振动，低噪声
- 成桩质量好，桩顶标高完全可控
- 极强的竖向抗压、抗拔及抗水平载荷能力
- 泥浆排放少
- 具有良好的社会效益和推广价值

- No soil-squeezing, no vibration, noiseless
- Great pile-forming quality, completely controllable of pile top elevation
- Strong vertical compression, pull and horizontal load resistance
- Low mud discharge
- Good social benefit and promotion value

适 用 范 围 APPLICATIONS

- 适用于各种抗震设防烈度地区，适应桩径：500-1200mm
- 粘性土、粉土、砂土、填土、碎（砾）石土以及地质情况复杂、夹层多、风化不均、软硬变化较大的岩层，最大入土深度：90m
- 当建筑场地临近有建筑物(构筑物)或地下管线等工程设施，采用其他桩型将引起不良影响时
- 桩端持力层层顶标高变化较大，桩的长度难于准确确定时，施工场地不具备混凝土现场浇注条件或者是现场浇注混凝土质量不容易保证的工程
- 对大量泥浆排放有限制的工程
- 设计要求单桩承载力较大，技术经济指标和施工条件又比其他桩型优越时

- Applicable to various seismic fortification intensity areas, adapt to the pile diameter: 500-1200mm
- Clay, silt, sandy soil, filled soil, broken stones (gravel) soil and complicated geological situation, mezzanine much larger changes, uneven weathering, hard and soft rock strata, maximum depth: 90m
- When the building site is adjacent to a building (structure) or underground pipeline and other engineering facilities, other pile type will bring bad effects.
- Large changeable of pile end bearing layer top elevation, the length of the pile is difficult to accurately determine, the on-site pouring construction site does not have the coagulation soil conditions or pouring concrete is not easy to ensure quality.
- Discharge of large amounts of mud is limited.
- Single pile bearing capacity is required and technical and economic indexes and construction conditions are superior to other piles.



送桩>
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ting pile

静钻根植工法

PRE-BORED PRE-CAST CONCRETE PILE METHOD

静钻根植工法植入桩桩型组合

PRE-BORED PRE-CAST CONCRETE IMPLANTED PILE TYPE COMBINATION

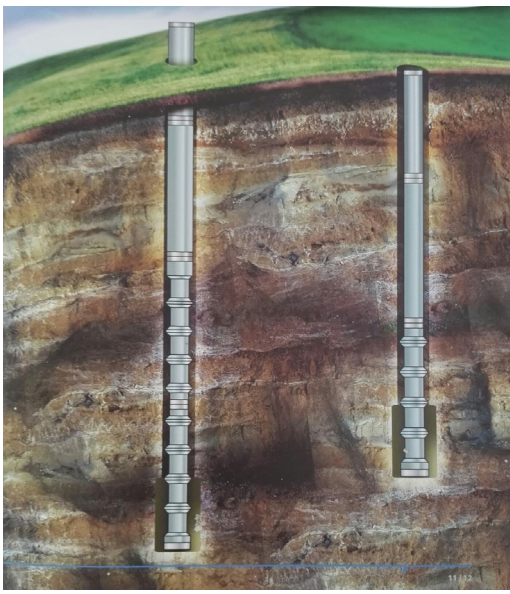
静钻根植工法植入桩：由静钻根植先张法预应力混凝土竹节桩（PHDC桩）、复合配筋先张法预应力混凝土管桩（PRHC桩）、先张法预应力高强度混凝土管桩（PHC）等按照一定的形式进行组合植入已成孔的预制桩。

Implanted pile: Precast pile with a certain combination of prestressed high strength concrete knot diversion pile (PHDC), prestressed reinforced high strength concrete pile (PRHC), prestressed high-intensity concrete pile (PHC), etc.

1

根据地质条件，选择合适的桩型增加侧阻力及桩端阻力

According to the geological conditions, select the appropriate pile type to increase lateral and pile tip resistance.



2

改善桩身上部的抗水平、抗拔承载力

Improve the resistance level and uplift bearing capacity of pile body

部位 Parts		组合一Combination 1	组合二Combination2
上节 Upper part	PHDC	PHC	PRHC
中段 Middle part	PHDC	PHDC 或PHC 或 PHDC+PHC	PRHC 或PHC 或 PHDC+PHC
下节 Lower part	PHDC	PHDC	PHDC

3

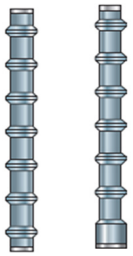
先张法预应力高强混凝土竹节桩（高性能混凝土根植桩）(简称竹节桩、代号：PHDC）

配置热轧带肋钢筋的预应力高性能混凝土桩

Prestressed high strength concrete knot pile (High-performance concrete implanted pile)(For short: PHDC)
Prestressed high performance concrete pile with hot rolled ribbed steel bar.

- 通过桩与周边的咬合，大幅度提高桩身侧阻力
- 通过下端扩头，改善桩端阻力特性
- The lateral resistance of the pile can be greatly increased through the interlocking between the pile and the surrounding area
- The resistance characteristics of pile tip can be improved by underside extension.

代号Code	竹节外径 Knot OD (mm)	桩身外径 Pile OD (mm)	节间距 Gap (mm)	壁厚 Thickness (mm)	扩头 直径 End diameter (mm)	长度 Length (m)
PHDC450-300	450	300		70	400	
PHDC550-400	550	400		95	500	
PHDC650-500	650	500	1000	100/125	600	7~15
PHDC800-600	800	600		110/130	700/800	
PHDC1000-800	1000	800		110/130	1000	

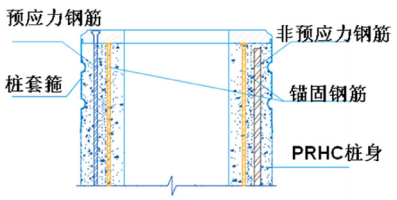


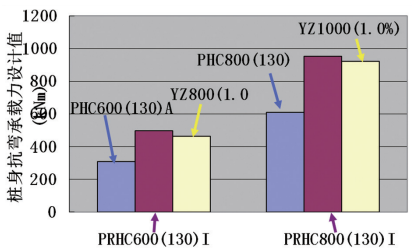
4

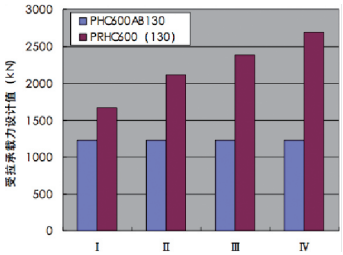
复合配筋先张法预应力混凝土管桩(简称复合配筋桩、代号：PRHC)

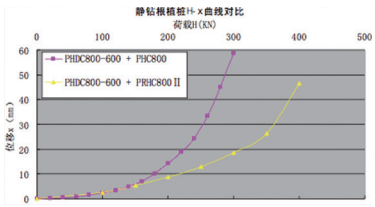
Prestressed reinforced high strength concrete pile (For short: PRHC)

- 预应力钢筋 + 非预应力钢筋、 端板锚固筋
- 可满足抗压、抗拔、抗水平荷载要求高的桩基，用于水平载荷要求高桩基的上节桩
- 可部分代替钢管桩
- Prestressed reinforcement, non prestressed reinforcement, End plate anchorage
- The pile is using for upper segment pile of pile foundation, it can meet the high requirements of resistant compression, pulling and horizontal load.
- Can partly replace steel pipe pile









设备技术优势

EQUIPMENT TECHNOLOGY ADVANTAGES

SDP系列静钻根植工法钻机是上工机械利用多年累积的深层搅拌钻机研发技术优势，完全自主研发的新一代适合静钻根植工法施工的钻机产品。该产品主要零部件采用国际知名品牌，具有扭矩大，钻掘深度大，科技含量高，可靠性好，施工效率高等特点，性能达到国际先进水平。

With accumulated technology advantages of deep soil mixing drill, SEMW completely independent research and develop SDP Series Pre-bored Pre-cast Piling Equipment, a new generation of drilling equipment which is suitable for the static drilling method. The main parts are international famous brands, which have the characteristics of high torque, great drilling depth, high scientific and technological content, good reliability, high construction efficiency, and the performance reaches the international advanced level.

1

采用先进的油压扩底技术，扩底直径为钻孔直径的1~1.6倍，扩底高度为钻孔直径的3倍。并采用先进的下位机软件历史数据记录方式，除同类进口 产品记录的多种施工过程数据，如钻孔深度变化、 钻孔速度、施工过程电流、温度情况钻孔用水流量、扩底监控、桩端桩周注入水泥浆量等。相关施工数据的设定与存储如施工单位、工地号、桩号、完成情况等，还可进行各项施工数据分析，形成对应的数据曲线。

SEMW SDP Series adopts the advanced oil pressure root-enlarging technology, the root diameter is 1~1.6 times of the diameter of drilling hole and the root height is 3 times of the drilling hole's diameter. In addition, advanced slave computer software history data recording method is adopted to record various construction process data of the same kind of imported products, such as borehole depth change, drilling speed, construction process current, temperature condition water flow of borehole, root-enlarging monitoring, amount of cement injected around pile tip etc. Setting and storage of relevant construction data, such as construction unit, site number, pile number, completion status, etc., can also be used to analyze various construction data and form corresponding data curves.

2

采用智能化施工管理软件，控制采用智能触屏方式，对施工过程实时监控，确保施工质量，各项施工数据清晰反映在显示器上并自动存储，可输出打印。

Intelligent construction management software is adopted to control the use of intelligent touch screen mode to monitor the construction process in real time. Ensure the construction quality and all construction data are clearly reflected on the display and stored automatically, which can be printed out.

3

操作系统设有失电380V自动关机程序。保证了钻机使用过程中不会发生因死机、断电而丢失数据的状况。

The SEMW SDP Series operating system is equipped with the power loss 380V automatic shutdown program. It ensures that the data will not be lost due to the crash or power failure during the operation of the drill.

4

电机启动方式采用的是软启动，软启动器本身带有各种电机保护功能：如：欠压、缺相、相序、过载等保护。另外散热功能良好，可频繁启动。

The SEMW SDP Series motor start mode adopts soft start. The soft starter itself has various motor protection functions, such as under-voltage, missing phase, phase sequence, overload, etc. Besides, it has good cooling function and can be started frequently.

5

液压扩底技术性能可靠，采用品质卓越的液压元器件，确保在深度80m下，液压扩底正常工作。钻具经过特殊设计与制造，强度大，抗弯性好，耐磨性好减少维护成本。

The technology of hydraulic root-enlarging has reliable performance and adopts excellent hydraulic components to ensure the normal operation of hydraulic root-enlarging under depth of 80m. Drilling tools are specially designed and manufactured with high strength, good bending and high wear resistance to reduce the maintenance costs.

我们的产品，N个工程的选择

SEMW PRODUCTS, YOUR BEST CHOICE!

1 象山金都花苑 XIANGSHAN JINDU GARDEN

商业与住宅楼，均为17层，设地下室一层，基坑开挖深度约5米。总用地面积17833.7m2，总建筑面积5292m2。桩型PHC 5 0 0AB (10 0)+PH DC 5 5 0-4 0 0AB (9 5), 桩长3 2-3 9 m，单桩抗压承载力特征值15 0 0 k N；桩型PHC600AB(110)+PHDC650-500AB(100),桩长32-39m, 单桩抗压承载力特征值1800kN。

Commercial and residential buildings, both 17 floors, have one layer basement, the excavation depth is about 5 meters. The total land area is 17833.7m2, the total building area is 5292m2. Pile type: PHC 5 0 0AB (10 0)+PH DC 5 5 0-4 0 0AB (9 5), pile length32-39m, characteristic value of load bearing capacity of single pile 1500KN; Pile type: PHC600AB(110)+PHDC650-500AB(100), pile length 32-39m, characteristic value of load bearing capacity of single pile 1800KN.

2 台州月湖小学 TAIZHOU YUEHU PRIMARY SCHOOL

项目建筑占地面积9265.1m2，总建筑面积23302.9m2，单桩承载力2000KN-5000KN，桩长40米-60米。桩型PRHC500(100)+PHC500AB1 (00)+PHDC550-400(95)AB，桩型PRHC600(110)+PHC600A（110）+PHDC650-500(100)AB。

The project land area is 9265.1m2, total building area is 23302.9m2, characteristic value of load bearing capacity of single pile 2000KN-5000KN, pile length 40-60m. Type: PRHC500(100)+PHC500AB(100)+PHDC550-400(95)AB,PRHC600(110)+PHC600A(110)+PHDC650-500(100)AB

3 宁波明州生物质发电厂 NINGBO MINGZHOU BIOMASS POWER PLANT

项目位于宁波市鄞州区姜山镇茅山，最大单柱荷载除主厂房约为1100kN外，其他装置最大单柱荷载约为4000-5500kN。桩型PHC600AB(110)+PHDC650-500(125)AB,设计桩长54m,桩基持力层为5层含粉质黏土圆砾层，单桩抗压承载力特征值1600Kn。

The project is located in maoshan, jiangshan town, yinzhou district, Ningbo. The maximum single column load is 1100KN (EXCEPT MAIN WORKSHOP) is 1100KN, the maximum single column load is 4000-5500KN. Pile type PHC600AB(110)+PHDC650-500(125)AB, pile length is 54m, the bearing layer of pile foundation is 5 layers round gravel with silty clay. characteristic value of load bearing capacity of single pile is 1600KN.

4 宁波中心 NINGBO CENTER

项目由世界顶级设计事务所美国SOM担纲规划及总体建筑设计。总建筑面积64.81m2。超高塔楼高度为398米；高层高度120米-150米；裙房为2-4层；地下整体三层，开挖深度18-20m。桩型PHC800(110)AB+PHDC800-600(110)AB,桩长56m,桩筹持力层为8-1层粉质黏土，抗压承载力特征值4450KN;桩型PRHC800(110)1+PHC800(110)AB+PHDC800-600(110)AB,桩长46m, 桩筹持力层为6-3层粉质黏土，抗压承载力特征值2950KN, 抗拔承载力特征值1400KN。

The project is planned and designed by SOM, the world's top design firm. The total building area is 64.81m2. The tower is 398 meters high. Upper height: 120-150m; The skirt room is 2-4 floors; Whole three floor underground, excavation depth of 18 to 20 m. Pile type PHC800(110)AB+PHDC800-600(110)AB, length is 56m, the pile supporting layer is 8-1 silty clay. Characteristic value of compressive bearing capacity is 4450KN. Pile type PRHC800(110)1+PHC800(110)AB+PHDC800-600(110)AB, length is 46m, t he pile supporting layer is 6-3 layers of silty clay, characteristic value of compressive bearing capacity is 2950KN, characteristic value of uplift capacity is 1400KN.

5 杭州下沙天然气枢纽站 HANGZHOU XIASHA NATURAL GAS HUB STATION

项目建设面积2 4 3 8 7. 5 3 m 2，由1幢12 层的高层及1- 4 层的多层以及局部1层的地下室组成，地下室开挖深度为5 - 6 米，单桩承载力15 0 0 K N -5 8 0 0 kN，桩长3 4米-67米。桩型P RHC 8 0 0 (13 0)+PHC800AB(110)+PHDC800-600(110)AB,桩型PRHC600(130)+PHC600AB(110)+PHDC650-500（ 100 ）AB。

The project construction area is 24387.53m2. It consists of a 12-storey high building, a 1-4 storey multi-storey building and a partial basement. The excavation depth of the basement is 5-6 meters. Characteristic value of load bearing capacity of single pile is 1500KN-5800KN. Pile length is 34-67m, pile type is P RHC 8 0 0 (13 0)+PHC800 AB(110)+PHDC800-600(110)AB & PRHC600(130)+PHC600AB(110)+PHDC650-500(100)AB.

6 温州电厂 WENZHOU POWER PLANT

项目建设规模为2×600MW。其中汽机房高32m,总荷载20000kN,烟囱高240m,最大荷载220000kN;煤仓间总荷载25000kN。桩基持力层为(7)砾(卵)石层，设计桩长为56-59m。桩型PRHC800(130)+PHC800AB(130)+PHDC800-600(130)AB,单桩承载力特征值5500kN;桩型

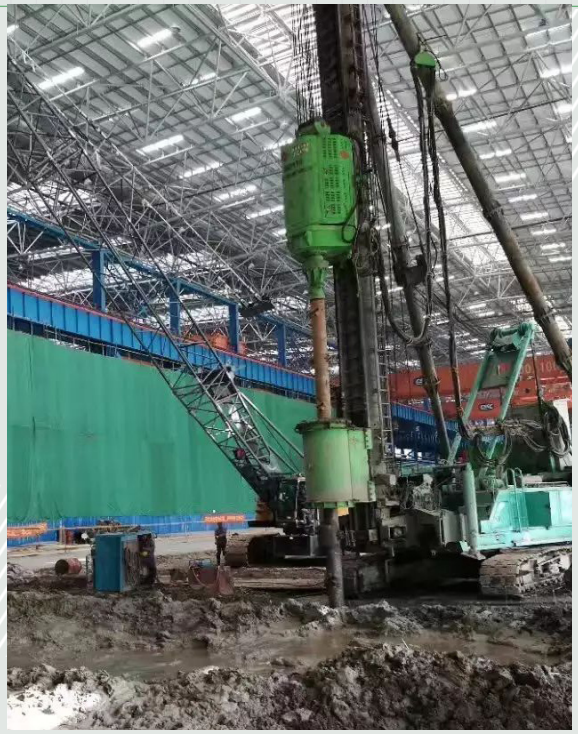
PRHC600（130）+PHC600AB（130）+PHDC650-500(125)AB,单桩承载力特征值4050kN。

The construction scale of the project is 2 x 600MW. The turbine building is 32m high, total load is 20000KN, chimney is 240m high, peak load is 220000KN. Bunker room's load is 25000KN. The bearing layer of pile foundation is (7) gravel (egg) stone layer, pile length is 56-59m. Pile type is PRHC800(130)+PHC800AB(130)+PHDC800-600(130)AB, characteristic value of load bearing capacity of single pile is 5500KN. Pile type is PRHC 600(130)+PHC600AB(130)+PHDC650-500(125)AB, characteristic value of load bearing capacity of single pile is 4050KN.

7 宁波瑞涌机械科技有限公司厂区 NINGBO RUIYONG MACHINERY TECHNOLOGY CO. LTD.

本工程桩基持力层为中风化凝灰岩，设计桩长为15-48m，采用PHC桩和PHDC桩组合的配桩形式。桩端扩底直径为1000mm，扩底高度为2300mm。

The pile bearing layer of this project is moderately weathered tuff, pile length is 15-48m. The combination of PHC pile and PHDC pile is adopted. The diameter of expanding bottom of pile tip is 1000mm, expanding height is 2300mm.



8 上海中船临港船用项目
Shanghai lingang ship equipment co. LTD

本工程设计桩长45~53m，钻孔最大深度为61m，送桩深度：8m，车间净高仅23m，成孔时需要进入20m含水量极大的粉砂层，对泥浆处理要求较高，相邻车间大型高精度船用发动机生产正常作业，要求施工全程安静、无尘、不挤土、不能对厂房结构及相邻设备基础产生不利影响。

The design pile length of this project is 45~53m, the maximum depth of drilling hole is 61m, and the depth of sending pile is 8m. The net height of the workshop is only 23m, and the pore formation needs to enter 20mm-high silt layer, which has high requirements for mud treatment. The production of large and high-precision Marine engines in the adjacent workshop should be normal. The entire construction process should be quiet, dustless, and free of soil compaction.

9 上海体育馆、游泳馆改造及新建综合体项目
Shanghai stadium, natatorium renovation and new complex projects

本工程设计桩长27，钻孔最大深度为33m， 采用PHRC桩和PHDC桩组合的配桩形式。桩端扩底直径为845mm，扩底高度为1195mm。

Pile length is designed to be 27m and the maximum depth of drilling is 33m, and the combination of PHRC pile and PHDC pile is adopted. The diameter of expanding bottom of pile tip is 845mm, and the height of expanding bottom is 1195mm.

10 台州东部新区第二中小企业园项目
Taizhou east new district the second enterprises zone project

本工程静钻根植桩以圆砾为持力层，采用PHDC800-800(110)AB-15、PHC800-800(110)AB-15、13、9，配桩形式钻孔深度85m，桩长84m。

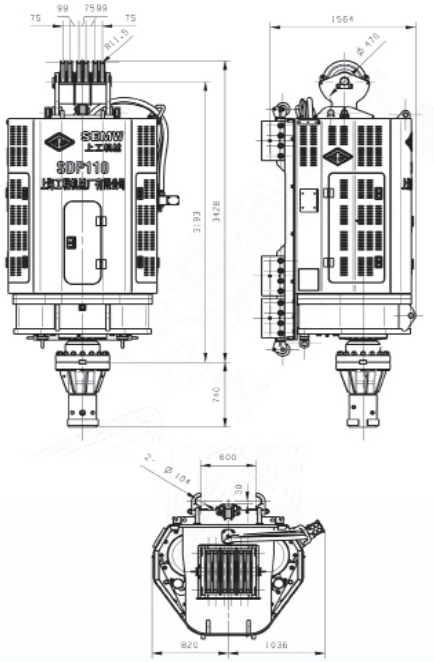
Static drilling rooted pile takes the round gravel as the holding layer and adopts phdc800-800 (110) ab-15, phc800-800 (110) ab-15, 13, 9, with the drilling depth of 85m and pile length of 84m.

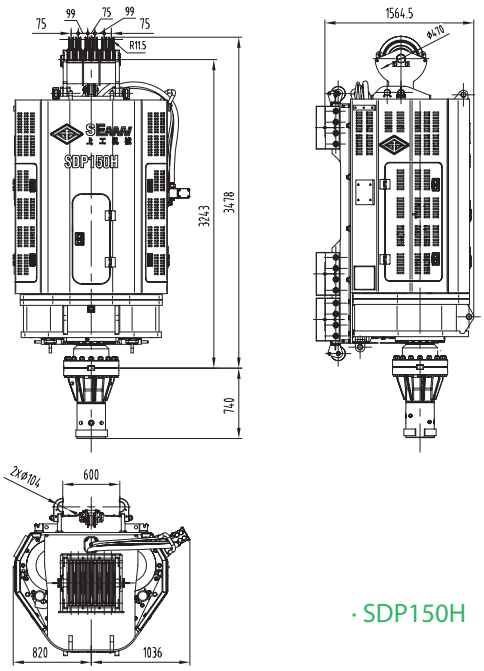
产品技术参数 SPECIFICATIONS

项目 Item		单位 Unit	SDP110H	SDP150H	SDP220
最大钻孔（扩孔）直径 Max. drilling diameter：		mm	Φ650（1040）/Φ750（1200）/Φ900（1440）		
钻杆额定转速 Rated speed of shaft	4P/8P	r/min	19.1/9.5		13.8（8P）
钻杆额定扭矩 Rated torque of shaft	4P/8P	kN.m	55/110	75/150	110/220
钻杆基本长度 Basic length of shaft		m	3、4、6、9		
电动机额定功率 Rated power of motor		kW	110（55×2）	150（75×2）	220（110×2）
导轨中心到钻杆中心距离 Distance of Rod Center to Guide Center		mm	1000		920
导轨中心到滑轮中心距离 Distance of Pulley Center to Guide Center		mm	655、800		
导轨中心距 Center distance between guides		mm	600XΦ102		
钢丝绳直径 Diameter of wire rope		mm	Φ22		
滑轮个数 Number of sheaves		个	6		
供浆系统耐压 Cement system pressure		Mpa	2.5		
液压系统压力 Hydraulic system pressure		Mpa	18		
配用水、浆管接头尺寸 Joint for water and cement hose			Rc1 1/2		$R_1$2
操纵方式 Operating control			CAN-BUS总线、电气控制CAN-BUS、Electrical Control		电气控制Electrical Control
动力头最大重量 Power unit max. weight		t	≈8.4 About 8.4	≈8.5 About 8.4	≈12 About 12
配套桩架 Supporting piling rig			不低于SPR115/ JB160A Same standard as SEMW SPR115/ JB160A	不低于SPR135/ JB180 Same standard as SEMW SPR135/ JB180	不低于SPR135/JB180 Same standard as SEMW SPR135/ JB180

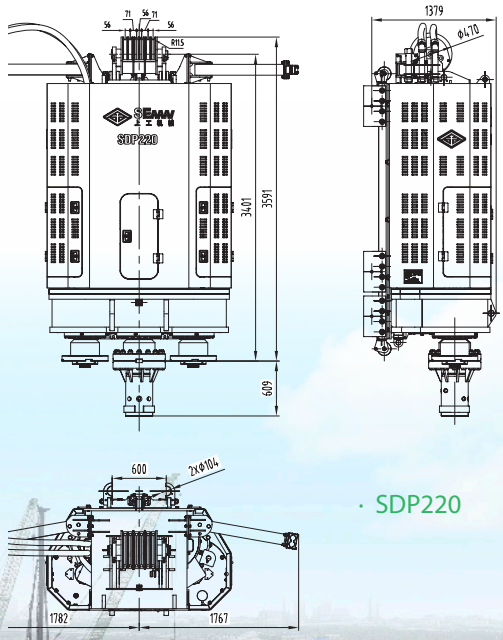
产品尺寸图

· SDP110H





· SDP150H



· SDP220

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