

Oil Seal for Steel Production Equipment



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, Pallet car, Sprocket wheel, Rail

Wheel, Intermediate seal (D)

Converter Furnaces

Large-size oil seal (MS)

Continuous Casting Machines

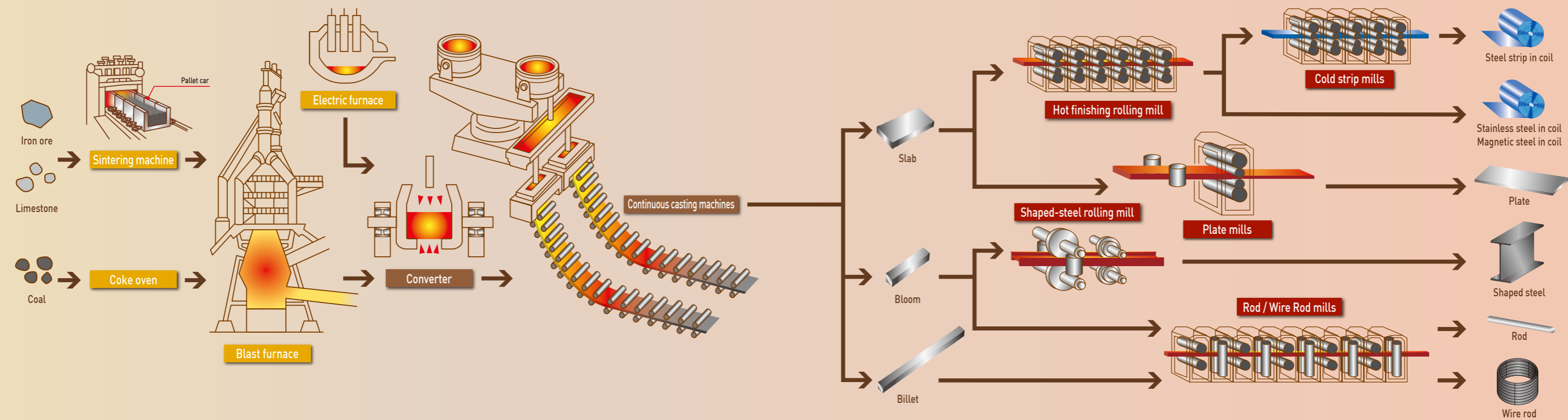
Oil seals for split bearing units

End side, Roll side

MHSEA, MHSE, MHSEA

Rolling Mill

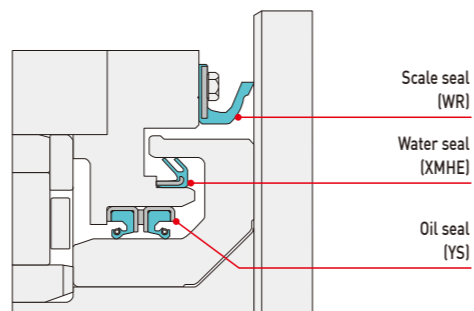
Scale seal (WR), Scale seal (WR...J), Oil seal (YS), Oil seal (YSN), Oil seal (HMSH...J), Morgoil seal (MS...NJ)



Examples of Oil Seal Applications

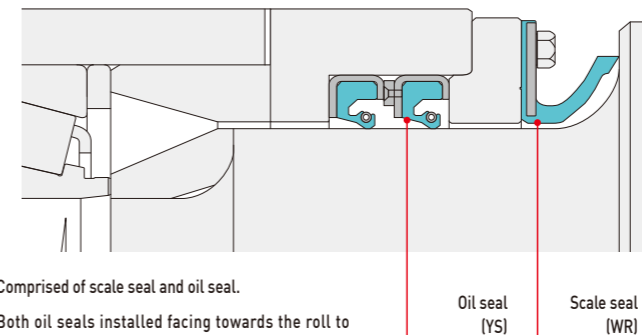
Cold Rolling Mill Backup Rolls

- 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 installed back-to-back to prevent the infiltration of rolling water and the leakage of bearing oil.



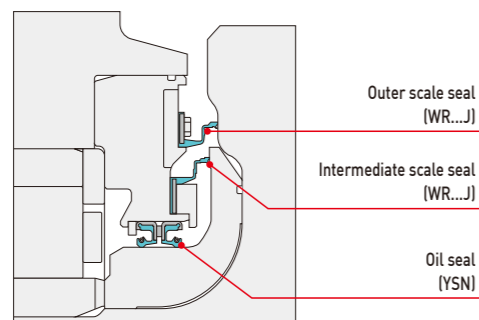
Rolling Mill Work Rolls

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



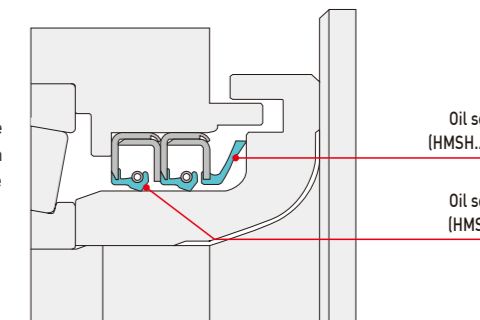
High-speed Cold Rolling Mill Backup Rolls

- If the roll rotation speed exceeds $1,800\text{min}^{-1}$, 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.
- The oil seals feature a low-torque specification.



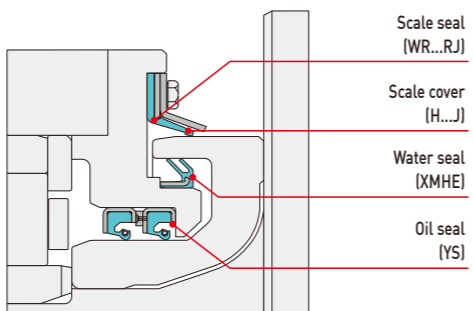
Shaped-steel Rolling Mill

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



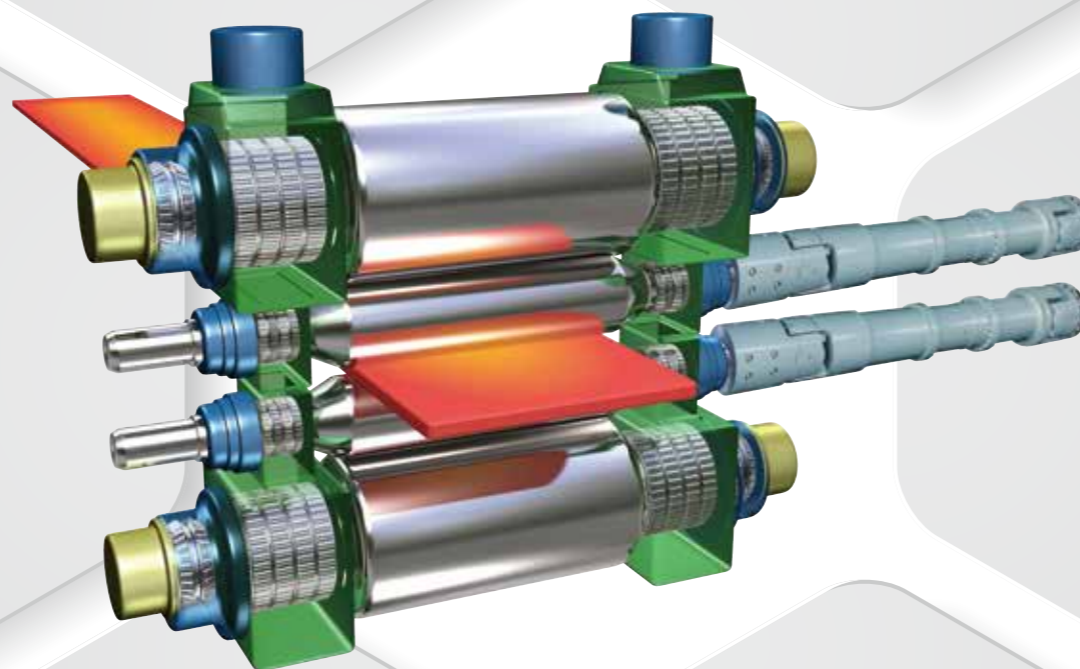
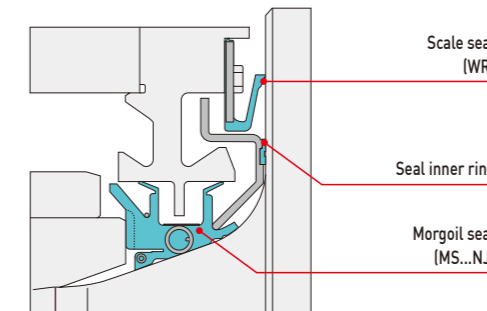
Hot Rolling Mill Backup Rolls

- 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.



Morgoil Bearing (sliding Bearing)

- In combination with the seal inner ring, the scale seal repels rolling water and suppresses its infiltration.
- In addition to the ability to shake off water, the Morgoil seal increases sealability using a seal lip.



Features of Each Oil Seal

Category	Scale Seal			
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

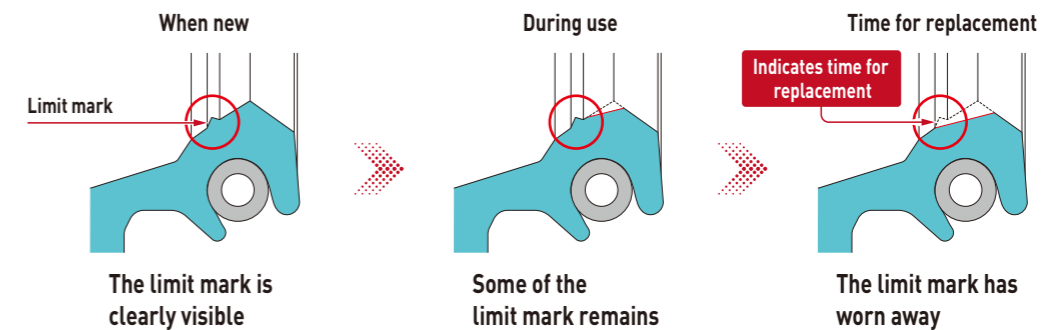
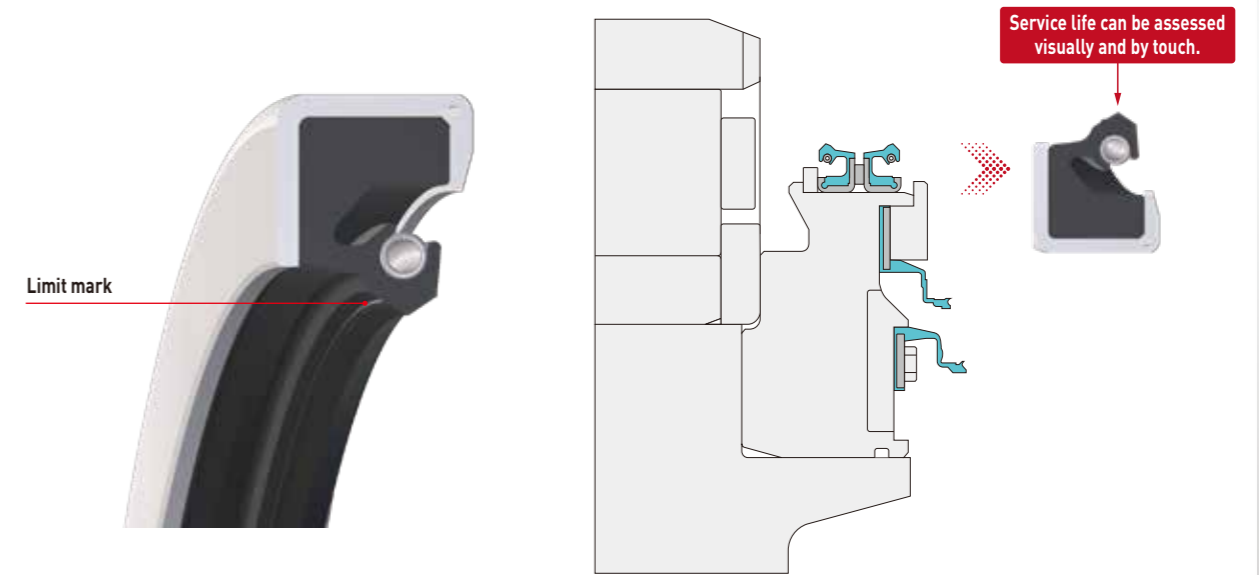
Category	Oil Seal				
Type	YS	YSA	YS...J	YS...P	YSN
Shape					
Features	<ul style="list-style-type: none"> Standard oil seal product Superior installation ability owing to use of robust steel band Spring less likely to come out as rubber covers more than 75% of the bearing 	<ul style="list-style-type: none"> YS oil seal with an additional protection 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

Category	Oil Seal				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 a protection 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

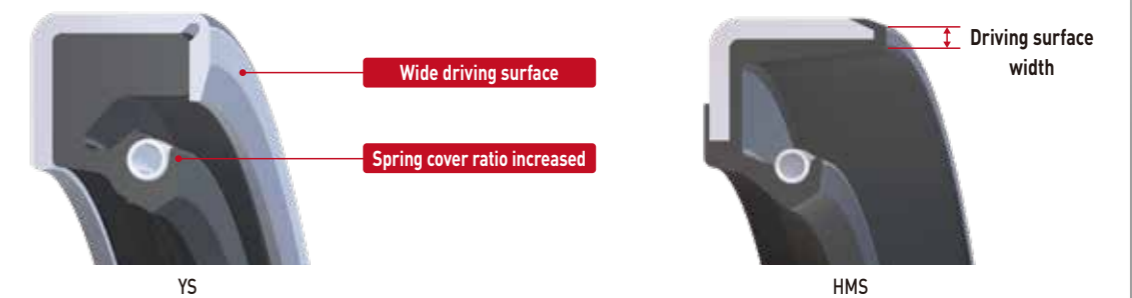
Category	Morgoil Seal		Block Mill Seal	
Type	MS...J	MS...NJ	M...BNJ	WR...J
Shape				
Features	<ul style="list-style-type: none"> Standard Morgoil seal product East-to-install seal that prevents the infiltration of oil and water Rotates due to being secured to the roll neck, and therefore has superior 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

- Features
- A hemispherical protrusion (limit mark) has been placed on the lip. Once this limit mark wears away, it indicates that the lip's wear limit has been reached and that it is time to replace the oil seal.



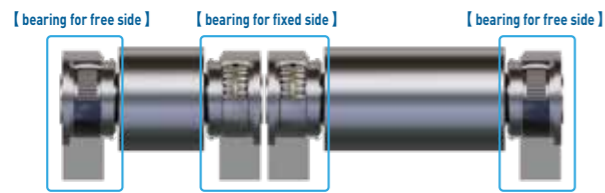
- Features
- Widened driving surface to prevent deformation during seal installation into the choke
 - Increased spring cover ratio to prevent springs from coming off during roll insertion



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 (pebble-shaped roll)

Optimal configuration for roll elongation absorption using pebble-shaped roll



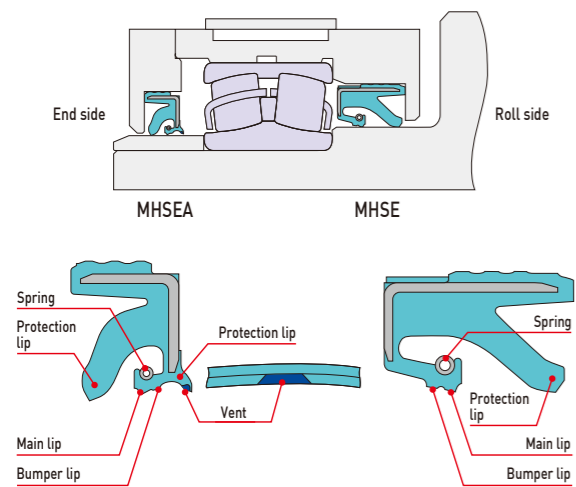
Oil Seals for Free Side/Fixed Side Bearing Housing Units

- Features**
- Main lip features a bumper lip shape that reduces shaft wear
 - Protection 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

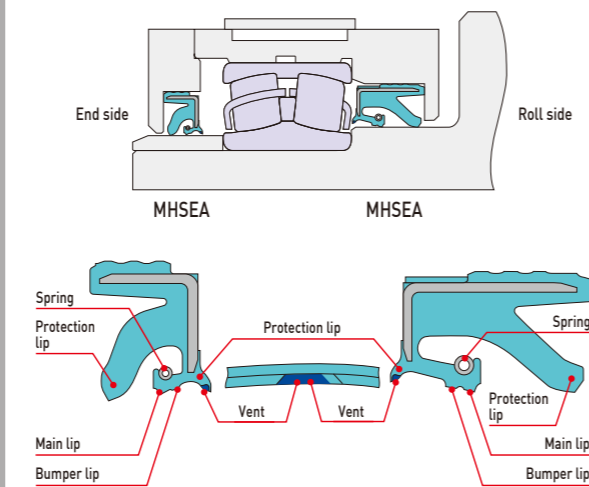
■ Discharge and recovery methods for bearing house grease and oil/air

	End side		Roll side	
	MHSEA	MHSE	MHSE	MHSEA
Shape				
Characteristic	Improved sealability with protection lip	Improved sealability with protection lip	Improved sealability with protection lip	Vent for improved lubrication
Grease	Discharge method	○	○	—
	Recovery method	○	—	○
Oil /Air	Discharge method	○	○	—
	Recovery method	○	○	—

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

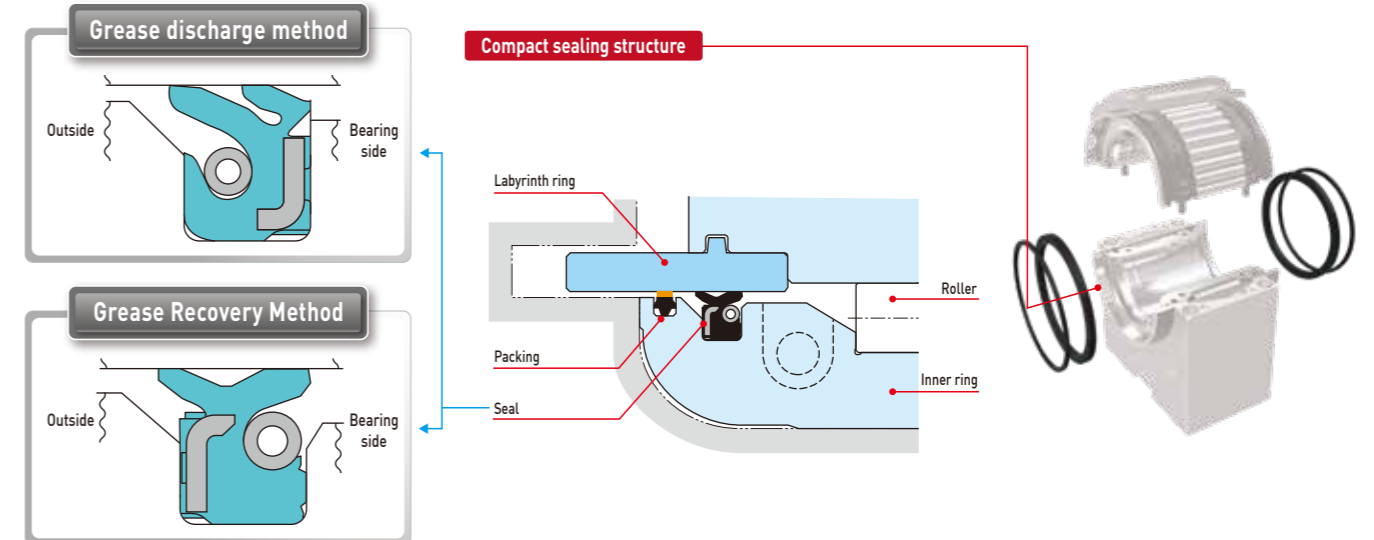


Bearing Housing Grease recovery method



Oil Seals for Split Bearing Units (Special lip shape)

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



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

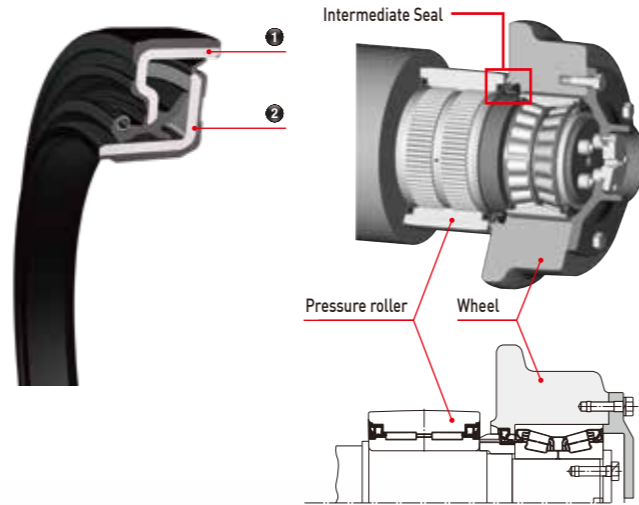
	Hydrogenated nitrile rubber (HNBR)	Fluoro rubber (FKM)	Nitrile butadiene rubber (NBR)
Heat resistance	○	○	△
Urea grease resistance	○	△	○
Water vapor resistance	○	×	△
Water resistance	○	○	○
Wear resistance	○	○	○

○: 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

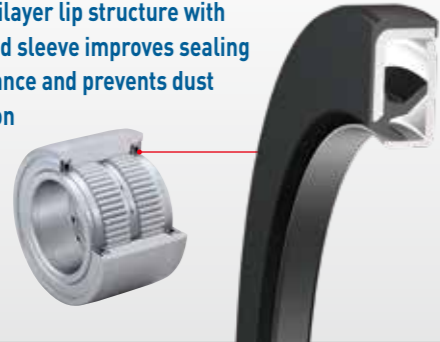
- Features**
- A structure that combines an oil seal ① and sleeve ②
 - Prevents dust infiltration owing to high sealing performance provided by a multilayer lip structure



Sealed Bearing Seals

Bearing seal for pressure rollers

- Features**
- The multilayer lip structure with integrated sleeve improves sealing performance and prevents dust infiltration



Bearing seals for wheels

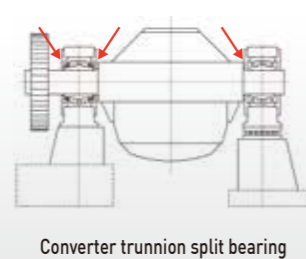
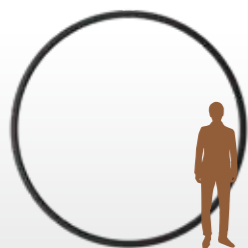
- Features**
- Compact seal width retains airtightness while preventing dust infiltration



Oil Seals for Converter Furnaces

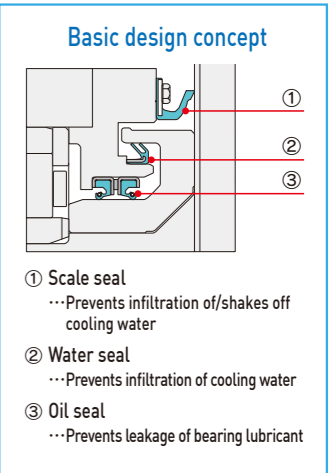
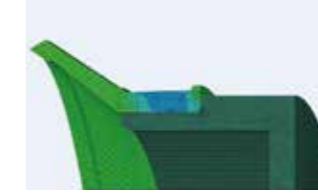
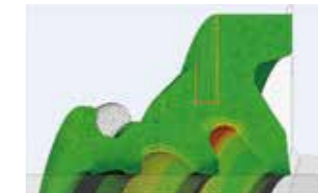
Large-size oil seals

- Features**
- MS oil seals can be cut in one location to enable easy installation without having to remove the shaft



Technology Management

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



Example rolling bearing sealers for backup rolls

Material Design Analysis

Technology Management

Production Inspection

Evaluation

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



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



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