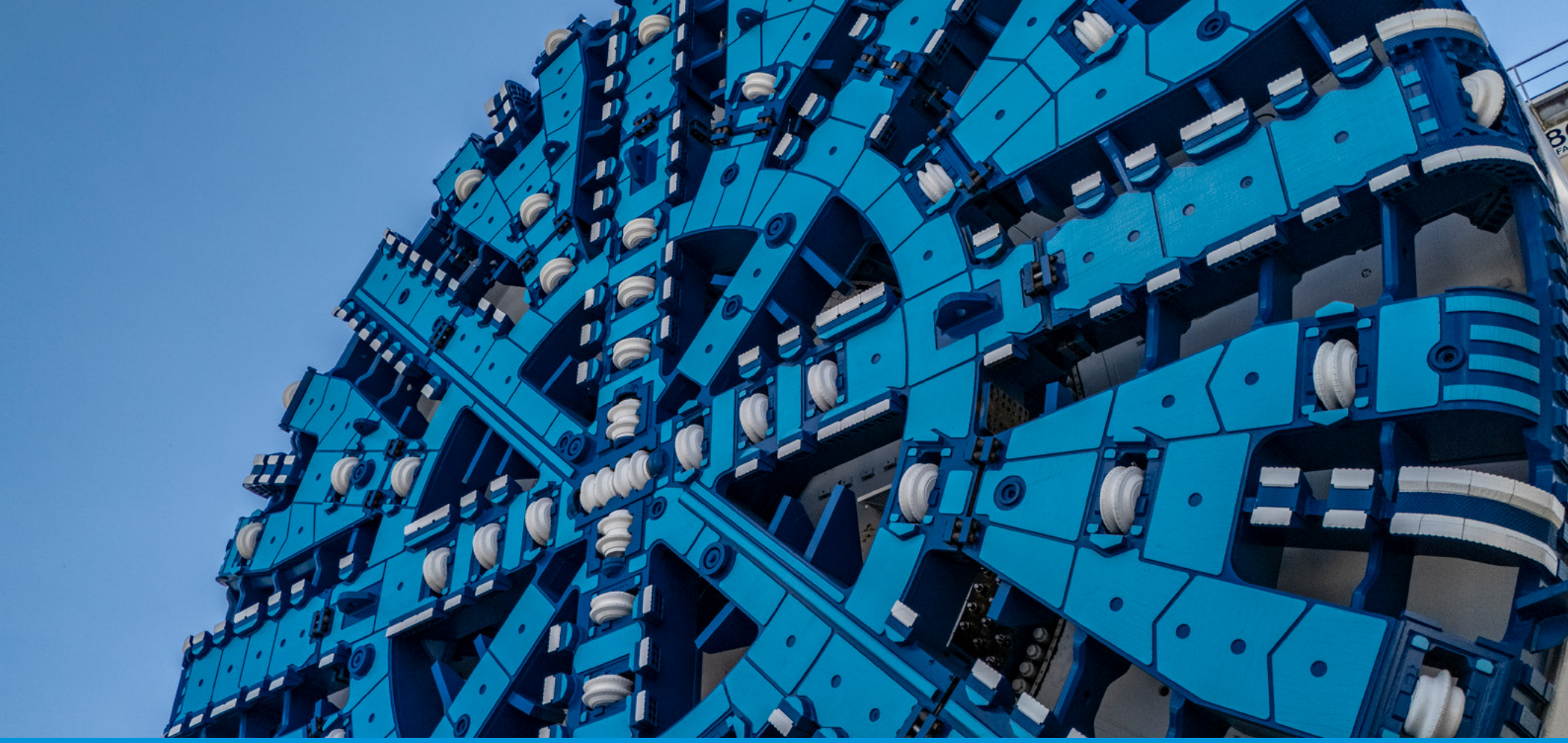


Rothe Erde

Precision and durability in tunneling applications

engineering. tomorrow. together.

thyssenkrupp

Applications for extremely high demands

Rothe Erde is a global manufacturer of slewing bearings, rolling bearings and seamless rolled rings with decades of experience in mechanized tunneling. Since the early days of tunnel boring technology, Rothe Erde has been actively involved in the development of bearing solutions for demanding tunneling applications.

We manufacture slewing bearings with diameters of up to approximately 9,800 mm in a seamless rolled design. Depending on project requirements and installation conditions, segmental bearing solutions with diameters exceeding 18,000 mm can also be supplied.

Applications used in tunneling place particularly high demands on precision, durability and reliability under exceptional operating conditions. Rothe Erde designs and manufactures bearings and rings tailored to individual application requirements, supporting stable and reliable operation throughout the entire service life.

Economic efficiency and reliability throughout the entire operational lifetime are key priorities for Rothe Erde. To consistently meet these requirements, core components are extensively tested and validated in our 11,000 m² research and development center for slewing bearings.

Advanced calculation methods and realistic test conditions ensure reliable performance under high loads and demanding operating environments. As a result, our products have demonstrated dependable performance over decades and are successfully used in a wide range of tunneling and industrial applications.

Scan the QR code to learn more about our solutions and achievements in mechanized tunneling.

Key bearing solutions for tunneling applications

Tunnel boring machines are complex systems in which multiple components must interact reliably throughout the tunneling process. Rothe Erde supplies bearings and rings for the key functional units of tunnel boring machines, supporting controlled movements, force transmission and precise positioning.

The interaction of these components can be illustrated using an Earth Pressure Balance (EPB) tunnel boring machine.

1 Disc cutters

Allow disc cutters to rotate under load, supporting efficient excavation at the tunnel face.

2 Spherical bearing

Compensates angular movements between the cutter head and the machine structure, supporting operation in tight curves or under misalignment.

3 Main bearing

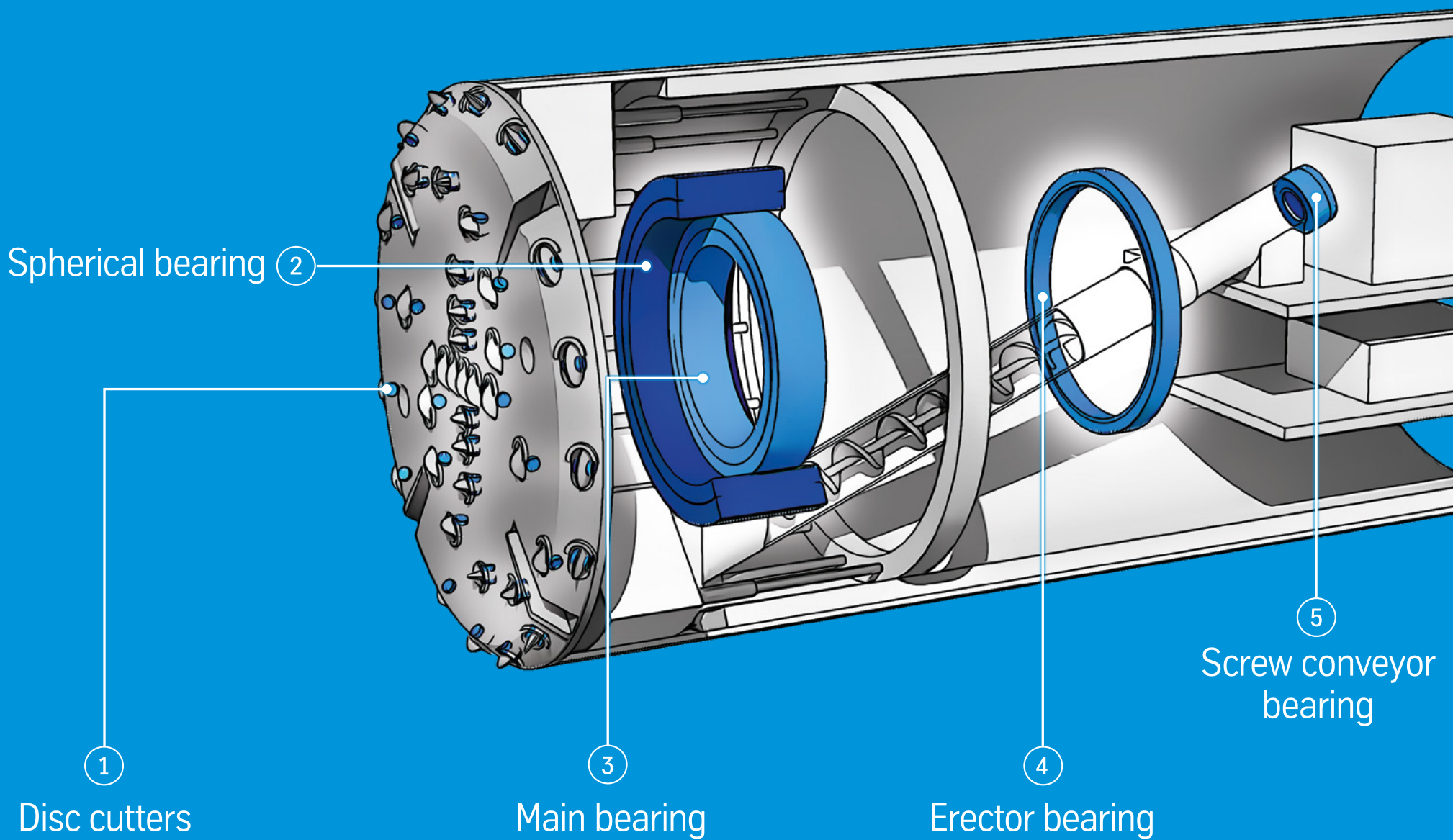
Enables rotation of the cutter head while transmitting thrust forces and drive torque during excavation.

4 Erector bearing

Enables controlled movement and precise positioning of concrete segments during ring installation.

5 Screw conveyor bearing

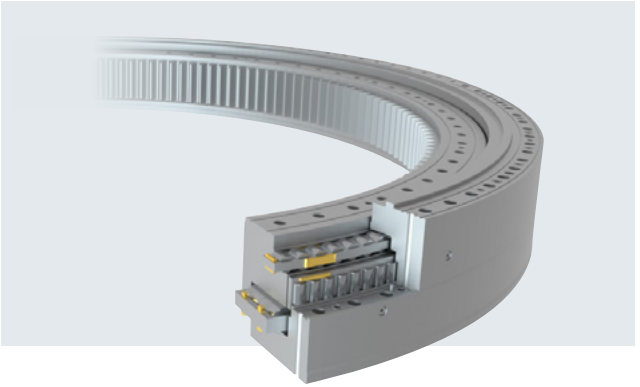
Accommodates rotational movement as well as axial and angular adjustments during material transport.


Spherical bearing 2
1
Disc cutters
3
Main bearing
4
Erector bearing
5
Screw conveyor bearing

One portfolio – multiple bearing solutions

Rothe Erde combines slewing bearings, rolling bearings and rings to provide system-relevant solutions for all major functional units of tunnel boring machines. The product portfolio covers key applications from cutter head rotation and curve compensation to material transport and segment installation.

Depending on specific project requirements and environmental conditions, the bearing designs can also be supplied in segmented versions.



Main bearing

rothe erde® slewing bearings · rothe erde® rings

Rothe Erde product

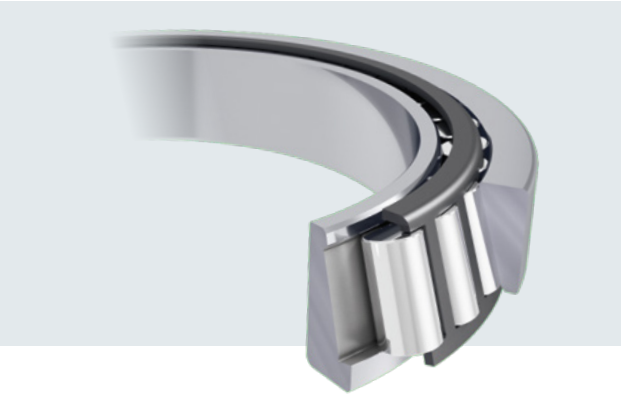
Three-row roller bearing
Gearing options:
– internal gearing
– external gearing
– without gearing (and separate geared ring)
Additional feature:
– preloaded retaining raceway

Function

Connects the cutter head with the thrust system and transmits high axial, radial and moment loads during excavation.

Features

- Three-row roller bearing designs for high load capacity
- Internal, external or non-geared configurations available
- Seamless or segmented designs for large diameters



Disc cutter bearing

psl® rolling bearings

Rothe Erde product

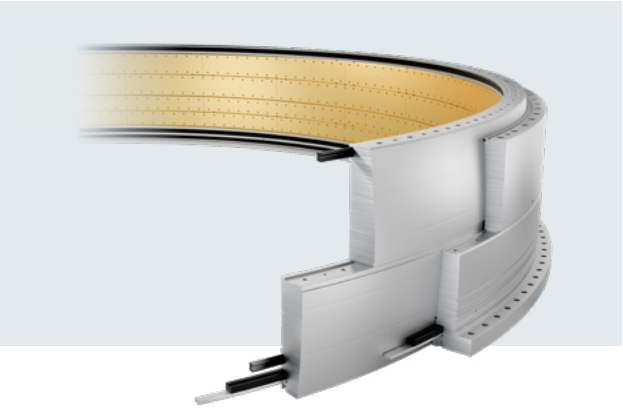
Single-row tapered roller bearing

Function

Allows free rotation of disc cutters while transmitting loads generated at the tunnel face.

Features

- Tapered roller bearing designs for compact installation
- High resistance to shock loads and wear
- Reliable performance in confined environments



Spherical bearing

rothe erde®

Rothe Erde product

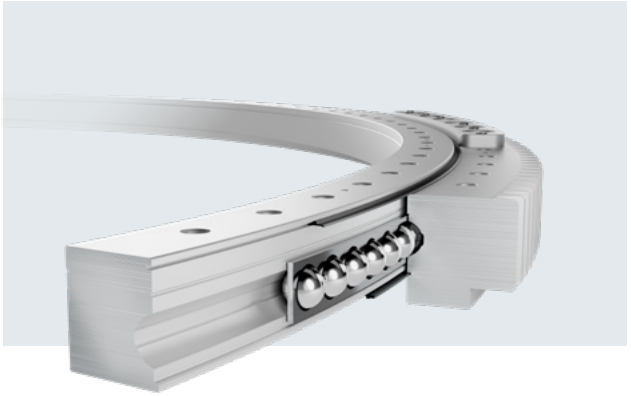
- sliding surfaces

Function

Provides angular compensation between the main bearing and surrounding structures when tunneling tight curves or operating under misalignment.

Features

- Spherical sliding surfaces for controlled angular movement
- Designed to accommodate high static and dynamic loads
- Robust design for demanding tunneling conditions



Erector bearing

rothe erde® slewing bearings

Rothe Erde Product

Single-row four-point contact ball bearing
or cross-roller beearing
- internal gearing
- external gearing

Function

Enables precise positioning and controlled movement of concrete segments during ring installation.

Features

- Four-point contact ball bearing or cross-roller designs
- High positioning accuracy for segment alignment
- Low-friction operation for smooth movement

Screw conveyor bearing

rothe erde® slewing bearings · rothe erde® rings

Rothe Erde product

Three-row roller bearing with
- spherical bearing
- implemented gearing
- sliding elements

Function

Supports rotational movement and required axial and angular adjustments of the screw conveyor during material transport.

Features

- Multi-row bearing concepts for combined loads
- Design options with gearing or sliding elements
- Suitable for continuous operation under harsh conditions

Tuen Mun Chek Lap Kok Link

Hong Kong, China

The major Tuen Mun – Chek Lap Kok Link project in Hong Kong links the airport with the Tuen Mun city district via a gigantic twin-tube road tunnel under the sea. The high safety requirements for vehicle traffic demand cross passages at regular intervals as escape and rescue tunnels between the tunnel tubes.

In order to drill Hong Kong's deepest, longest, and largest underwater tunnel the largest tunnel boring machine was used. The gigantic mixshield with a diameter of 17,630 mm is driven by a rothe erde® slewing bearing.
The production of this type of bearing takes place based on a concrete load spectrum, consisting of axial and radial forces, resulting tilting moments and eccentric axial or radial forces. It is also important to take the speed and duty cycles, as well as the required service life of such a high-performance bearing, into consideration.

Customer	Herrenknecht
Tunnel length	10,518 m
Shield diameter	17,630 mm
Main shield bearing diameter	7,600 mm
Main shield bearing type	four-row roller bearing

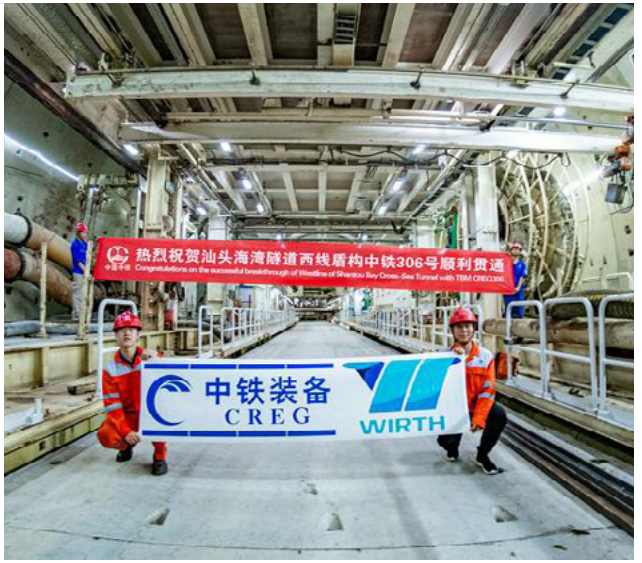
Gotthard Road Tunnel – Second Tube

Switzerland

For more than 40 years, the Gotthard Road Tunnel in Switzerland has run through the mountain range of the same name. The tunnel connects Göschenen and Airolo and, with a length of nearly 17 kilometers, is one of the most important north–south routes through the Alps. Now the Gotthard Road Tunnel gets a second tube. Tunnel construction began in 2022 with the excavation of two access tunnels using two tunnel boring machines equipped with boring shields over 7 meters in diameter. Since 2025, two tunnel boring machines with over 12-meter-diameter boring shields have been excavating the second tube. In three of the four tunnel boring machines manufactured by Herrenknecht, including both of the larger machines, bearings from Rothe Erde enable the boring shield to rotate.

Challenges of the work here include tunneling through hard alpine rock, as well as dealing with heat, dust, and demanding geological conditions. Completion is scheduled for 2033.

Customer	Herrenknecht
Tunnel length	16,900 m
Shield diameter	1 × > 7,000 mm + 2 × > 12,000 mm
Main shield bearing diameter	1 x 3,500 mm 2 x 6,600 mm
Main shield bearing type	three-row roller bearing



Shantou Haiwan Tunnel

Shantou, China

The Shantou Su'Ai Sub-sea Tunnel is a new high-performance road tunnel in the Chinese port city of Shantou.

With three lanes per tunnel tube it significantly improves the connection between the north and the south of the city. 3,047 meters of the 6,680 meter long Shantou Su'Ai Sub-sea Tunnel are being excavated by means of mechanized tunneling using two tunnel boring machines (TBMs). The machine was launched on October 26th, 2018 from the southern bank and successfully completed the Western Route tunnel on August 7th, 2020, which runs entirely under the South China Sea.

Customer	China Railway Tunnel Group Co., Ltd. (CREG)
Tunnel length	3,047 m
Shield diameter	14,960 mm
Main shield bearing diameter	7,600 mm
Main shield bearing type	three-row roller bearing

Moscow Metro 3rd Transfer Line

Moscow, Russia

In 2017, five sets of 6m-class Earth-Pressure-Balance machines started launching (one after the other) at Moscow Metro Southwest Ring Project, where the record of 35 m a day was achieved.

The Moscow metro southwest ring section has a length of 4.6 km, with designed segment outer diameter of 6 m. The section mainly consists of clays and sand layers, rich of pressure water. The line has high slope and small turning radius with some concrete walls to drill through. Due to the extreme coldness in winter, CRCHI developed a drive unit, which can endure –30° low temperature, with additional hydraulic pump stations and converters as auxiliary heaters, which show excellent adaptabilities in extreme cold weather.

Due to the excellent performances of the five sets of 6 m-class EPBs, Moscow Metro placed an additional order for this 11 m-class large diameter shield machine.

Customer	China Railway Construction Heavy Industry Co., Ltd. (CRCHI)
Tunnel length	2,947 m
Shield diameter	10,840 mm
Main shield bearing diameter	6,010 mm
Main shield bearing type	three-row roller bearing

DECARBON TECHNOLOGIES
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