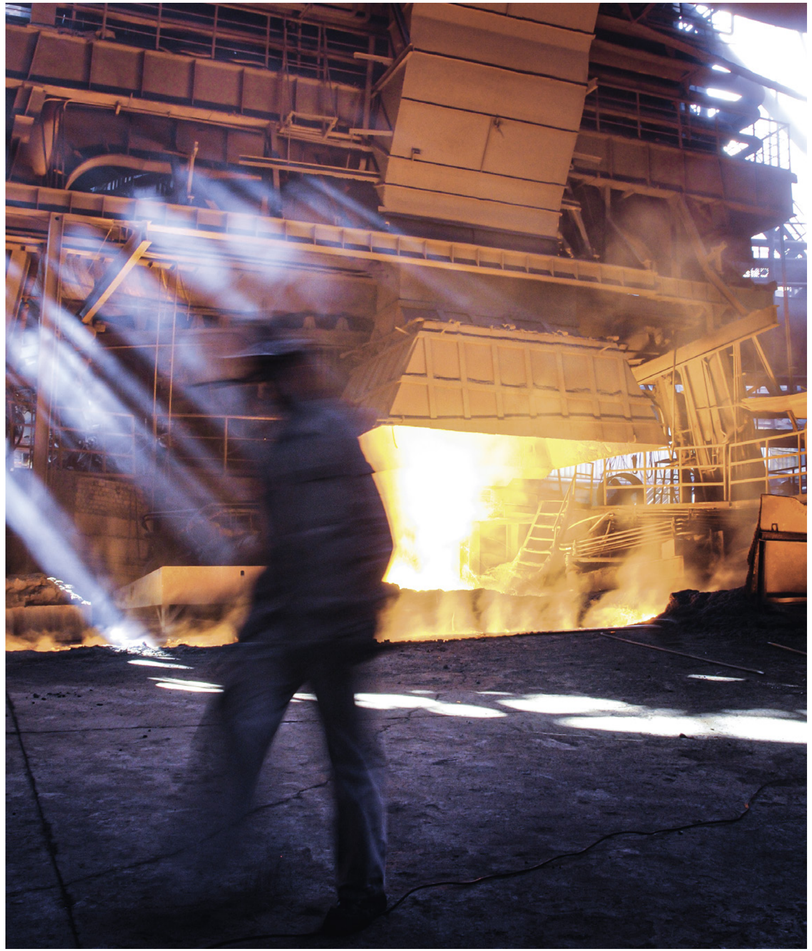
thyssenkrupp rothe erde

Steel mills

Metal
Works
Engineering

thyssenkrupp



Our partners understand: our products are made for tough environments.

We at thyssenkrupp rothe erde are the leading global manufacturer of slewing bearings, rolling bearings and one of the largest producers of seamless rolled rings. Every month more than 7,000 employees transform 15,000 tons of steel into customer-specific solutions. Every day, we contribute to keeping everything rolling smoothly – with production facilities all around the world. Through our many years of experience, we understand our clients' applications, challenges and needs.

From beginning to end and beyond: rely on quality – for a lifetime

A steelworks plant produces steel out of iron ore. Much of the equipment required for the production of steel is equipped with either ball bearings or roller bearings. thyssenkrupp rothe erde individually develops, manufactures and maintains products for steelmaking technology.

The requirements of the equipment used in the production of steel are extreme and only the best performance is acceptable. With our expertise in design and manufacturing, we can provide the highest quality slewing bearings designed to work in these difficult conditions. We offer a variety of sealing systems designed to keep your bearings functioning as long as possible. We bring all of the important elements together and offer quality to our clients.

We are there when you need us.

Expertise, experience, global presence and competence in solving problems are the building blocks of the first-class service from our highly qualified and specialised team – as well as guaranteeing satisfaction for your requirements. Make thyssenkrupp rothe erde your partner for all services relating to slewing bearings!

The route to steel

Bearings used in steel production applications must provide the utmost reliability. In addition, the challenging operational and environmental conditions require extremely robust bearings to ensure they are able to support the ongoing production cycles. This is why we develop bearings at thyssenkrupp rothe erde.

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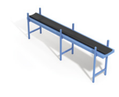
2 Handling cranes

3 Ship loader

4 Bucket wheel excavator

5 Stacker/reclaimer

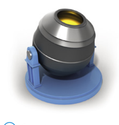


6 Belt conveyor

7 EAF cover

8 Ladle metallurgy furnace

9 Ladle transfer car



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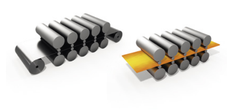
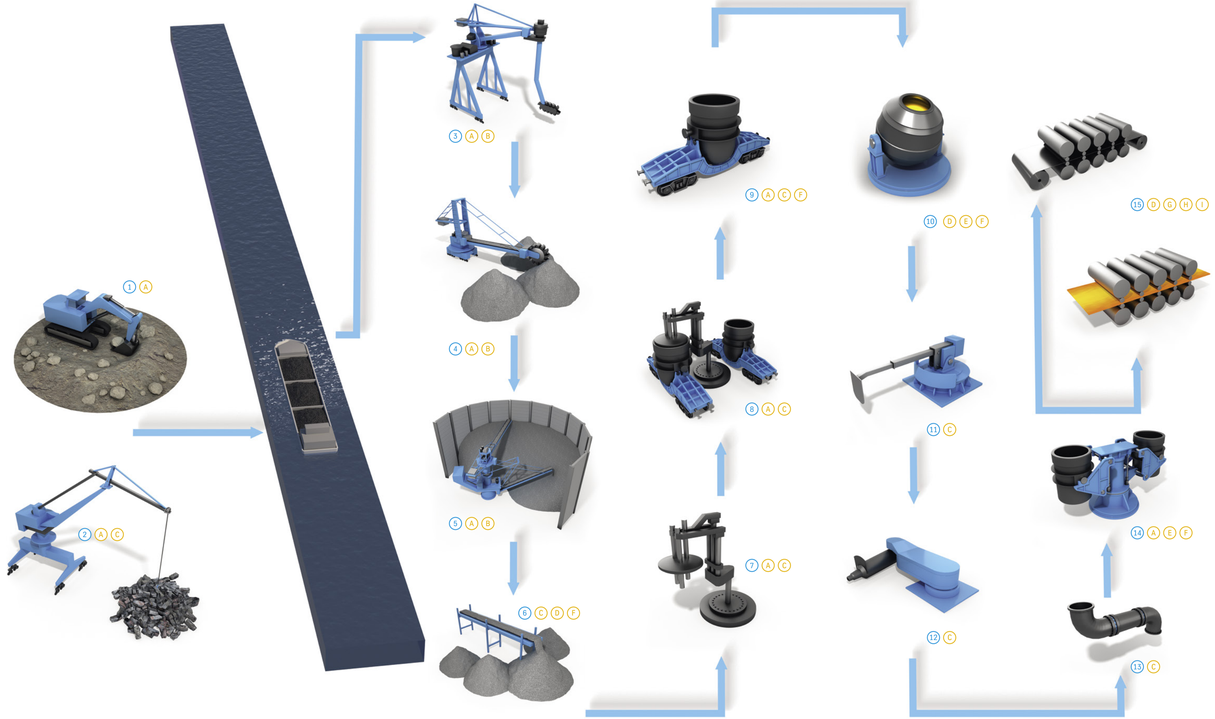


15 Strip rolling mills



A

Three-row roller bearings
Our rothe erde® three-row roller-bearing slewing rings combine the ability to absorb heavy loads with the promise of a long service life. Three-row roller-bearing slewing rings can be purchased either with exterior or interior gearing or entirely without gearing.

B

Combination bearings
rothe erde® combination bearings allow for the advantages of balls and rollers to be combined. On this type of bearing, the roller raceway transmits the axial loads and the ball raceway the radial loads.

C

Four-point bearings
Thanks to their simple yet robust design, our rothe erde® four-point bearings are an ideal economical, reliable and durable solution to your bearing needs. This design is relatively resistant to deviations in companion structure. They are an ideal compromise between economical and technical demands.

D

Tapered roller bearings
In our psl® tapered roller bearings, the tapered rollers run in designated cages on the raceways. They are ideal for simultaneously absorbing radial and axial loads. The point on the bearing's axis where contact occurs ensures a low-friction operation and correct rolling. The fact that the bearings can be separated makes them easy to assemble and to adjust.

E

Split cylindrical roller bearings
The split psl® cylindrical roller bearings consist of bearing rings and cylindrical rollers that are guided between equally cylindrical contact surfaces. On the outer, and less frequently on the inner ring, there are shelves that guide the roller set with the cage. They feature mainly very high radial load capacity. Customised design solutions with split rings and cages enable easier assembly at the site for heavy steel mill applications.

F

Spherical roller bearings
psl® spherical roller bearings can absorb large radial loads and the effects of the axial load in both directions simultaneously. The psl® spherical roller bearings' raceways allow for the reciprocal tilting of the rings during operation. This ensures the even distribution of loads on the rolling elements, even with the smallest shaft deflections or in cases of the axial alignment of the ring's contact surfaces being non-compliant.

G

Four-row tapered roller bearings
psl® multi-row tapered roller bearings are best suited for absorbing large radial forces. This type of bearing is designed for low to medium rolling speeds. Thanks to the design of our bearings, the high axial loads typically found on radial loads can also be absorbed. Thus, in general, there is no longer a need for a separate axial bearing.

H

Four-row cylindrical roller bearings
Since multi-row psl® cylindrical roller bearings can only absorb radial loads, they are installed in combination with deep-groove ball bearings, angular ball bearings or axial tapered roller bearings, which absorb the axial loads. Multi-row cylindrical roller bearings are never latching, which means all bearing parts can be installed or disassembled separately from the free bearing rings.

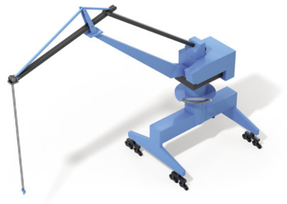
I

Tapered roller thrust bearings
The single- and double-row direction psl® tapered roller thrust bearings are rigid bearings with high loading capacity that are perfect for the absorption especially of axial loads in one direction or both directions. Components of thrust bearings can be fitted separately.

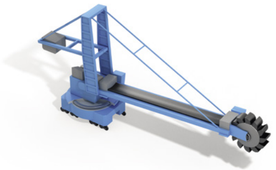
Note: in addition to the common bearing types shown here, other series can also be used depending on the application and load specifications of our customers.

Applications

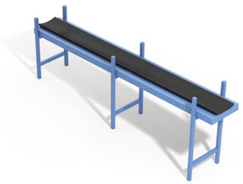
Mining excavator
The term ‘mining excavator’ refers to the largest excavators with a bucket capacity of over 50 tons of material weight. These machines are mainly used in mines for the extraction of coal, ores, and other raw materials. The machine’s high level of mobility is its advantage over bucket excavators. This is achieved by means of the bearing, which ensures a connection between the upper structure and chassis of the excavator, enabling it to rotate around the whole work area.



Handling cranes
Port operations, handling and shipyard cranes offer essential support in transporting products, goods and parts. These cranes are often rail-mounted and characterised by their reliable technology and high durability. Since bearings made by thyssenkrupp rothe erde can withstand the toughest demands and operate under extreme load conditions, they have already been used as loading and shipyard cranes around the world.

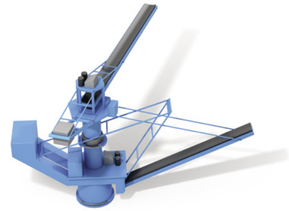


Bucket wheel excavator
The bucket wheel excavator mines bulk material stored at the end of the conveyor line in a targeted and continuous manner. The excavator consists of a chassis, a feeder of the materials to be stacked and a rotatable upper structure with the ejection trailer. Spoil piles coming from the conveyor belt can be filled again at another location with a spreader. Slewing bearings made by thyssenkrupp rothe erde ensure the chassis and the upper structure are reliably connected. The excavator is a lifting device for heaped material, which needs to be transported from a stockpile for further processing. The diverse selection of models ensures all kinds of storage locations are catered to. Since swivel movements have to be carried out to remove a stockpile, our slewing bearings of varied dimensions are also put to use here.



Belt conveyor
Belt conveyor modules are used in mines to transport coal, metals etc. in a straight line, when there are changes in elevation. High levels of dust and dirt accumulation as well as heavy loads can be challenging for the bearings in a conveyor. This is where our four-point bearings made by thyssenkrupp rothe erde come into play. They are ideal for every type of use in the field of conveyor belt technology, whether as a connection to tripper cars, stacker or other applications.

Ship loader
Ship loaders and ship unloaders are important in ensuring the efficient transportation of bulk goods along the shipping route. Coal, ores, phosphate, sulphur and fertilisers are fed onto continuously operational conveyor belts, and deposited into the vessel to be transported on a cantilever by means of the ship’s open loading hatch. For the ship to be optimally filled, it has to be moved under the cantilever. Elaborate manoeuvring can be avoided if the cantilever’s unloading system is movable.

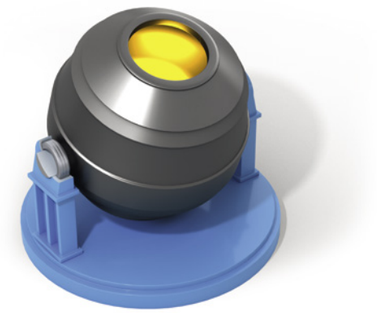


Stacker / reclaimer
The stacker / reclaimer is a versatile stockyard machine. Several types of materials can be stacked in the same stockyard since the reclaimer is able to move and retrieve the exact material required. In addition, multiple reclaimers can be installed in one stockyard.

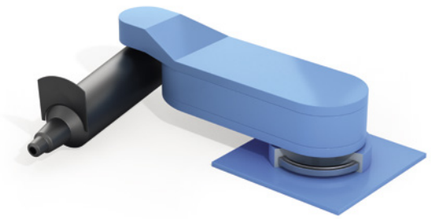
Electric arc furnace (EAF) cover
Industrial-sized furnaces are used to heat and melt material via electric arc. The EAF roof must be swung out of the way in order for the charging bucket to load the furnace with scrap.

Ladle metallurgy furnace (LMF)
The LMF is used to refine molten steel into speciality grades while remaining in the ladle. LMFs are used to superheat to required tapping temps for subsequent casting operations. They allow flexible scheduling between availability of caster and readiness of molten steel from the furnace.

Applications

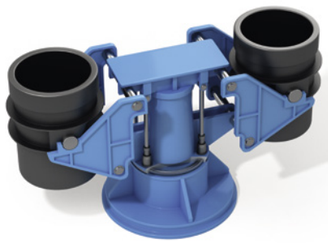


Converter
Converters are used to produce steel out of unrefined iron. To ensure that several hundred ton-heavy skip vessels remain mobile, converter bearings are used. Very slow swivel movements combined with regular shock loads demand a very high static load-bearing capacity. Our converter bearings for this sector are designed to withstand high loads against the backdrop of a low number of rotations, while reducing the risk of permanent deformation.

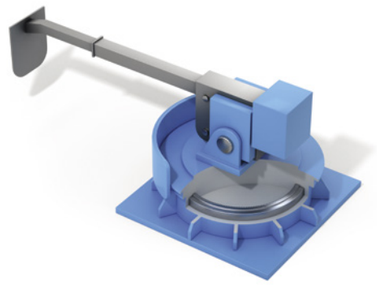


Lance slewing mechanism
In steelmaking, carbon found in unrefined iron is oxidised via a targeted supply of oxygen. Lance slewing mechanisms are used in this process. thyssenkrupp rothe erde develops slewing bearings specifically for this application. These bearings are designed to safely withstand the extreme environmental conditions.

Vacuum swivel joints
Swivel joints are movable parts of a pipe. They are used to transport fluids or gases between two system parts that move relative to each other. This presents a unique challenge during construction: the swivel joints must be able to carry out pivotal movements and slow swivel movements simultaneously, within a radius of 360°.

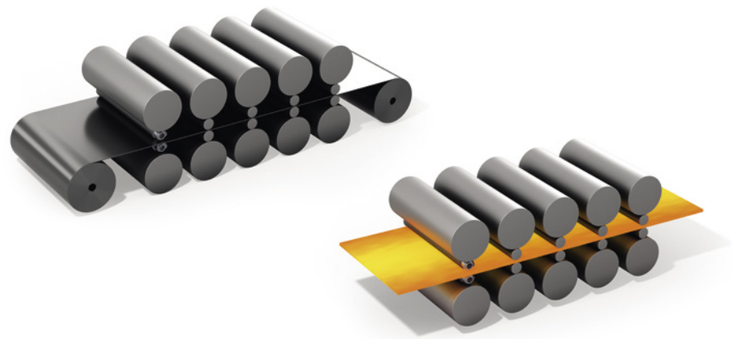


Ladle turret
When each batch of molten steel leaves the LMF, it is the proper chemistry and temperature for casting. The ladles of steel are placed in a turret that is rotated atop a slewing ring. This allows for efficient continuous casting of molten steel by keeping the supply constant. When one ladle is empty, another rotates into place and continues to pour. There are typically two types of turrets: stiff or fixed-arm turrets and adjustable-arm turrets. The ladle turret and swifter are in permanent use and set in their loading position. Roller bearing slewing rings made by thyssenkrupp rothe erde are used here: they guarantee the uninterrupted operation of the continuous casting line and can withstand extremely high loads.



Slag skimmer
Slag skimmers are designed to remove the slag layer from the surface of molten steel, leading to increased efficiency and decreasing double-slag heats. When not removed from the molten bath, slag can freeze, cause bridging, remain mixed with metal and compromise the quality of your castings.

Ladle transfer car
Ladle transfer cars are used to carry hot metal ladles within the mill. With weight capacities of up to 300 tons, a ladle transfer car is required to carry much heavier loads than most. Our slewing bearings are used to ensure the car stays mobile.



Strip rolling mills
Strip rolling mills are used to reduce the strip thickness of plates and strips. Bearings made by thyssenkrupp rothe erde are used in rolling mills as part of their warm and cold rolling process. Here, they are exposed to particularly harsh conditions: in addition to the extreme temperatures, the strong rolling forces particularly impact all components. Bearings for this area of application thus require high load-bearing capacities to absorb resulting rolling forces. We develop, design and manufacture these down to the tiniest detail, so that our customers are provided with a financially optimal design, which ensures both maximum safety and reliability.

Maximum reliability through comprehensive services.

As a customer, you are important to us.
As a result, thyssenkrupp rothe erde offers you comprehensive services – worldwide!

As a leading global manufacturer of slewing bearings, we at thyssenkrupp rothe erde are also your first choice when it comes to obtaining services for these critical components. After all, only regular maintenance and expert servicing will ensure that the slewing bearing reaches a long service life, with trouble-free operation. Keeping your equipment fully operational is a critical factor for your success.

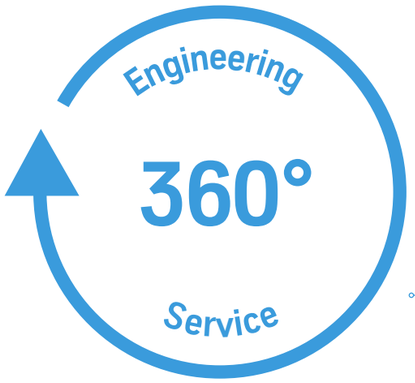
Expertise, experience, global presence and competence in solving problems are the building blocks of the first-class service from our highly qualified and specialised team. Make thyssenkrupp rothe erde your partner for all services relating to slewing bearings!

Maximum reliability through comprehensive services.

From installation to inspection, from maintenance to repair and even training courses: our service concept is comprehensive and is divided into three areas:

1.

In-house service
At our own facility, we carry out maintenance, inspection, repair and overhaul activities on your bearings – regardless of the original manufacturer



2.

On-site service
We can also carry out all the stated works at your site. In addition, we can handle the installation and commissioning of bearings in your plant.

3.

Proactive service
Next to the actual work on the bearings, we can prepare service plans for you, analyse the condition of bearings in your plants and provide you with detailed reports. In addition, we offer you customised services such as training and preventative maintenance.

In-house service

External service

Installation
- Bearing assembly
- Measurement and assessment of the contact surface
- Commissioning

Maintenance and inspection
- Lubricant analysis
- Wear measurement
- Bolt check
- Examination regarding continued use
- Examination of replacement bearings
- Long-term packaging up to five years
- Renewal of packaging
- Seal exchange

Repair
(up to 8 m in one piece, up to 20 m divided)
- Repair
- General overhaul

Training measures
- Installation, lubrication, maintenance
- Bearing measurement
- Preliminary discussion regarding assembly

Proactive service

Customer care
- Status analyses of the bearings in your systems
- Detailed reporting

Our service team is always at your side.

Spare parts management

Packaging check
To allow the permitted storage times to be successfully reached, we check and evaluate packaging and the storage conditions.

Renewal of packaging
We are able to renew or optimise packaging so that spare parts will be available when needed. This can extend storage by up to five years.

Extended warranty after the storage period has been exceeded
Once the storage period has been exceeded, an extended warranty can be provided following a check on the raceway system. Upon request, we will be pleased to submit a quotation.

Bearing installation / bearing exchange

Bearing positioning
Correct positioning of the hardness position “S” is of fundamental importance in operational reliability and for the service life of a slewing bearing.

Bearing bolt connection
The high expectations on quality and service life of rothe erde® slewing bearings also requires efficient handling of bolted connections. Our service team can support the bolt-tightening process.

Setting the backlash
The backlash of the drive pinion and the bearing teeth must be set relative to the teeth marked in green.

Baseline measurement
A preliminary basic measurement must be carried out to monitor and evaluate the progress of wear on the slewing bearing.

Preliminary laser measurement

Evaluation of the mounting surfaces prior to bearing installation
We use our laser measuring systems to measure the flatness of mounting surfaces according to DIN EN ISO 1101.

Bearing inspection in the plant

General bearing condition
During the inspection of the bearing condition, the slewing bearing as well as adjacent machine parts are visually checked. The characteristics that are examined include the level of contamination, condition of the seals, lubrication condition, noise, etc.

Wear measurements (settlement / movement measurements)
Wear measurements provide precise information about the operational reliability and compliance with wear limits in a slewing bearing.

Grease samples including lubricant analyses
Lubricant analyses combined with wear measurement and clearance measurements provide an optimum way of assessing the progress of wear and the status of the raceway system in a slewing bearing.

Bolt check
A sufficient amount of preload must be provided throughout the entire service life of a slewing bearing. The preload value can be confirmed during our visit to your facility.

Wear status and evaluation of the contact pattern of the gear teeth
Experience shows that the permitted wear can be 0.1 x modulus. The general evaluation of both the slewing bearing and drive pinion is conducted visually. Gear wear measurements are carried out using special tools and measuring equipment.

Removal of the bearing

Determining the function value
The function values are determined using proven and tested processes. These provide information about the status of the slewing bearing as well as whether or not it can be reused.

Detailed examination of the gear teeth if necessary
In addition to the visual inspection and wear evaluation, non-destructive testing of the gear teeth can be carried out.

Examination of the bearing after removal

Detailed inspection of the raceway
The best way of assessing the condition of the raceway is following removal and cleaning of the individual parts.

Status analysis and reporting with repair recommendations
Following each inspection, a detailed report is prepared including digital images. This describes, among other things, the overall bearing condition and suitability for repair, if applicable. The report also contains recommendations from our experts regarding continued operation.

Non-destructive testing of raceways
Non-destructive testing provides information about whether a slewing bearing can continue to be used. For example, following an accident it will be necessary to establish whether a bearing is still suitable for operation.

Repair of the removed bearing on-site

Manual reworking of damaged areas
If the extent of damage is minor, it may be possible for a slewing bearing to be repaired on site by manual reworking. For example, seals can be replaced, new rolling elements can be installed or the gear teeth can be smoothed manually.

Packaging (standard or long-term)
Following an examination / inspection, we offer the choice of standard packaging or long-term packaging. With long-term packaging, storage is possible for up to five years in temperature-controlled areas.

On-site training at thyssenkrupp rothe erde

Custom training courses
We adapt the content of our training courses to your individual needs, so that the focus is always on your specific requirements. The possible content of the training includes bearing installation, bearing checks, seal renewal, wear measurement, relubrication guidelines, etc.


We are there
when you need us.

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