

Koyo®

Oil Seal

For Steel Production Equipment



JTEKT

JTEKT CORPORATION

JTEKT

Koyo | TOYODA

CAT. NO. B1020E

Steel production equipment operates in high-temperature environments where a large amount of water is used. In order to secure the stable operation of steel production equipment, JTEKT produces optimal oil seals that contribute to ensuring a favorable working environment where the equipment demonstrate its true potential. We offer a complete range of sealing technology services, including oil seals and surrounding structures such as bearings, drive shafts and other key components.

Sintering Machine Pallet Cars

Wheel, Sprocket wheel, Rail, Pallet car

Wheel, Intermediate seal

Converter Furnaces

Large seal (MS)

Continuous Casting Machines

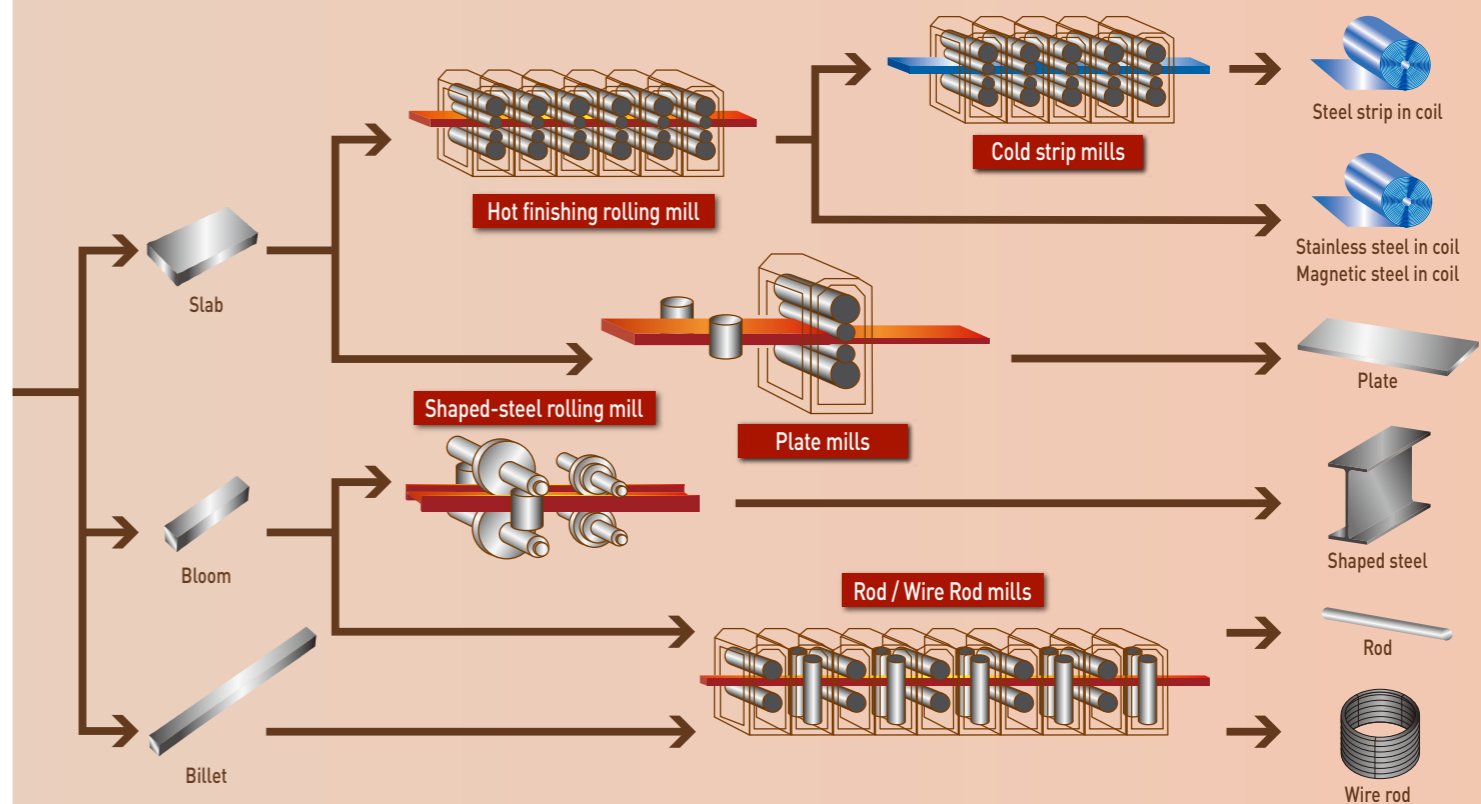
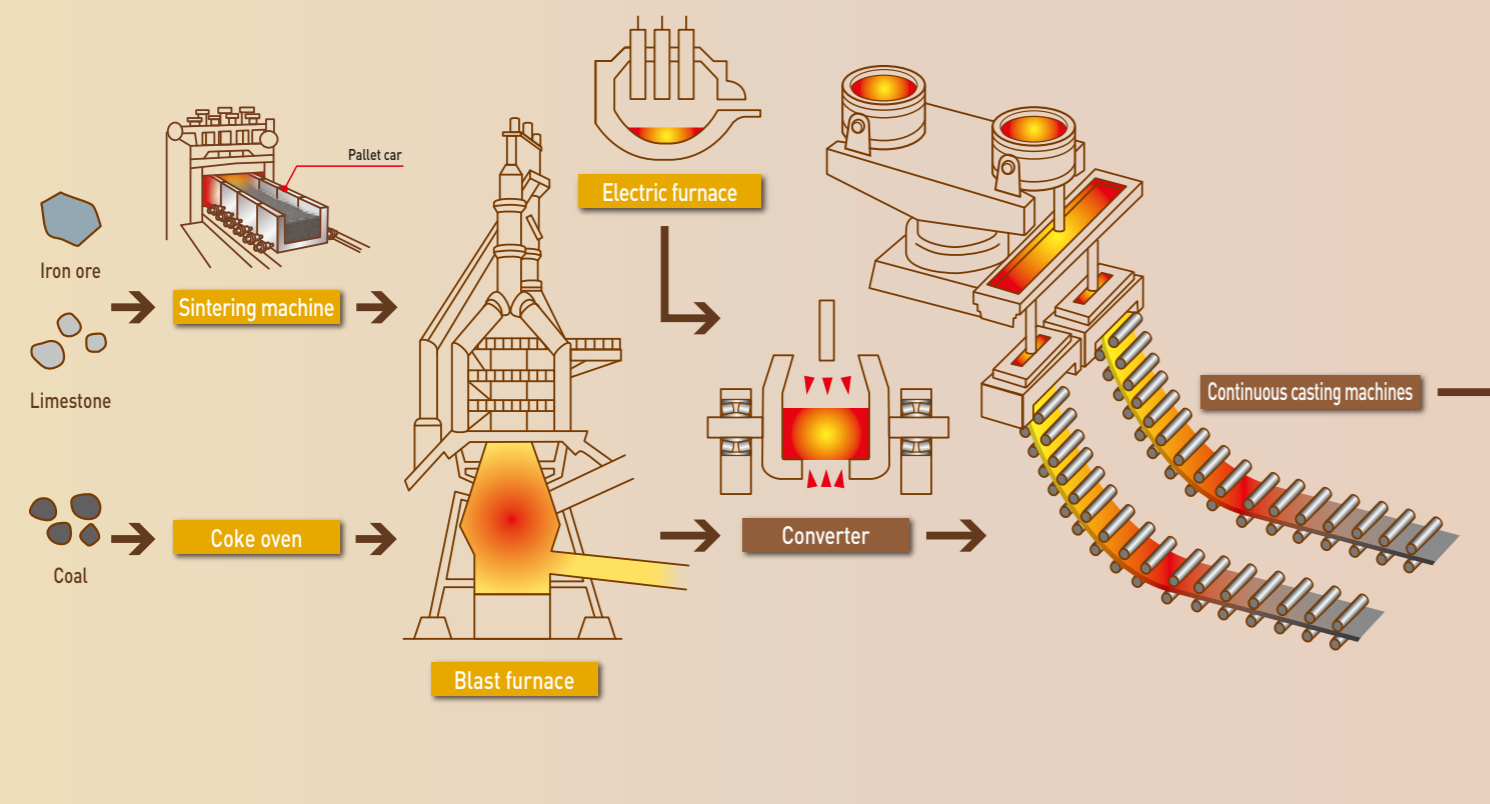
Oil seals for split bearing units

End side, Roll side

ME type, MD type, GK type

Rolling Mill

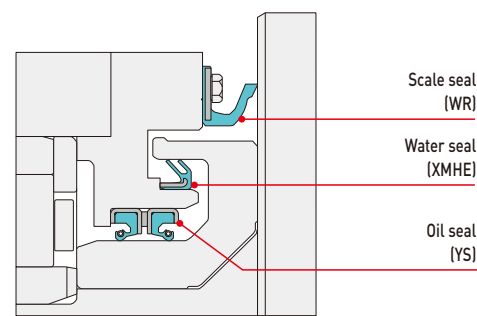
Scale seal (WR), Scale seal (WR-J), Oil seal (YS), Oil seal (YSN), Oil seal (HMSH-J), Mogoil seal (MS-NJ)



Examples of Oil Seal Applications

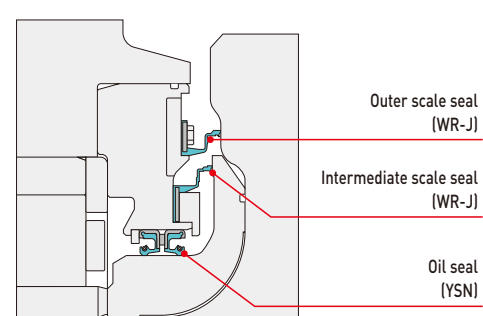
Cold Rolling Mill Backup Rolls

- The WR seal is often used as a scale seal owing to it featuring a side lip that gives it superior ability to shake off rolling water.
- Oil seals are attached back-to-back and play an important role in preventing bearing oil leaks.



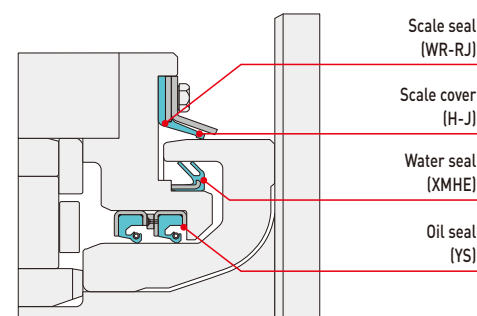
High-speed Cold Rolling Mill Backup Rolls

- If the roll rotation speed exceeds 1,800min⁻¹, the durability of the scale seal is improved thanks to its low heat generation specification.
- Infiltration of rolling water is prevented by using two scale seals.
- Oil seals for low-heat generating specifications.

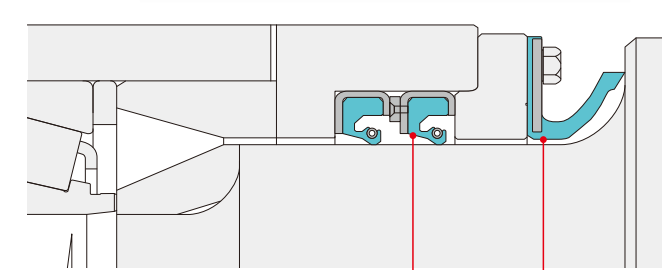


Hot Rolling Mill Backup Rolls

- The WR-RJ scale seal with a radial lip for superior following of axial displacement and the H-J scale cover can also be used.
- Two oil seals installed facing towards the roll play an important part in preventing water infiltration.



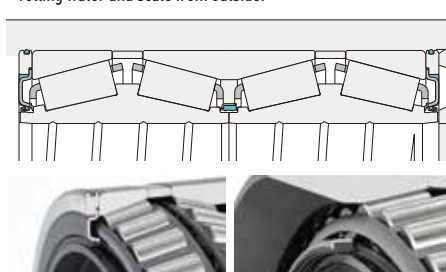
Rolling Mill Work Rolls



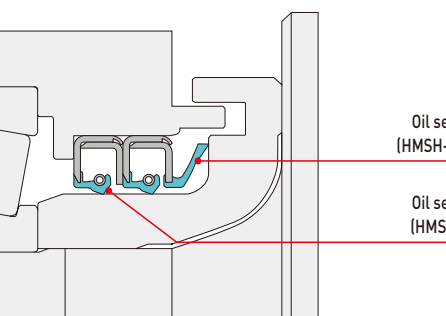
- Comprised of scale seal and oil seal.
- Both oil seals installed facing towards the roll to prevent the infiltration of rolling water.

Sealed type four-row tapered roller bearings

- Holds grease in the bearing and prevents the infiltration of rolling water and scale from outside.

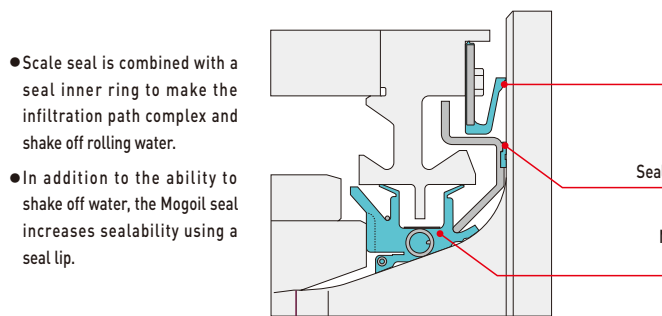


Shaped-steel Rolling Mill



- A HMSH-J oil seal with scale seal function added is used on the roll side to prevent the infiltration of scale.

Mogoil Bearing (Slide Bearing)



- Scale seal is combined with a seal inner ring to make the infiltration path complex and shake off rolling water.
- In addition to the ability to shake off water, the Mogoil seal increases sealability using a seal lip.

Features of Each Oil Seal

Scale Seal				
Category	WR	WR-RJ + H-J	WR-J	WR-BJ
Type	WR	WR-RJ + H-J	WR-J	WR-BJ
Shape				
Features	<ul style="list-style-type: none"> • Standard scale seal product • Side lip has superior ability to prevent rolling water/scale infiltration 	<ul style="list-style-type: none"> • Used when there is frequent movement in the axial direction • Scale cover (H-J) is used if rolling water come in direct contact with the seal 	<ul style="list-style-type: none"> • Low torque specifications • Appropriate for high-speed cold rolling, dry milling and other specifications where heat generation and lubrication are difficult 	<ul style="list-style-type: none"> • Used if there is no space to install in the radial direction • Tightened and secured with a steel band

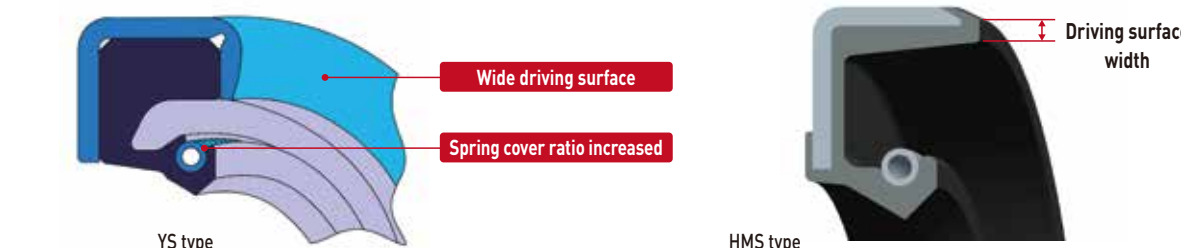
Oil Seal					
Category	YS	YSA	YS-J	YS-P	YSN
Type	YS	YSA	YS-J	YS-P	YSN
Shape					
Features	<ul style="list-style-type: none"> • Standard oil seal product • Superior installation ability owing to use of robust steel band • Spring less likely to come out as rubber covers more than 75% of the bearing 	<ul style="list-style-type: none"> • YS oil seal with an additional auxiliary lip to prevent the infiltration of dust 	<ul style="list-style-type: none"> • YS oil seal with scale seal modification added for when there is insufficient space to install a scale seal 	<ul style="list-style-type: none"> • YS with pressure-resistant specification • Additional backup ring on the lip prevents lip from turning due to pressure, reduces lip temperature by providing support 	<ul style="list-style-type: none"> • Often used for low-torque YS specifications but can be used with general specifications

Oil Seal						
Category	MS	MSA	HMSH	HMSH-J	Water Seal	V ring
Type	MS	MSA	HMSH	HMSH-J	XMHE	MV-A
Shape						
Features	<ul style="list-style-type: none"> • Easy-to-install oil seal comprised of rubber and hook-type spring • If shaft cannot be removed, a one cut-type oil seal (MS-C) is used 	<ul style="list-style-type: none"> • MS oil seal with an auxiliary lip added to prevent the infiltration of dust 	<ul style="list-style-type: none"> • Small-diameter oil seal (outer diameter 300mm or less) 	<ul style="list-style-type: none"> • HMSH oil seal with scale seal modification added for when there is insufficient space to install a scale seal 	<ul style="list-style-type: none"> • Seal lip is installed facing outward, with the two spaces functioning as a conduit to direct rolling water from the top to the bottom and prevent infiltration of rolling water and scale 	<ul style="list-style-type: none"> • A seal made of only rubber stretched and attached to the shaft • Used as an alternative to a scale seal

Mogoil Seal		Block Mill Seal		
Category	MS-J	MS-NJ	M-BNJ	WR-J
Type	MS-J	MS-NJ	M-BNJ	WR-J
Shape				
Features	<ul style="list-style-type: none"> • Standard Mogoil seal product • Easy-to-install seal that prevents the infiltration of oil and water • Rotates due to being secured to the roll neck, and therefore has superior shake off performance 	<ul style="list-style-type: none"> • Lip contact is stable owing to the different shapes of the lip and end-plate, thereby achieving superior sealability performance compared to the MS-J 	<ul style="list-style-type: none"> • Standard block mill seal product • Prevents infiltration of oil and water at ultrahigh-speed rotation of 100 m/s 	<ul style="list-style-type: none"> • Improved product durability with superior detachability • Uses two seals, one each for oil and water, for tough specification conditions, with seal on water side only easy to replace

Oil Seal (YS) Features

- Wider driving surface when assembling seal on the choke prevents seal distortion, and steel band made of enhanced high-strength material is used
- Spring cover ratio increased to prevent spring from coming off when inserting into roll

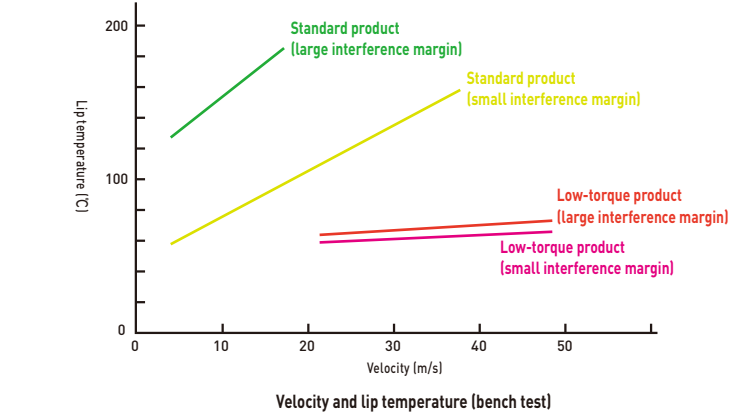


Scale Seal (WR & WR-J) Features

- (Standard products)**
 - Used in locations exposed to large volumes of water, such as hot rolling mills, owing to superior ability to prevent water and scale infiltration
- (Low-torque products)**
 - Used for high-speed cold rolling owing to the ability to suppress rising lip temperature



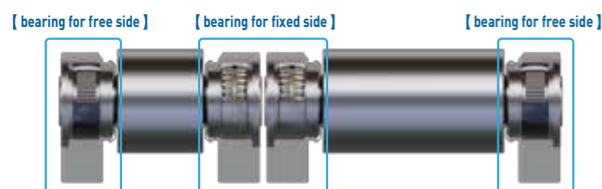
- Lip temperature on actual machine measured and reflected in design



Types of Rolls

Roll configuration example 1 (single and split rolls)

Optimal configuration for roll elongation absorption using single and split rolls



Roll configuration example 2 (pestle-shaped roll)

Optimal configuration for roll elongation absorption using pestle-shaped roll



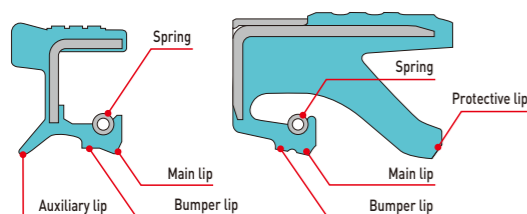
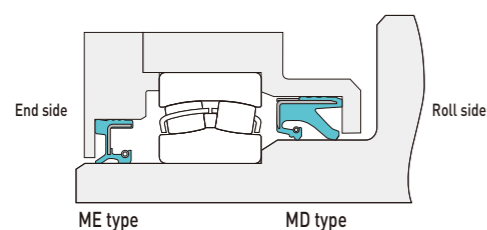
Oil Seals for Free Side/Fixed Side Bearing Housing Units

- Features**
- Bumper lip shape for main lip alleviates shaft wear
 - Protective lip suppresses water/scale infiltration
 - Hydrogenated nitrile rubber (HNBR) used as standard rubber material, featuring superior heat resistance that ensures more stable use when exposed to water vapor

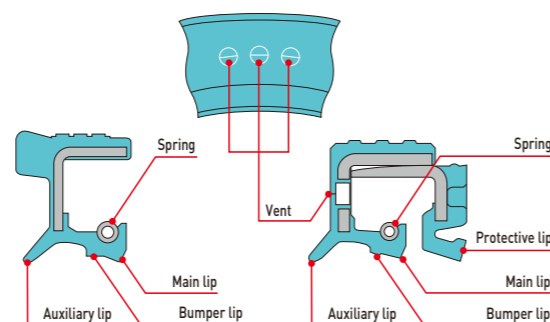
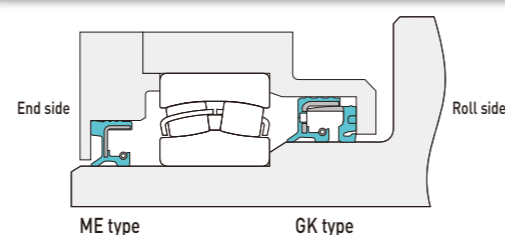
■ Discharge and recovery methods for bearing house grease and oil/air

	End side		Roll side	
	ME type	MD type	MD type	GK type
Shape				
Characteristic	Standard end-side product	Improved sealability with protective lip	Improved sealability with protective lip	Vent for improved lubrication and suppressing wear on shaft and lip
Grease	Discharge method	○	○	—
	Recovery method	○	—	○
Oil/Air	Discharge method	○	○	—
	Recovery method	○	○	—

Bearing Housing Grease discharge method Oil/Air discharge method Oil/Air recovery method



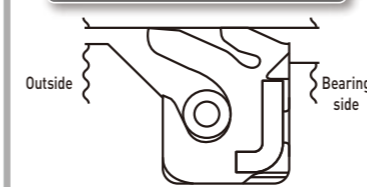
Bearing Housing Grease recovery method



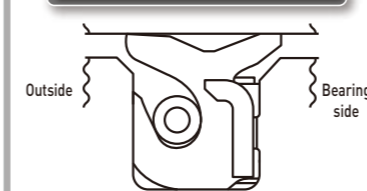
Oil Seals for Split Bearing Units

- Features**
- Follow roll deflection
 - Suppress water and scale infiltration
 - Hold grease between lips

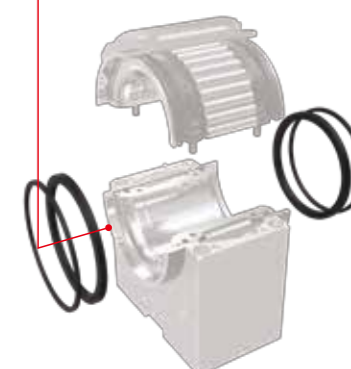
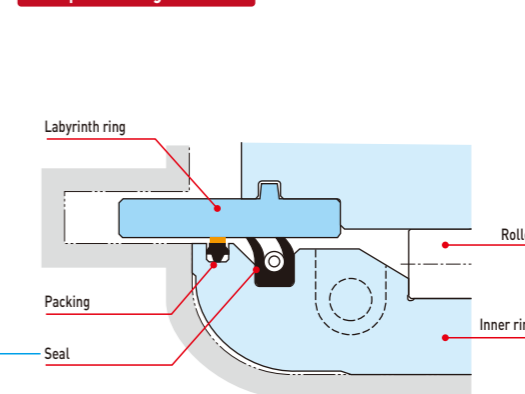
Grease discharge method



Grease Recovery Method



Compact sealing structure



Please consult with JTEKT regarding oil seals for oil/air lubrication.

Oil Seal Rubber Material Used for Continuous Casting Machines

- Features**
- Compared to fluoro rubber (FKM), hydrogenated nitrile rubber (HNBR) has superior water vapor resistance and grease resistance (urea-based), thereby providing better performance than FKM in cases of continuous use.

■ Rubber material resistance comparison

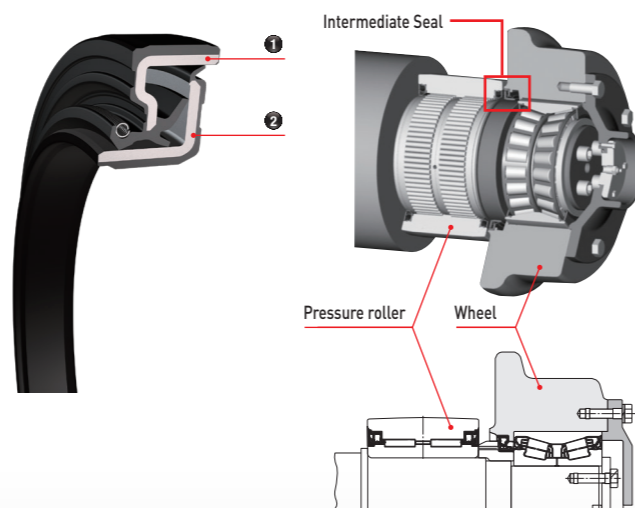
	Hydrogenated nitrile rubber (HNBR)	Fluoro rubber (FKM)	Nitrile butadiene rubber (NBR)
Heat resistance	○	○	△
Urea grease resistance	○	△	○
Water vapor resistance	○	×	△
Water resistance	○	○	○
Wear resistance	○	○	○

○:Has resistance (excluding specific cases) △:No resistance (excluding specific cases) ×:No resistance
Note: Judgment of heat resistance and water vapor resistance assumed a working condition of 100°C

Oil Seals for Sintering Machine Pallet Cars

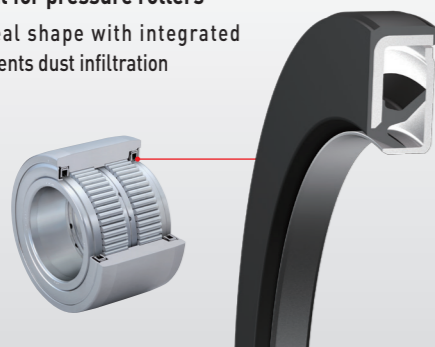
Intermediate seal

- Features**
- No damage to peripheral parts owing to two-component (① and ②) combined structure
 - Prevents dust infiltration owing to high sealing performance provided by multilayer lip structure



Sealed Bearing Seals

- Bearing seal for pressure rollers**
- Special seal shape with integrated sleeve prevents dust infiltration



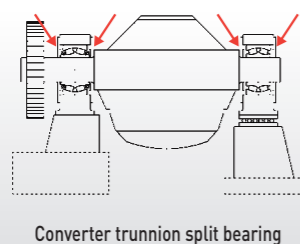
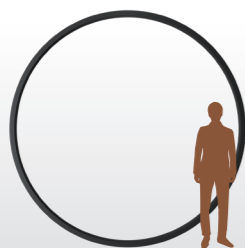
- Bearing seals for wheels**
- Compact seal shape with improved sealing performance prevents dust infiltration



Oil Seals for Converter Furnaces

Large Seals

- Features**
- MS-type oil seals can be cut in one location to enable easy installation on long or complex-shaped shafts



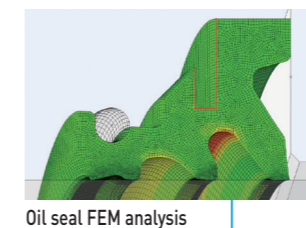
Converter trunnion split bearing



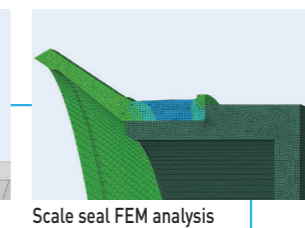
MS-type oil seal cut in one location

Technology Management

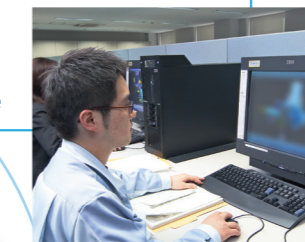
- Optimal rubber composition as sealing material
- Well-balanced design adaptable to location of use



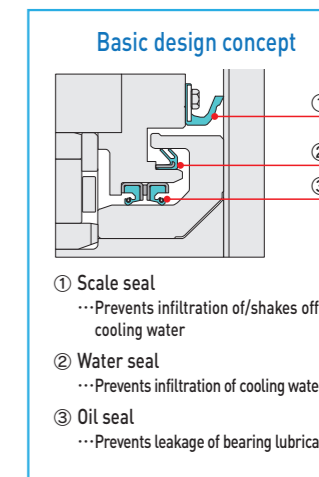
Oil seal FEM analysis



Scale seal FEM analysis



Analysis example



Example rolling bearing sealers for backup rolls

Technology Management

Material Design Analysis

Production Inspection

Evaluation

- Evaluation can be performed in a simulated environment closely resembling actual machine operation



Bearing tester for steel production equipment

- Stable quality by vacuum vulcanization molding
- Integrated production of seals including rubber and metal ring



Large turning machine



Inspection data CPU

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