



Wirth™ Pile Top Drill Rigs Reverse Circulation Drilling



About HMM

Although the HMM name is new, HMM has been manufacturing industry-leading equipment for more than 125 years. Building on the legacy of our historical brands, such as Wirth™ pile top drilling rigs, and with an eye towards innovation, HMM has created one of the industry's most comprehensive portfolio of products, systems, and services for onshore and offshore drilling, subsea and onshore mining, and construction applications.

With a global span that covers five continents, HMM is embracing new opportunities in other industries - including offshore wind, subsea mining, civil construction and innovative digital solutions - with the same commitment to quality, safety and value.

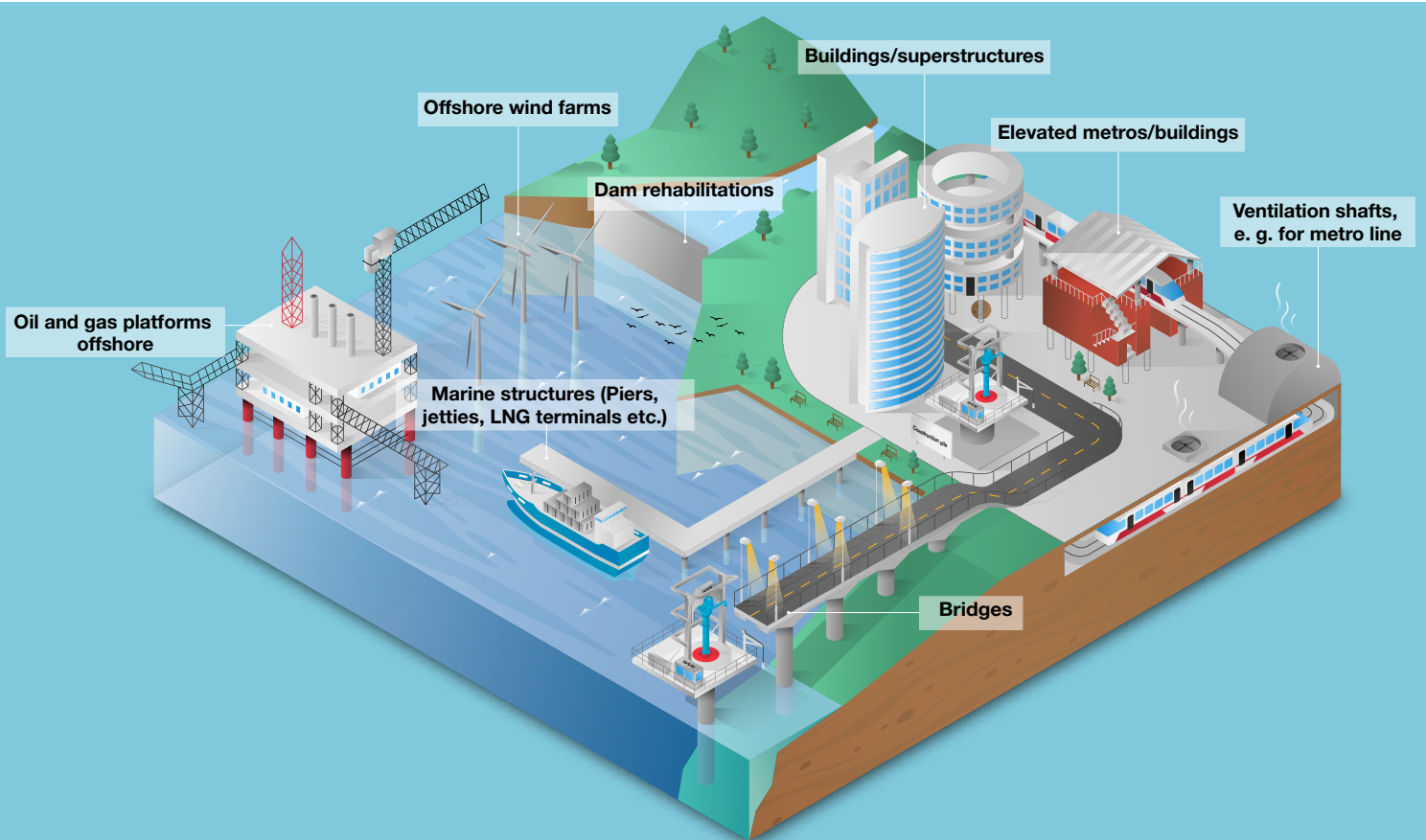
In even the most demanding of environments, you can count on HMM to deliver advanced performance and products, integrated delivery capabilities, and renowned industry expertise to meet your needs.

Experts at your disposal

HMM is your first choice for reliable reverse circulation drilling rigs for onshore and offshore applications. With our global network of experienced specialists, we provide quality, reliable OEM servicing and support through project completion, enabling timely, cost-effective and outstanding performance for your drilling project.



Broad Range of Applications



Our Wirth™ pile top drill rigs, also known as reverse circulation drilling (RCD) rigs, can be used for a large variety of construction works. They provide the best performance in

- Mixed ground, boulders and hard rock
- Large diameters of 0.6 m up to 8.5 m (1 ft. 11 in. to 27 ft. 11 in.)
- Great depths of up to 400 m (1,312 ft)
- Also for inclined piles

Most common drilling applications

- Rock drilling
- Rock socketing
- Underreaming
- Bell-out of the rock socket
- Pile cutting
- Milling of deformed casings
- Anchor drilling
- Secant wall drilling

Our Expertise for Your Project

At HMM, we work closely with our customers throughout the project lifecycle, providing continuous support during the lifetime of the RCD rig to allow you to complete your project on time and on budget.



Pre-project and Tender Phase

- Close consultation and support
- Tailor-made consulting on (auxiliary) equipment recommendations, calculations etc.
- Project specific concept studies

Manufacturing and Testing

- First-class equipment manufacturing
- Internal Factory Acceptance Test (FAT)

Delivery

- Any type of delivery according to Incoterms 2020

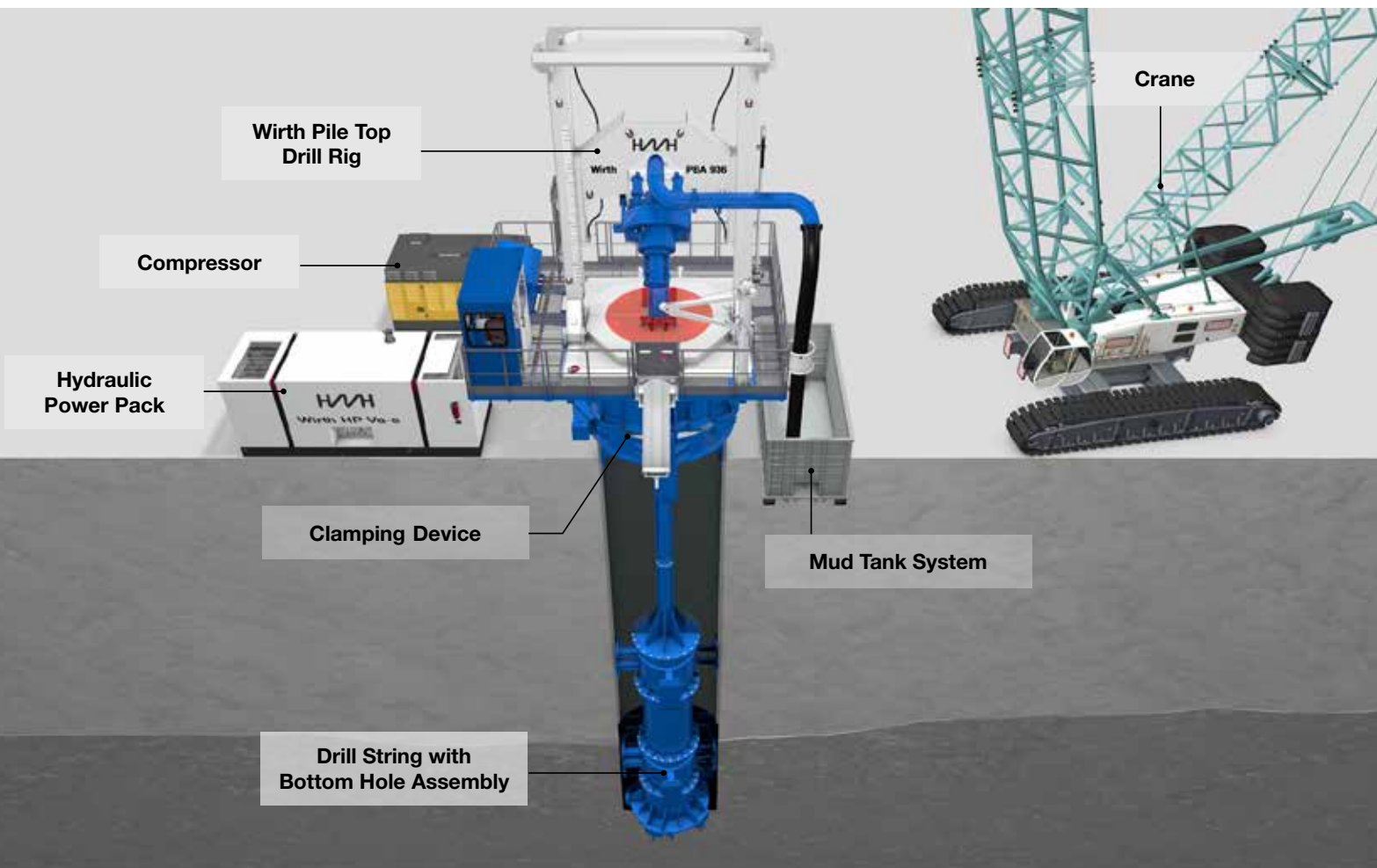
Installation, Commissioning & Training

- On-site installation by experienced specialists
- Crew and operator training (on-site, classroom or online)
- On-site supervision, at initial drilling and during the project, to maximize rig performance

Lifetime Services

- Professional local service and maintenance
- Wear and spare parts service
- Cutter management
- Advanced operator supervising and training for further performance improvements
- Professional decommissioning, overhaul and rig conservation services for maximized lifetime and performance

Rig Arrangement



Reverse Circulation Drilling Technology

Our highly efficient reverse circulation drilling (RCD) technology, also referred to as airlift drilling, is the core technology of our Wirth™ pile top drill rigs. Material transport is based on the physical principle of pressure differences, thus maximizing drilling performance at large diameters, great depths and in hard rock.

Watch the video on our website to learn more about RCD technology in Wirth™ pile top drill rigs



Our Wirth™ pile top drill rigs

Six different pile top drill rig (PBA) models cover the diameter range from 0.6 m to 8.5 m (1 ft. 11 in. to 27 ft. 11 in.). All our PBAs are manufactured in our premises in Germany.

Pile top drill rig	408/1300/200	615/2000/300	818/2500/300	936/3200/300	1045/3200/330	1450/6000/330
Drilling diameter	0.6 – 1.3 m (1 ft. 11 in. – 4 ft. 3 in.)	1.2 – 2.0 m (3 ft. 11 in. – 6 ft. 7 in.)	1.5 – 2.5 m (4 ft. 11 in. – 8 ft. 2 in.)	2.0 – 3.2 m (6 ft. 7 in. – 10 ft. 6 in.)	2.5 – 4.5 m (8 ft. 2 in. – 14 ft. 9 in.)	3.0 – 8.5 m (9 ft. 10 in. – 27 ft. 11 in.)
Nominal size	NW 200	NW 200/NW 300	NW 300	NW 300 HT	NW 330 HT	NW 330 HT
Maximum power swivel torque	81 kNm (59,700 ft·lb)	150 kNm (111,000 ft·lb)	182 kNm (134,250 ft·lb)	360 kNm (265,500 ft·lb)	455 kNm (335,600 ft·lb)	500 kNm (368,500 ft·lb)
Maximum drilling speed infinitely variable	38 rpm	23 rpm	24 rpm	20 rpm	22 rpm	15 rpm
Maximum thrust force	400 kN (90,000 lb)	500 kN (110,000 lb)	800 kN (176,000 lb)	1,100 kN (242,500 lb)	1,100 kN (242,500 lb)	1,400 kN (310,000 lb)
Maximum pull back	650 kN (143,000 lb)	1,000 kN (220,000 lb)	1,300 kN (286,000 lb)	1,700 kN (375,000 lb)	2,000 kN (440,000 lb)	4,000 kN (880,000 lb)
Unit weight drill rig	17,000 kg (18.4 short tons)	19,500 kg (21.5 short tons)	27,000 kg (29.8 short tons)	32,000 kg (35.3 short tons)	34,000 kg (37.5 short tons)	75,000 – 120,000 kg (82.7 – 132.3 short tons)
Unit weight hydraulic clamping device	3,500 kg (3.9 short tons)	5,200 kg (5.7 short tons)	5,200 kg (5.7 short tons)	11,000 kg (12.1 short tons)	11,000 kg (12.1 short tons)	70,000 kg (77.2 short tons)
Hydraulic power pack type	HP IVa			HP Va-s	HP VIa	HP Va-s



Our Wirth™ Hydraulic Power Packs

We provide a full range of Wirth™ hydraulic power packs (HPU) of up to 470 kW (639 hp). All HPUs consist of leading-edge technology and are optionally available as multi-purpose units, allowing to also drive auxiliary equipment.

Power pack		HP IVa/HP IVa-s	HP Va / HP Va-s	HP VI / HP VI-s
Hydraulic power pack rating		261 kW (354 hp)	447 kW (608 hp)	470 kW (639 hp)
Unit weight hydraulic power pack (dry)		6,500 kg (7.2 short tons)	9,500 kg (9.0 short tons)	
Dimensions	Length	5,000 mm (16 ft. 5 in.)	5,920 mm (19 ft. 5 in.)	
	Width	2,000 mm (6 ft. 7 in.)	2,100 mm (6 ft. 11 in.)	
	Height	2,320 mm (7 ft. 7 in.)	2,320 mm (7 ft. 7 in.)	

Main features

- Compact design for a minimum footprint
- Soundproofed cover reduces noise emission substantially to ≤ 78 db(A) (norm 3)
- Frame designed with removable modules allow easy access for service and maintenance
- Integrated lifting lugs for quick handling
- Built-in exhaust system ensure short set-up time
- Cooling system for heavy duty working conditions
- Enhanced safety and environmental features
- Premium class diesel engine
- Operation with biodegradable oil possible
- All power packs are available in accordance to EU Stage III and EU Stage V emission standard
- Control panel for remote operation
- Multi-function features to drive a casing oscillator/rotator or other pile top units (optional)



Auxiliary equipment

Pile top drill rig	408/1300/200	615/2000/300	818/2500/300	936/3200/300	1045/3200/330	1450/6000/330
Air compressor delivered air volume	20 m ³ /min (706 ft ³ /min)		22 m ³ /min (777 ft ³ /min)	25 m ³ /min (883 ft ³ /min)		
Air compressor operating pressure	5 – 15 bar (73 – 218 psi)			7 – 15 bar (102 – 218 psi)		
Back filling pump delivery volume	720 m ³ /h (423 ft ³ /min)	720/1,080 m ³ /h (424/636 ft ³ /min)	1,440 m ³ /h (848 ft ³ /min)	2 x 1,080 m ³ /h (2 x 636 ft ³ /min)		
Back filling pump pressure at delivery head, approximately	4 bar (58 psi)					

Optimal air volume and air pressure setting are to be calculated for each project. Volume of backfilling pump is to be proven according the mud discharge system.

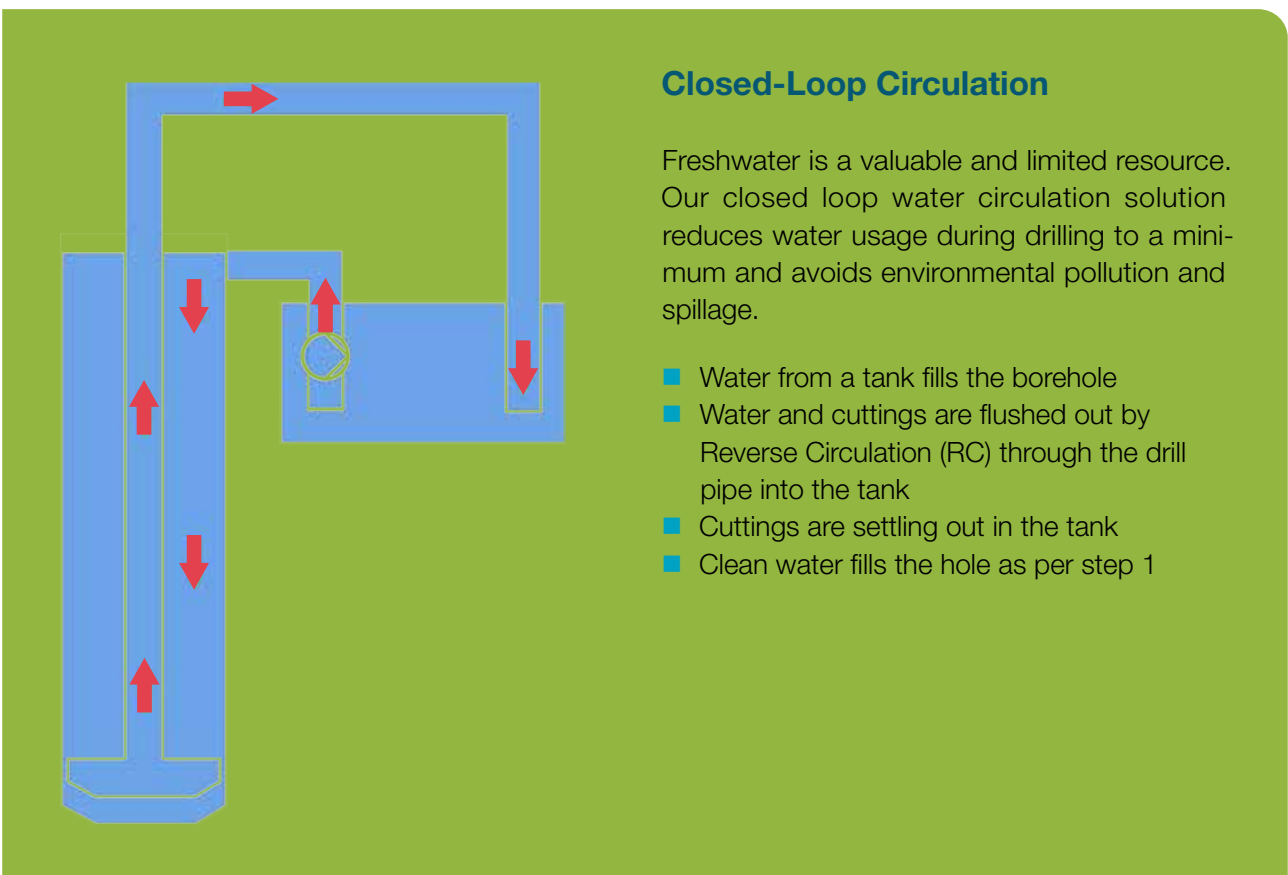
Our Commitment to HSSE and ESG

At HMM, we deliver leading solutions that increase efficiency while reducing our carbon footprint. We promote a diversified workforce, support basic human rights and are an accountable business partner.

We aim to enhance our environmental performance and contribute to the UN environmental pillar of sustainability. Therefore, all HMM facilities across the globe hold the group certification of ISO 14001:2015. UN sustainability goals are vested in our product design, supply chain, project management and operations at all our customer sites.

Wirth™ pile top drill rigs are the preferred solution for projects in environmentally sensitive and residential areas. We comply with required European, US and international standards.

Our Wirth™ power packs are driven by premium class diesel engines. They also allow operation with biodegradable oil, and we follow latest emission standards.



Digital Solutions

HMH's digital solutions support you to optimize drilling performance and efficiency.

Our logging tool RCD Logger™ continuously logs machine and drilling data, such as

- Weight on bit (WOB)
- Rate of Penetration (ROP)
- Torque
- Drilling depth
- Verticality
- GPS data

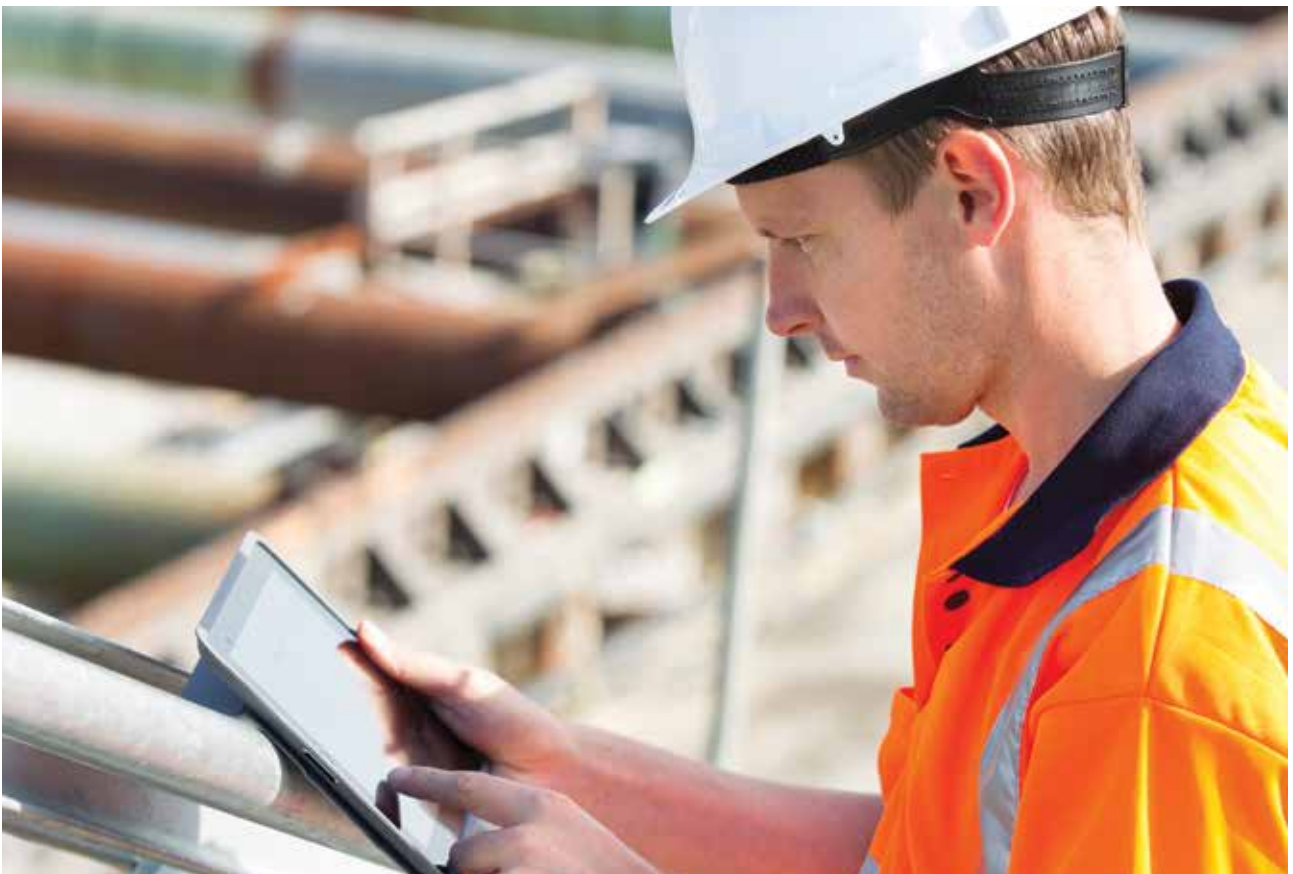
RCD Logger™ is a cloud-based service, providing real-time and historical machine data that can be accessed from any device, such as PCs, tablets, smartphones, etc. Logged data can be exported for further use e.g. for reporting or analysing purposes.

RCD Assist™ provides the operator optimized drilling parameters based on real-time machine and drilling data.

This allows maximum drilling performance, increases efficiency and reduces the CO₂ footprint.

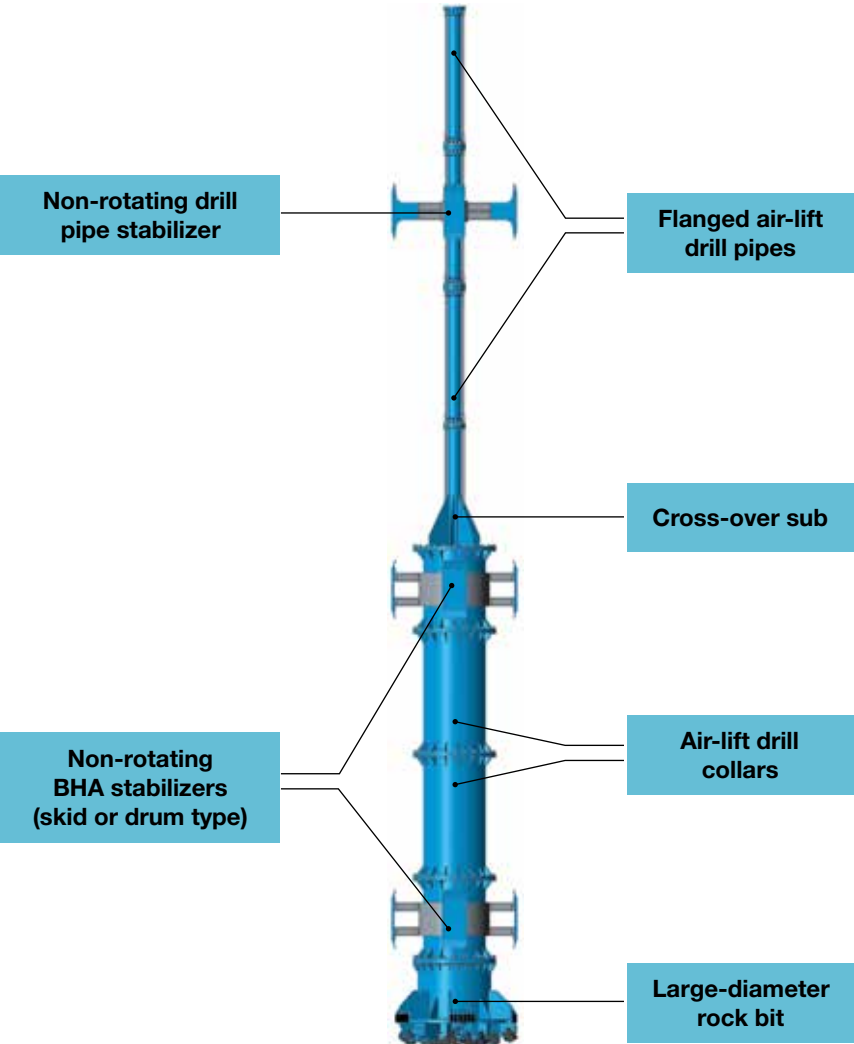
RCD Analytics™ provides an in-depth understanding and analysis of the drilling operation. It analyses performed drilling operations, based on machine and drilling data provided by our RCD Logger™. Reports indicating machine condition, proposals for optimized operational handling as well as borehole certificates stating verticality, depth, etc. can be provided.

Critical HSSE functions such as clamping of the clamping device can be operated via remote control provided by the Wirth™ power pack.



Drill String

With a modular design, our drill strings cover a wide field of applications with various depths and diameters.



Special Tools

In addition to our standard drill rigs, we provide you with special tools for outstanding challenges. The following tools are available:

- Large drilling diameter bits up to 8.5 m (27 ft. 11 in.)
- Rock bits with stinger
- Drill bits with integrated underreamer
- Pneumatic underreamer
- Hydraulic underreamer with rotor and separate power pack
- Milling tools to cut steel/deformed casings
- Steel-pile cutting tools for decommissioning of oil and gas platforms
- Cutters for all geological conditions up to 350 MPa



References

More than 350 Wirth™ pile top drill rigs have proven to be outstandingly reliable and efficient in numerous projects around the world.

China/Hong Kong – Stonecutters Bridge

Wirth PBA
936/3000/300 for
foundation of flyover
piles, each with a
diameter of 3.0 m
(9 ft. 10 in.) and
depths of more than
100 m (328 ft)



France – St. Nazaire Offshore Windfarm

Wirth PBA 928 for
foundation drillings
of France's first com-
mercial offshore wind
park. For this project,
the reverse circulation
drill rig was installed
on a jack-up barge
and drilled piles up
to a depth of 14 m
(46 ft).



Australia – North West Shelf

Wirth PBA
936/3000/300 for
foundation of the
Angel oil and gas
platform; drilling
diameter of 3.0 m
(9 ft. 10 in.) and a
drill string length of up
to 110 m (360 ft)



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Canada/British Columbia – Dockyard Extension

Wirth PBA 612 used to drill piles for extension of the shipyard's capacity. Piles have a diameter of 1.1 m (3 ft. 7 in.) and a depth of up to 100 m (328 ft).



India – Mumbai Port Extension

Wirth PBA 615 for construction of the 2,500 m (8,202 ft) long approach trestle; more than 600 piles with 1.2 m (3 ft. 11 in.) at a drilling depth of up to 45 m (148 ft).



Ghana – Volta River Bridge

Wirth PBA 818 drilling piles for a 300 m (984 ft) long railway bridge, being Ghana's longest railway bridge; drilling diameter 1.6 m (5 ft. 3 in.); raker piles with an inclination of 1:5

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Kroatia – Peljesac Bridge

Wirth PBA 936 and Wirth PBA 615 drilled through clay and rock layers. Drilling diameters between 1.5 m (4 ft. 11 in.) and 2.2 m (7 ft. 3 in.); drill string length: 102 m (334 ft). The rigs were also used for cleaning of perfobond shear connectors of 120 piles.



India – Mumbai Trans Harbour Link

Five Wirth PBAs 818 operated in the Mumbai Trans Harbour Link project, drilling piles with 2.2 m (7 ft. 2 in.) diameter and depths of up to 50 m (164 ft). The 22 km long Mumbai Trans Harbour Link Bridge connects the city of Mumbai with Navi Mumbai, its satellite city.



China/Hong Kong – Mei-Tung Estate

Foundations for high-rise buildings during redevelopment of a residential area; 11 Wirth pile top drill rigs operating at the same time; drilling diameter: 3 m (9 ft. 10 in.) in Hong Kong granite





**Canada/Saint John –
Canaport LNG
terminal**

Wirth PBA 612 for foundation of 60 piles, each with a diameter of 1.12 m (3 ft. 8 in.) and a depth of 80 m (262 ft)



**USA/Kentucky –
Wolf Creek Dam**

Wirth PBA 818/2500/300 for a cut-off wall, with a drilling diameter of 1.27 m (4 ft. 2 in.), depths of up to 90 m (295 ft), rock strengths of up to 150 MPa



**USA/Tennessee –
Boone Dam**

Multiple Wirth PBAs 818 drilled more than 300 piles for an underground cut-off wall in front of an active dam. Piles have a diameter of 1.27 m (4.2 ft) and a depth of up to 80 m (262 ft)



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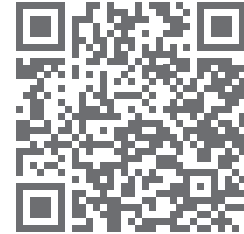
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