JTEKT...
Utilizing comprehensive strengths to manufacture products that respond to steel production equipment needs and support stable operations.

Steel production equipment are operated in extremely harsh environments, where machinery is exposed to high temperatures, water and mill scale. The bearings used in this equipment must continually withstand heavy loads and high-speed rotation. These conditions test not only each bearing, but also the overall strengths of peripheral parts and the integration thereof. As a general manufacturer of bearings, drive shafts and oil seals, JTEKT is a full-service provider for a wide range of products.
Steel production equipment

Offering long-life bearings for systems, we manufacture bearings for continuous casting equipment, bearing housing units, oil lubrication devices, oil seals and other products.

**Required performance and issues**

- Measures for ultrahigh-speed rotation, which is unattainable for lubrication
- Measures for high contact stress / roll indentation under high load
- Measures for oil/air lubrication under high temperature
- Measures for corrosion / lubrication failure due to the infiltration of steam (water)
- Measures for surface roughness / indentations due to the infiltration of mill scale

**Features**

- High-load type using compact sealing structure
- Water-cooled structure with high cooling efficiency
- Superior sealing performance
- Lip contact stress dispersed
- Compatible with H-NBR and FluoroRubber

**Roll configuration example 1** (infeed side)

- Bearing for feed side
- Bearing for free side
- Bearing for feed side
- Spilt bearing for needle roller roll

**Roll configuration example 2** (infeed side)

- Bearing for feed side
- Bearing for free side
- Bearing for feed side
- Spilt bearing for needle roller roll

**Measures for ultralow-speed rotation, which is unfavorable for lubrication**

- Measures for high contact stress / roll deflection under high load
- Measures for roll elongation under high temperature
- Measures for corrosion / lubrication failure due to the infiltration of steam (water)
- Measures for surface roughness / indentations due to the infiltration of mill scale

**Drying system**

- Reduce unexpected incident ratio

**Features**

- Smooth absorption of roll movement in the axial direction
- Absorption of roll deflection and misalignment

**Measures for high load / high temperature**

- Designed for maximum load rating; internal design reduces contact stress
- Conventional bearing
- High-load bearing

**Cylindrical roller bearings with self-aligning ring**

- Conventional unit
- HSC bearing units with half round outer ring

**Oil / Air lubrication system**

- Oil / Air distributor supports multipoint oil supply
- Oil / Air lubrication system

**Measures for intrusion of water / mill scale**

- Oil / Air lubrication system
- Oil seals

**Oil seal**

- Superior sealing performance
- Lip contact stress dispensed
- Compatible with H-NBR and FluoroRubber

**Features**

- Positive pressure inside the bearing prevents the intrusion of water / mill-scale, and the adoption of a high-viscosity oil improves lubrication
- Oil / Air distributor supports multipoint oil supply
**Bearings for sintering machine pallet car**

Sintering machines are used in harsh environments where high temperatures and large amounts of dust are generated. We provide sealed bearings and mill-scale seals capable of withstanding these kinds of environments.

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**Required performance and issues**

- Measures for heavy load / shock load
- Preventing intrusion of dust

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**Pressure roller bearings**

*(sealed type double row cylindrical roller bearings)*

- Optimized outer ring thickness and carburized steel adopted
- Sealing structure using special seal
- Full roller shape adopted

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**Wheel bearings**

*(sealed type double row tapered roller bearings)*

- Integrated seal structure offers both high load capacity and excellent sealing performance

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**Oil seal for wheel bearings**

- Structure combining two parts (1 and 2)
- No damage to peripheral parts
- High sealing performance owing to multilayer lip structure

Steel production equipment

Iron manufacturing and rolling mill lines must operate continuously while maintaining high reliability in severe production environments. Answering these needs through the realization of epoch-making long-life and high corrosion resistance is JTEKT Hyper Strong (JHS). By adopting newly developed materials and processes for bearing steel, seal materials and other components, we have realized a 2-to-4-fold increase in bearing service life compared to previously used bearings. Continuing on from JHS520 for rolling mill roll necks and JHS210 for Sendzimir rolling mill backup rolls, we are steadily expanding the bearing series according to each application. The JHS bearing series offers total support for achieving maximum performance and durability in the ever-evolving field of steel equipment. Please keep your expectations high. We won’t let you down.

- Large-sized bearings mainly used for rolling mill backup rolls. Produced for high-load, high-speed applications, they are optimized for use in rolling mills. Compared to oil-film bearings, they provide stable rotational accuracy, which enhances product precision.

- Bearings developed to manage the axial load of roll necks in rolling mills. A large contact angle is used to create a structure that increases axial performance. Additionally, an oil seal is inserted to constrain grease flow and prevent intrusion of water and mill scale inside the bearing.

- Chock seals
  A lip shape with excellent sealing performance is used, and rubber materials matched to the environment are applied.

- Drive shafts optimised for use in high-load applications such as in rolling-mill roll drives. High-strength and long-life technologies have been adopted, thereby enabling compatibility with ever higher torques.

- Four-row cylindrical roller bearings
  Inside diameter: 180~1,349.04mm

- Double-row tapered roller bearings
  Inside diameter: 268~777.56mm

- Sealed type four-row tapered roller bearings
  Inside diameter: 220~800mm

- Four-row tapered roller bearings (open)
  Inside diameter: 170~939.8mm

- Four-row tapered roller bearings (45D)
  Inside diameter: 360~685.8mm

These bearings, mainly used for work rolls or intermediate rolls, carry both of radial load and axial load at a time. Adjustment of internal clearance is not required, facilitating handling. Open type is also available. Reliability is being pushed to higher levels through the adoption of special bearing materials that improve rolling fatigue service life and corrosion resistance.
Bearings for roll necks

Bearings used to steel mill roll necks must cope with heavy loads and high-speed rotation in severe environments. In order to respond to these needs, JTEKT works daily to resolve related issues such as developing bearing materials and improving bearing seal performance.

Required performance and issues

- Enhancing durability and service life under heavy load / high-speed rotation
- Preventing the intrusion of water / mill scale

Long-life high corrosion-resistant steel

- Long-life, corrosion-resistant steel realized by adding standardized amounts of chromium and Molybdenum
- Enhanced corrosion and abrasion resistance realized using a carburizing heat process developed by JTEKT

Bearing service life evaluation results under maintenance-related rust environment (water-contaminated grease injected)

<table>
<thead>
<tr>
<th>Comparison of rust-resistance</th>
<th>Service life (in-house bench test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional product</td>
<td>Rust High</td>
</tr>
<tr>
<td>Carburized developed steel</td>
<td>Rust Low</td>
</tr>
<tr>
<td>Special heat-treatment processed developed steel</td>
<td>Approx. 2.2-fold</td>
</tr>
<tr>
<td></td>
<td>Approx. 3.8-fold</td>
</tr>
</tbody>
</table>

Examples of used result in the customer

Cold strip mill work roll (open)

- Conventional type
  - Approx. usage: 4,000,000 (under DS)
- No flaking

Cold strip mill work roll (sealed)

- Conventional type
  - Used approx. 3,000,000 (under CR)
- Approx. 4.8-fold
- Hardly any indication of rust

Sealed type four-row tapered roller bearings

- Substantial reduction in grease consumption
- Reduction in harmful effects on working environment
- Intrusion of rolling mill water and mill scale prevented

Seal cover with seal and O-ring

- Special oil seal
  - Higher rated load and easier maintenance
  - The oil seal width has been narrowed, freeing up space for the roller and enabling a higher load rating. Design also took ease of maintenance into consideration.

Seal between inner rings

- Integration of metal ring and packing
  - Compact and easy to handle

Chock seals

- Original design realizes an optimal lip structure that demonstrates excellent sealing performance

For more information, please refer to catalog No. B2013E and No.B2002E.
Bearing for multi-roll mill backup rolls

We provide high-precision bearings with excellent durability based on long years of experience and achievements.

#### Required performance and issues

- Seal structure that maintains a favorable lubricated state
- Longer inner ring rolling fatigue service life
- Improving outer ring durability
- Improving outer ring rotational accuracy
- Improving ease of outer ring regrinding work

#### Bearings for multi-roll mill backup rolls

- Seal structure that maintains a favorable lubricated state
- Improving outer ring durability
- Improving outer ring rotational accuracy

### Bearings for oil mist lubrication

- Improved bearing service life (2-fold compared to conventional type)
- High sealing performance
- Space-saving size for simple installation / removal

### Bearings for forced oil lubrication

- Outer ring with both high rigidity and durability realized
- High resistance to fatigue realized owing to superior materials composition
- Design optimized to match surrounding structure

### Bearings-regrinding Jigs

- Bearing radial runout minimized
- Installation / removal work simplified
- Reproduction of radial runout accuracy equivalent to that when product is new

### Measurement for Bearing Section Height

- High rigidity, possible to make extremely accurate measurements
- Possible to measure outer ring rotational accuracy
- Adoption of mandrel shape realizes easy bearing insertion / removal

### Optimization of load distribution

Contributes to rolled coil quality / precision

- Variation of bearing section heights on one shaft: ± 0.006 mm
- Variation between two adjacent bearings on one shaft: ± 0.003 mm

### Core hardening

Surface-hardened layer improved approximately 3-fold

- Core-hardened steel is used for the inner ring to ensure the best of rolling service life under low-viscosity lubrication.
- Bearing service life is approximately 1.5 to 3 times that of conventional products.

### Premium specifications

- Use of retaining ring simplifies oil-seal insertion / removal
- Oil seal rotates together with outer ring
- Seal plate

### Features

- Shaft (backing shaft)
- Bearing for Backing Shafts

### Typical hardness distribution of cored hardening outer ring

- Developed steel
- Core-hardened steel
- Carbonized steel

For more information, please refer to catalog No. B2012E.
Drive shafts for rolling mills

We provide high-strength, long-life drive shafts that have good torque transfer reliability under severe environments.

Required performance and issues

- Stronger, longer-life drive shafts capable of handling increased rolling torque
- Stronger, longer-life drive shafts for use with smaller rolling mill roll diameters
- Protecting rolling mill drive systems from excessive torque
- Ability to randomly adjust the roll rotational phase

**Example of block-type configuration**

- Sliding surface (clearance)
- Bearing fixed bolts

**Features**

- Improved fatigue strength
- Improved corrosion resistance
- Longer service life

**Application of different diameter rollers for cross & bearing**

- Roller diameter at the end of the cross reduced slightly
- Uniform multi-row roller load

**Ball burnishing on cross shaft**

- Increasing of residual compressive stress at subsurface
- Reducing of Strength reduction
- Restraint of Strength reduction

**Thermal spraying coat of tungsten carbide (WC) on bearing cup key**

- Restraining of clearance between key and key way due to corrosion wear
- Reducing of surface hardness
- Increasing of residual compressive stress at subsurface beneath the bottom surface of the threaded

**Application of form rolling to bearing set Bolt**

- Fine surface roughness (Removal protrusion)
- Increasing of surface hardness
- Increasing of residual compressive stress at subsurface

**Roll phase adjustment device (for bar & rod mill)**

- Device enables the rotational adjustment of rolls to be suddenly adjusted when producing screw reinforcing bar or deformed bar for construction.
- Phase can be adopted almost immediately in a short time, improving product accuracy.
- Operation being possible without dismounting the drive shafts.

**Optional mechanisms supporting drive shafts for rolling mill**

- Easy to set operating torque
- Significantly improved operating precision and durability
- Device for protecting rolling mill drive system from excessive torque
- Hyper coupling (torque limiter)
Bearing units for plate levelers

We provide plate leveler units to cope with severe usage environments such as heavy loads, rust and the intrusion of water / foreign matter.

Required performance and issues
- Stable operation under heavy load
- High corrosion resistance
- Prevent the intrusion of water / foreign matter

Roll strength and bearing load rating improved as the result of integrating the roll and outer ring structure
- Special stainless steel for rolls developed
- Seal and shield are combined to form a labyrinth structure that has excellent sealing performance

Bearing units for tension levelers

We provide optimal tension leveler units that are compatible for high-speed rotation, wet / dry environments and low torque.

Required performance and issues
- Low torque
- Tightly sealed structure
- High section height accuracy

Bearing units for tension levelers
- Wet-specification unit has an oil seal that forms a tightly sealed structure and also realizes lower torque
- Dry-specification unit has a labyrinth seal structure that realizes the lowest possible torque
- Addition of a suitable, uniform corrective force by controlling bearing section height (H) dimensional accuracy

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Providing high quality and cutting-edge technology for the world

Manufacturing in Japan enables JTEKT state-of-the-art material and technology to be implemented to JTEKT products, which leads to delivering top quality and excellent performance. Furthermore, JTEKT can contribute high quality and appropriate technical support to customers worldwide through JTEKT global network system.

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