
Advanced tunnelling technology

Components for tunnel
boring machines

LIEBHERR

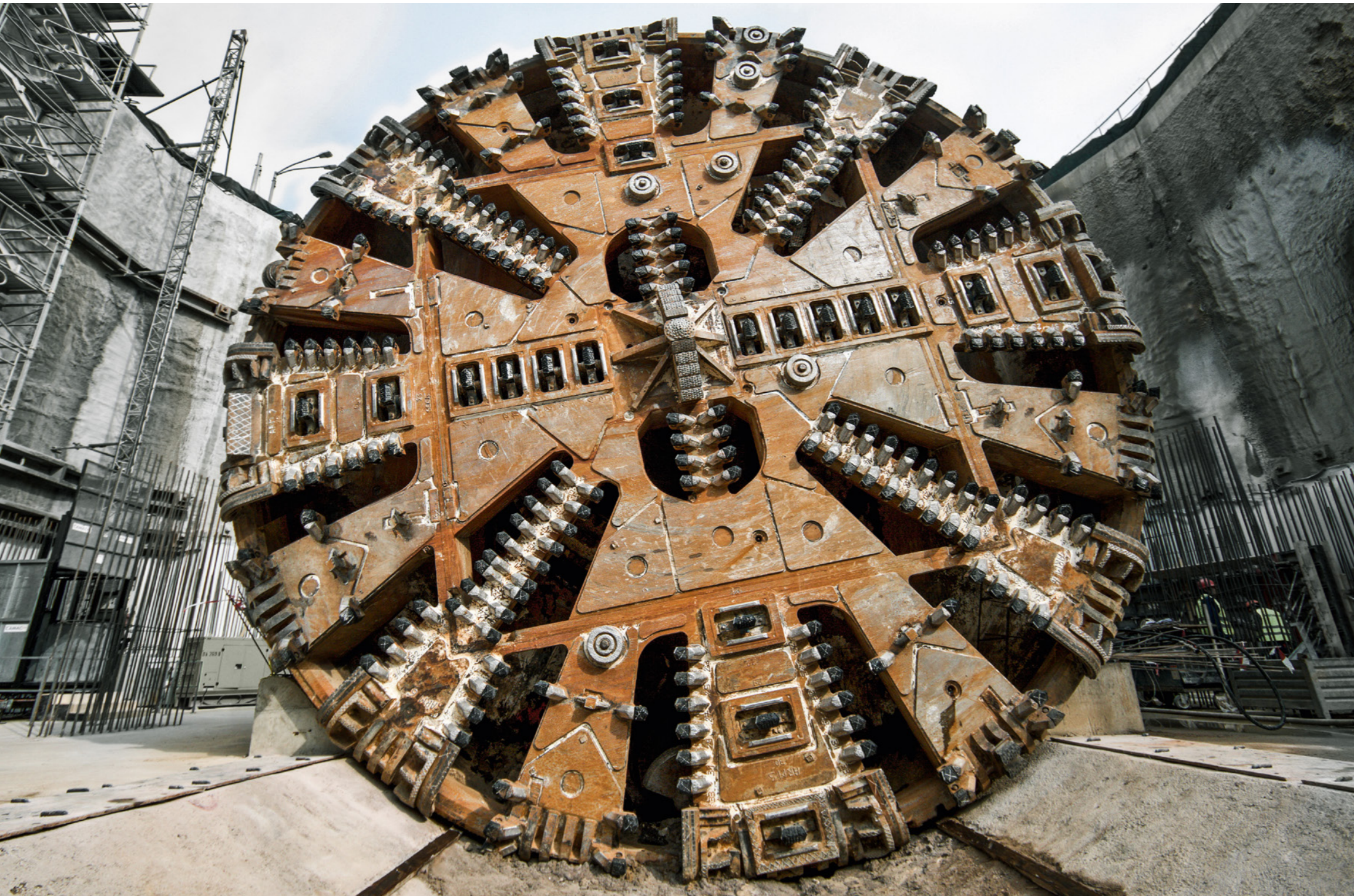
Components



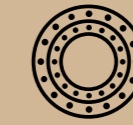
A strong partner for tunnelling applications

Liebherr is one of the world's leading manufacturers of components for construction machinery, maritime applications and many other fields of industry. Components by Liebherr have been used in tunnelling projects around the world for several years. Thereby, Liebherr relies on over 60 years of experience in the development, design and

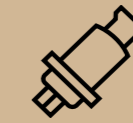
manufacturing of these products. The components are produced at our sites in Biberach an der Riss (Germany), Bulle (Switzerland) and in Dalian (China), for application both within and outside the Liebherr Group.



Components



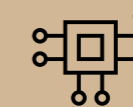
Slewing bearings



Drive technology



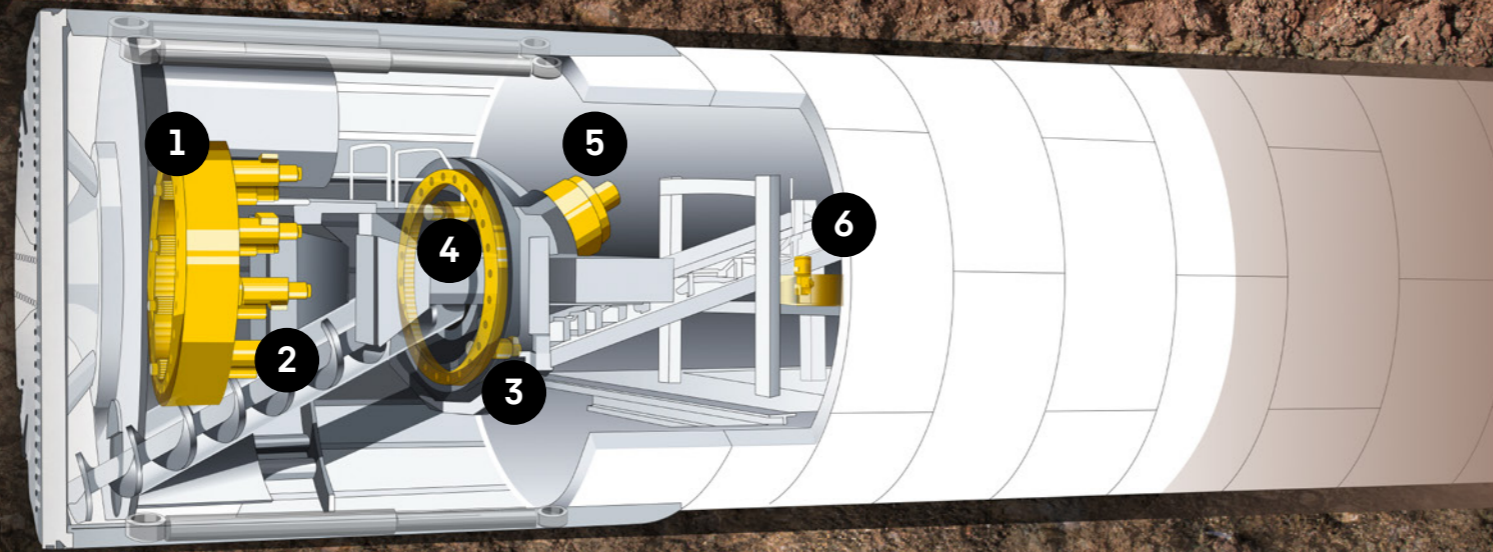
**Axial piston pumps
and motors**



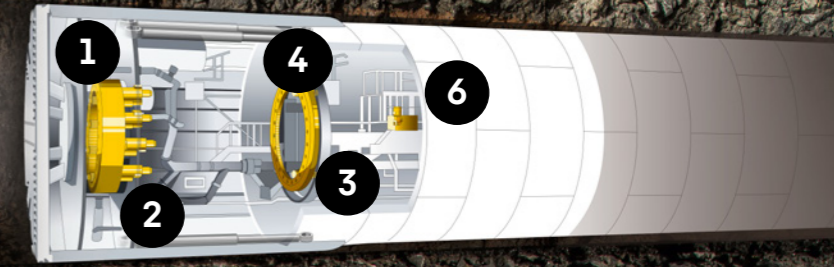
Electronics

Machine types

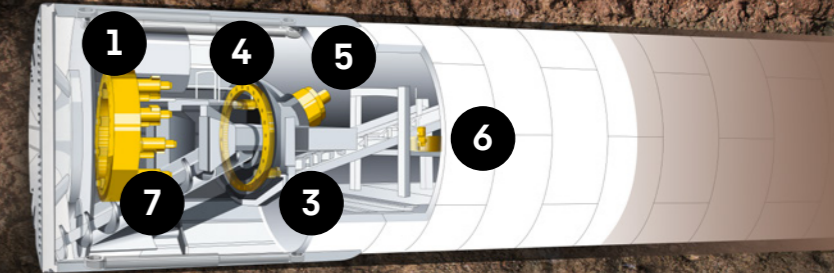
Earth pressure balance (EPB)



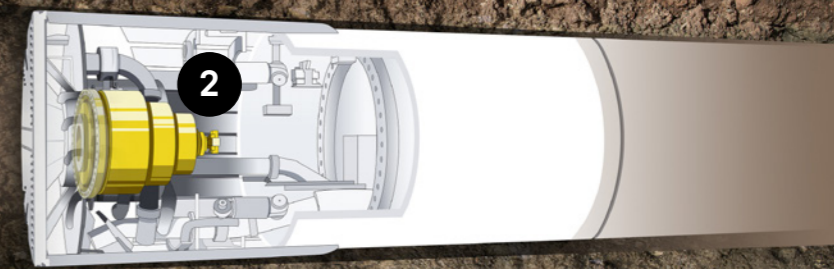
Hard rock



Dual mode




Micro



- 1 Main bearing**
 - proven customer track record
 - optimised wear opportunities
- 2 Main drive**
 - small installation space
 - high power density
- 3 Erector bearing**
 - resistant to deformation
 - low torque resistance
- 4 Erector drive**
 - high-precision movement
 - compact design
- 5 Screw drive**
 - integrated cooling system
 - hydraulic- or electric-driven
- 6 Axial piston pumps and motor**
 - open circuit
 - various sizes and controls
- 7 Shift gears**
 - combine operation models for hard rock and EPB
 - reduce downtime

Request data

Send us your enquiry online at liebherr.com:

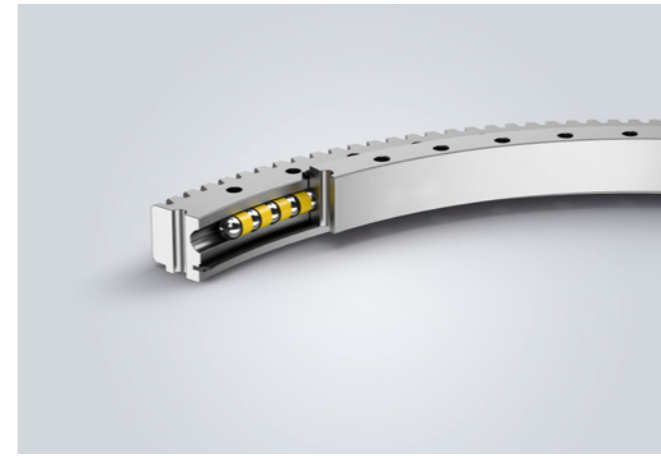
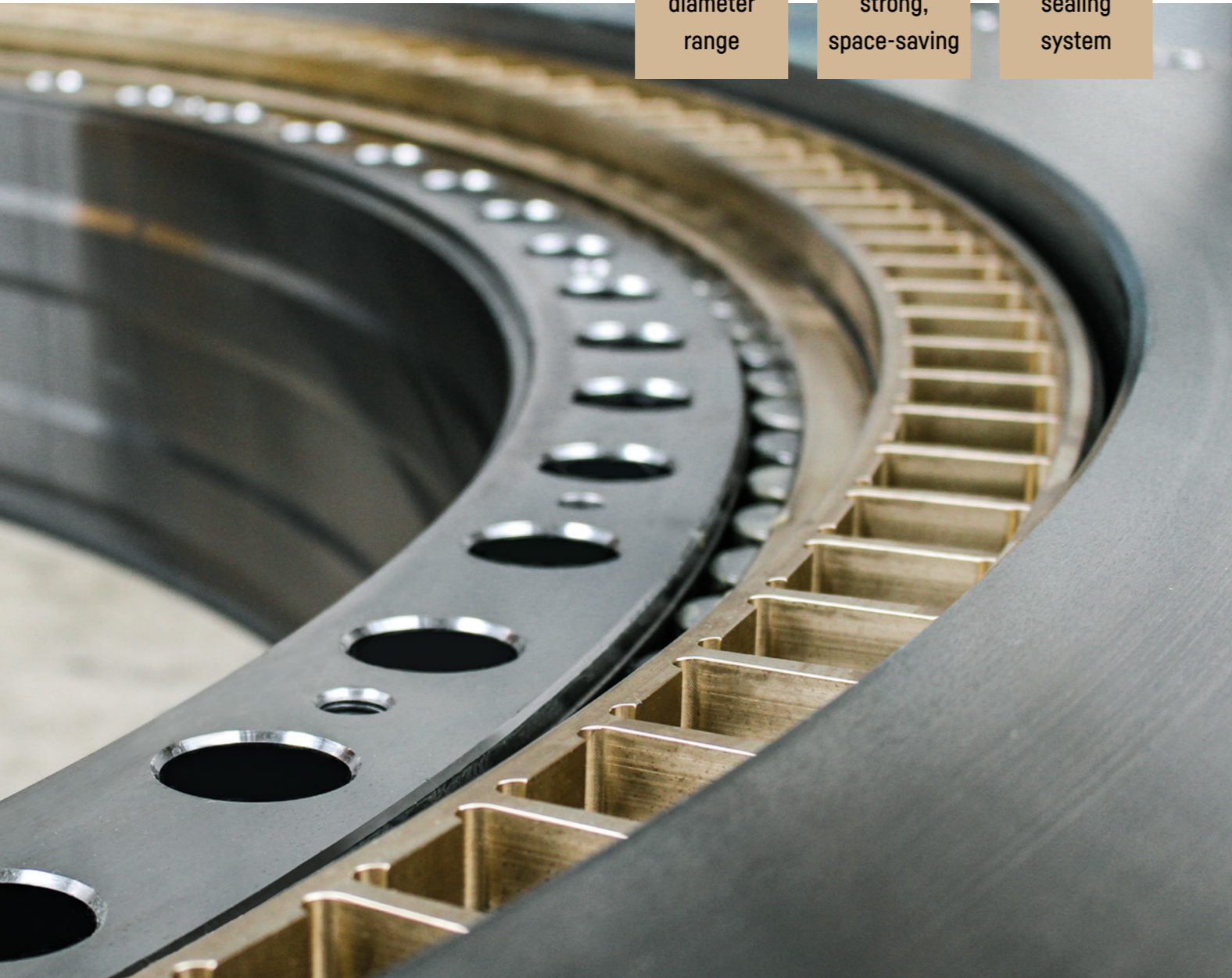


Slewing bearing

large diameter range

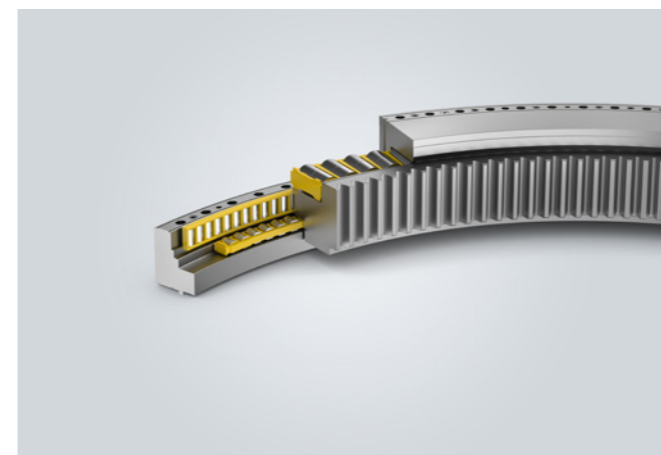
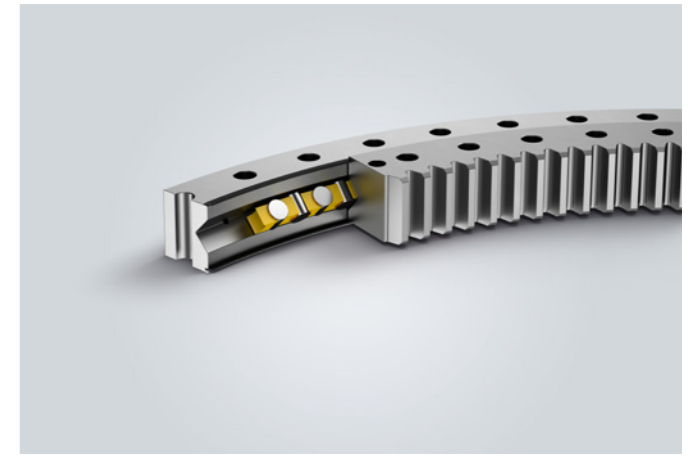
sturdy, strong, space-saving

complete sealing system



Erector bearing

Single-row four-point bearings and cross-roller bearings are used to position the lining segments in an erector system.



Main bearing

Main bearings connect the cutter head with the thrust system and carry all the cutter head loads for a secure and continuous operation. Therefore, three-row cylindrical roller bearings are perfectly suited as main bearings. As an alternative, the Liebherr portfolio also includes double-row tapered roller bearings.

The right bearing for any application

The main parts of a tunnel-boring machine are a rotating cutting shield, followed by a main bearing, a thrust system and a trailing support mechanism. The slewing bearings by Liebherr are specifically developed for EPB, hard rock and other types of shields. Liebherr produces bearings with both internal and external gearing, and also without any gears.

The bearings are available in a diameter range of up to 9,000 mm. They have already proved themselves in different subway projects, for example in Mumbai (India), London (UK) and Qingdao (China).

Your bearing competence partner

Relying on our outstanding bearing expertise and advanced engineering methods, we offer our customers detailed engineering support to identify the best solution according to specific project requirements.

Our success factors are high engineering competence, reliable products, as well as high production and service standards. All parameters combined are vital for a successful and long-lasting partnership.

Drive technology



customised
gearbox
design

state-of-
the-art
technology

wide
ratio
range

Your partner for drive technology

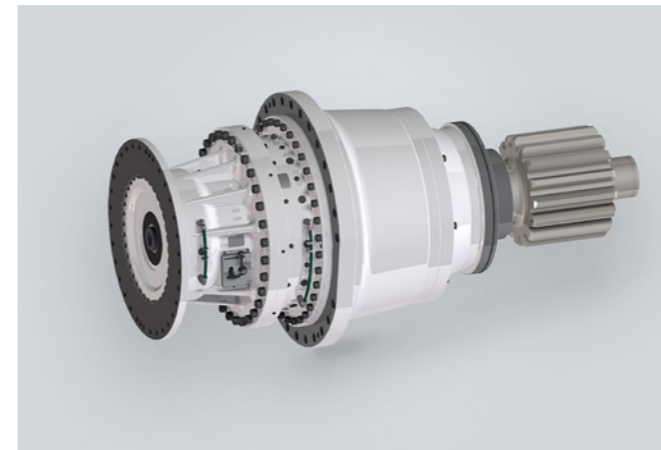
Liebherr tunnelling gearboxes are designed for harsh operating conditions in rough environments. They impress by their sophisticated modular construction and maximum flexibility. Within the standard series, the gearboxes enable dynamic output torques of up to 610,000 Nm. Our technical expertise also enables customised and individual designs.

The great variety of Liebherr gearboxes makes it possible to equip any type of tunnel-boring machine. Our tunnelling portfolio includes erector drives, screw drives, central drives as well as shift gears.

Cooling and sealing systems

The gearboxes are equipped with a specially developed cooling system that keeps the temperature of individual components low. This, in turn, increases the life expectancy of the components, and considerably extends the time between oil changes and maintenance intervals.

Liebherr has also developed a sealing system with pressure-resistant seals, as an option. This increases operational safety under harsh environmental and operating conditions.



Shift gears for cutter heads

Liebherr shift gears allow for the modification of the whole drive train ratio in the field during tunnelling works. Consequently, it is possible to tune the working parameters of the cutter head accordingly.

Therefore, the same machine functions in different operation modes: be it hard rock or EPB (earth pressure balance). Hence, no decision has to be made about the machine type for the run-up to a TBM project.

Condition monitoring

Liebherr's portfolio of components for tunnel construction also offers the opportunity of condition monitoring.

The gearbox series can be optionally equipped with oil particle sensors, oil level sensors and temperature monitoring sensors to provide a rapid and safe overview of the operating conditions. In addition, load measurement can be integrated.

All individual Liebherr components match each other perfectly to comply with customer requirements. Therefore, it is possible to use them as an integrated drive system, such as in the cutter head of a tunnel-boring machine.

Our vast experience in mining enables us to provide special service kits that help to extend the performance of your tunnel-boring machine.

Axial piston pumps and motors

fixed and variable displacement

stable and reliable operation

robust design



Liebherr designs variable displacement pumps for the open and closed circuit. These pumps enable the optimal running of tunnel-boring machines by supplying the hydraulic motors and cylinders with the amount of required oil flow and high pressure at any given time.

Our DPVO hydraulic pump product family for the open circuit is characterised by a nominal pressure of 400 bar. At a selected nominal size of 215 cm³ the pump is able to achieve a speed of 2,600 rpm.



Our variable displacement pumps and motors operate stably, even in challenging working conditions as required by tunnel-boring machines.

The DMVA motor for the open or closed circuit is both available as a single unit or as a double motor. It operates at a nominal pressure of 450 bar. The double motor is able to achieve a maximum speed of 3,000 rpm if a nominal size of 330 cm³ is chosen. The single motor, in turn, is able to achieve a maximum speed of 3,350 rpm at a nominal size of 108 cm³.

Furthermore, Liebherr offers plug-in motors i.e. to drive the screw conveyor together with a planetary gearbox.

Our FMF fixed displacement motor operates at nominal pressures of 350 or 380 bar depending on its size. It is able to achieve a speed of 5,180 rpm using a nominal size of 32 cm³.



The right solution for your tunnel-boring machine

Liebherr axial piston pumps and motors have proven their reliability and robustness in various industries and applications worldwide, including mining. Our pumps and motors

withstand the harshest environments and work their way through kilometres of soft and hard rock with ease.

Electronics

specifically
designed for
your application

powerful
and
efficient

uniquely
robust



Camera-monitor systems

- True-colour and detailed HD images even under challenging lighting conditions – with an illuminance level of 1 millilux
- Several smart functions to process the image in the camera itself
- Robust solution for demanding environmental conditions



Gateways

- Future-proof and flexible due to open programmability
- Easy cloud connection and edge computing for data preprocessing
- Data security with our chain-of-trust concept

Human-machine interfaces

Display and operation units from Liebherr impress with their ergonomic design and connectivity. They can be easily integrated in user-friendly human-machine interfaces.

IoT gateways

Telematics units by Liebherr provide ample scope for your applications. The powerful hardware enables far more application possibilities compared to conventional telematics products. The open software environment allows the development of process-orientated applications.

Test centre for electronics

Latest technologies and smart solutions

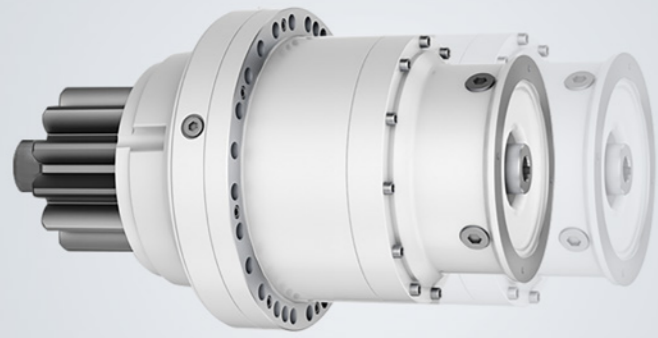
In Lindau (Germany), Liebherr operates a competence centre for electronics – including a test centre with state-of-the-art testing and measurement technology that realistically simulates environmental influences.

Throughout their entire life cycle, electronic products are subject to a wide range of environmental influences, such as extreme temperatures, vibrations or electromagnetic radiation.

Intensive testing does not only improve the performance and service life of our devices, but also ensures their functionality throughout the entire life cycle.

Our success factors are high engineering competence, reliable products as well as high production and service standards. All parameters combined are decisive for a successful and long-lasting partnership.

Innovations



More power within less space

Thanks to a compact design and an optimised planetary carrier design, up to 25% installation space can be saved.



Safe and sealed

The complete sealing systems safely protect the TBM against pressure from outside and against penetrating dirt. The sealings of the slewing bearings consist of shaft seals, hardened seal races, seal carriers and corresponding intermediate rings. Additionally, the service seal, which was developed in cooperation with a seal manufacturer, ensures greater safety. If the seal package fails, the service seal can be activated by compressed air and thus protects the raceway system.



Customer Service

Always at your side

Service

Competent specialist personnel can be at the site quickly, if required. This helps to minimise downtimes. Furthermore, our customers can take advantage of technical advice and support from specialists at our production sites.

Training courses

Professional maintenance and repair make a significant contribution towards maximum exploitation of Liebherr components' lasting character. Our experienced employees are happy to pass on their specialist knowledge to customers and sales partners in the course of training. The company has its own training centres at the production facilities for this purpose. If necessary, we can also run training courses directly on-site.

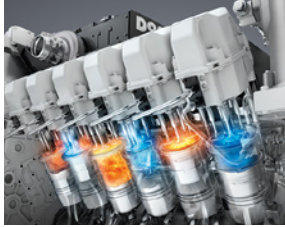
Spare parts

Original spare parts are available for all components from Liebherr. The extensive internal quality assurance system checks ensure, along with our components themselves, that these meet the highest demands in terms of perfection and performance.

Reman program

Within the scope of the Reman Program, used Liebherr components are remanufactured in accordance with industrial standards.

Components



Diesel engines



Fuel injection systems



Axial piston hydraulics



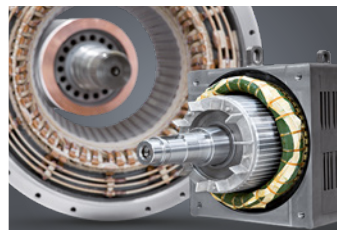
Hydraulic cylinders



Slewing bearings



Gearboxes and winches



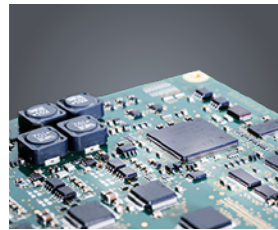
Electric machines



Remanufacturing



Human-machine interfaces and gateways



Control electronics and sensor technology



Power electronics



Control cabinets



Software

From A to Z – the component product segment of the Liebherr Group offers a broad range of solutions in the areas of mechanical, hydraulic, electric and electronic drive system and control technology. The efficient components and systems are produced at ten production sites worldwide to the highest quality standards. The central point of contact for all product lines are available to our customers at Liebherr-Component Technologies AG and the regional sales and distribution branches.

Liebherr is your partner for joint success: from the product idea to its development, production and commissioning right through to customer service solutions like remanufacturing.

components.liebherr.com

LIEBHERR

Liebherr-Components AG · Post box 222 · 5415 Nussbaumen, Switzerland
+41 56 296 43 00 · components@liebherr.com · www.liebherr.com



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