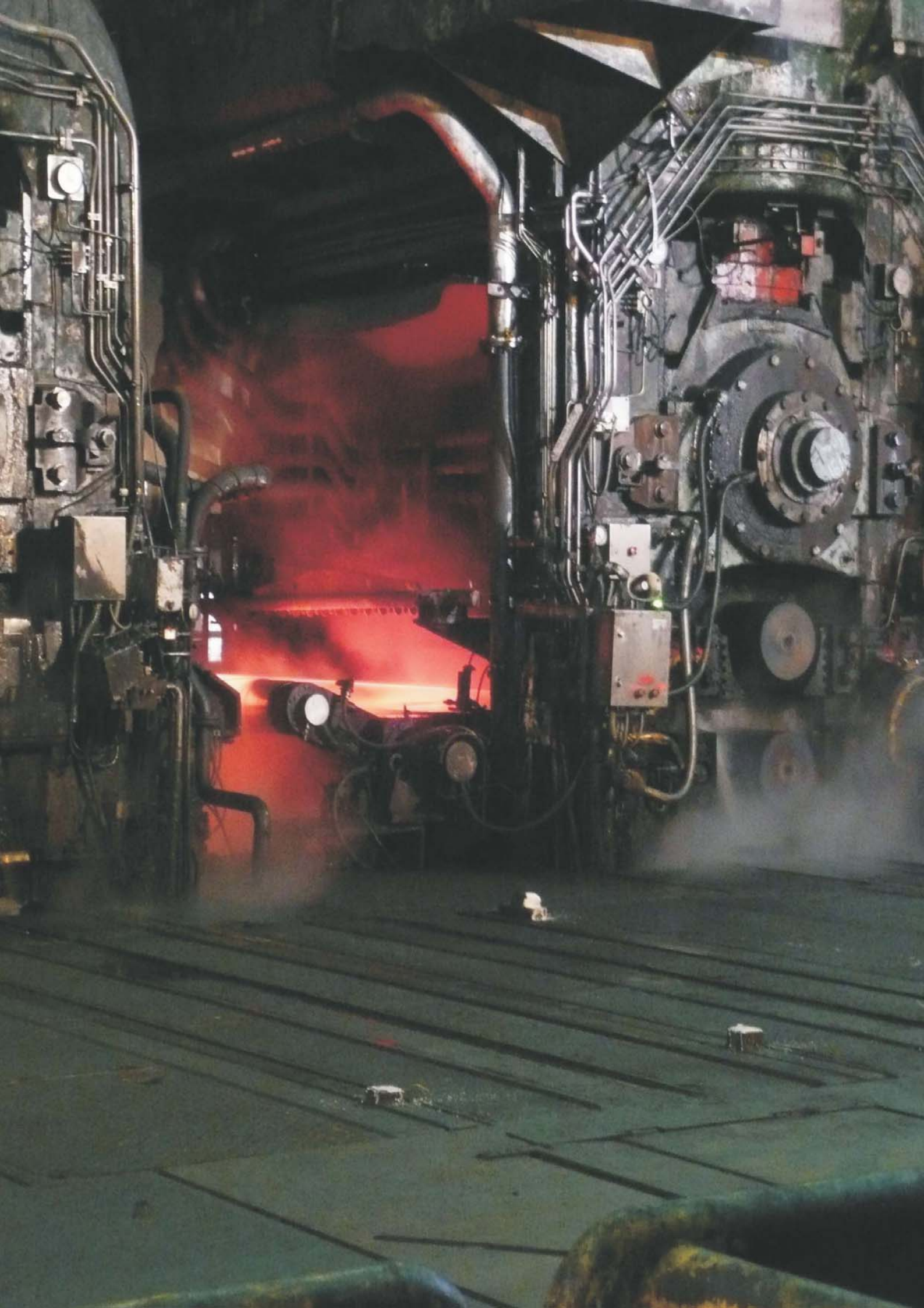
Sealing Solution for Steel Industry

MAX SPARE
LIMITED
QUALITY. PRECISION. SPEED.



Introduction

Sealing Solutions in the field of Steel Industry

Max Spare is a leading seal manufacturer in India providing standard & customised sealing solutions to clients across industries. Having more than five decades of experience and expertise in serving the industrial clients, Max Spare with its wide range of seal profiles and elastomers is fully capable of serving Iron & Steel Industries.

Max Spare is involved in all different stages of Iron & Steel making process.

- High Speed
- High Pressure
- High Temperature
- Operating Reliability
- Economy & Long Life
- Customised Solutions

Max Spare thus understand these needs which comes across during selecting appropriate seals & elastomers.

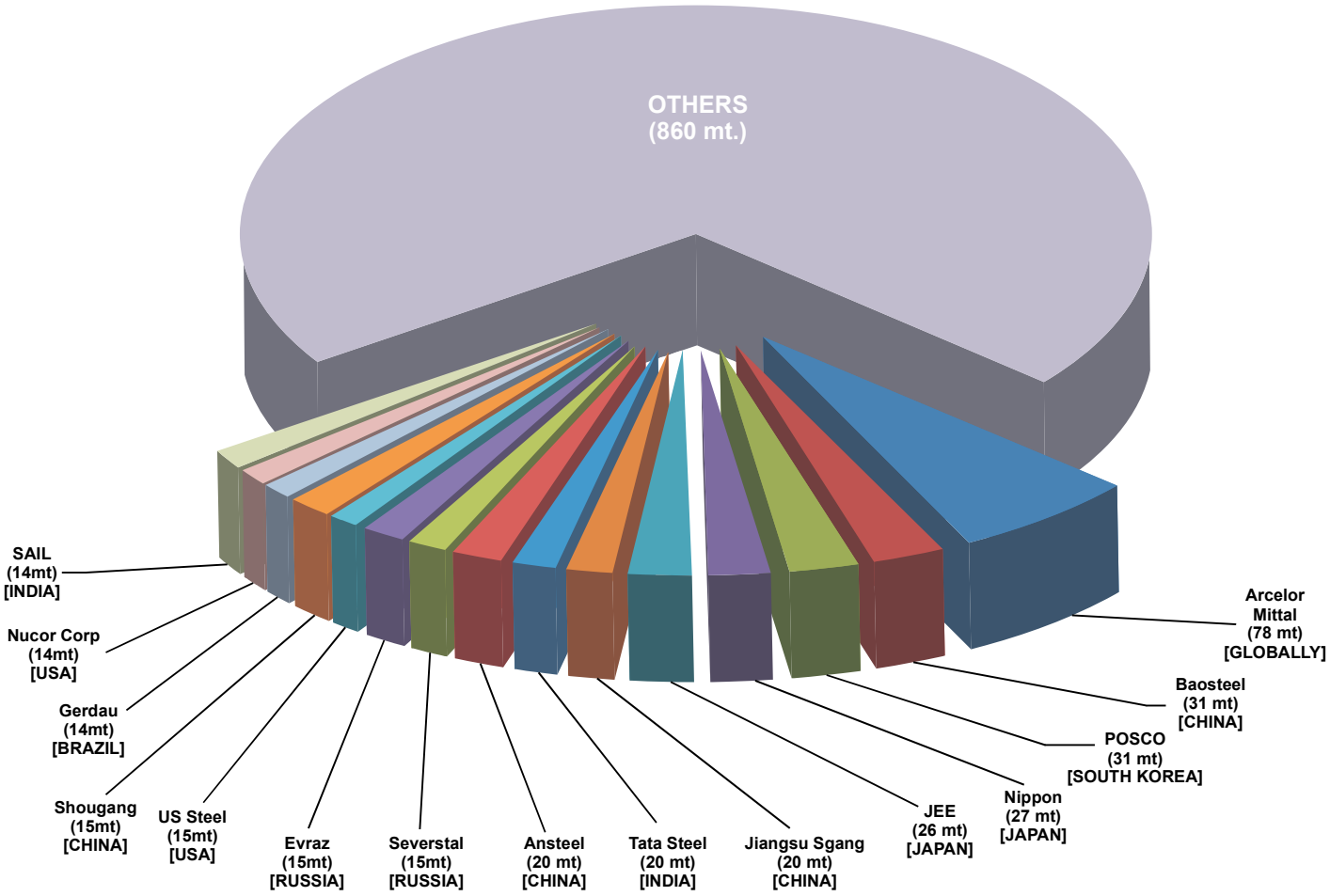
Thus offers Standard and Customised seals for Rotating & Reciprocating applications.

Max Spare offers high pressure hydraulic seals upto 700 bar and rotary seal for high speed upto 30mtr/sec in rolling mill applications.

It is not only the seals design an issue, but the easy installation under challenging environment, Max Spare offers split seal solutions which reduces down time.

With the team of competence engineers, we are capable to offer sealing solutions without carrying out major modification in the existing setup. Our team is involved from start to the designing, installation and monitoring the performance of the sealing solutions.

A global presence enabels Max Spare to deliver sealing technology to places where it matters the most. From Asia to North America and Europe, we are just a phone call away from delivering the best sealing solutions.



ABOVE IS AN OVERVIEW OF THE TOP COMPANIES PRODUCING STEEL

Max Spare involvement in Iron & Steel making process

Material Handling Plant
Blast Furnance
Coke Oven
Continuous Casting
Hot & Cold Rolling Mill

Steel Products

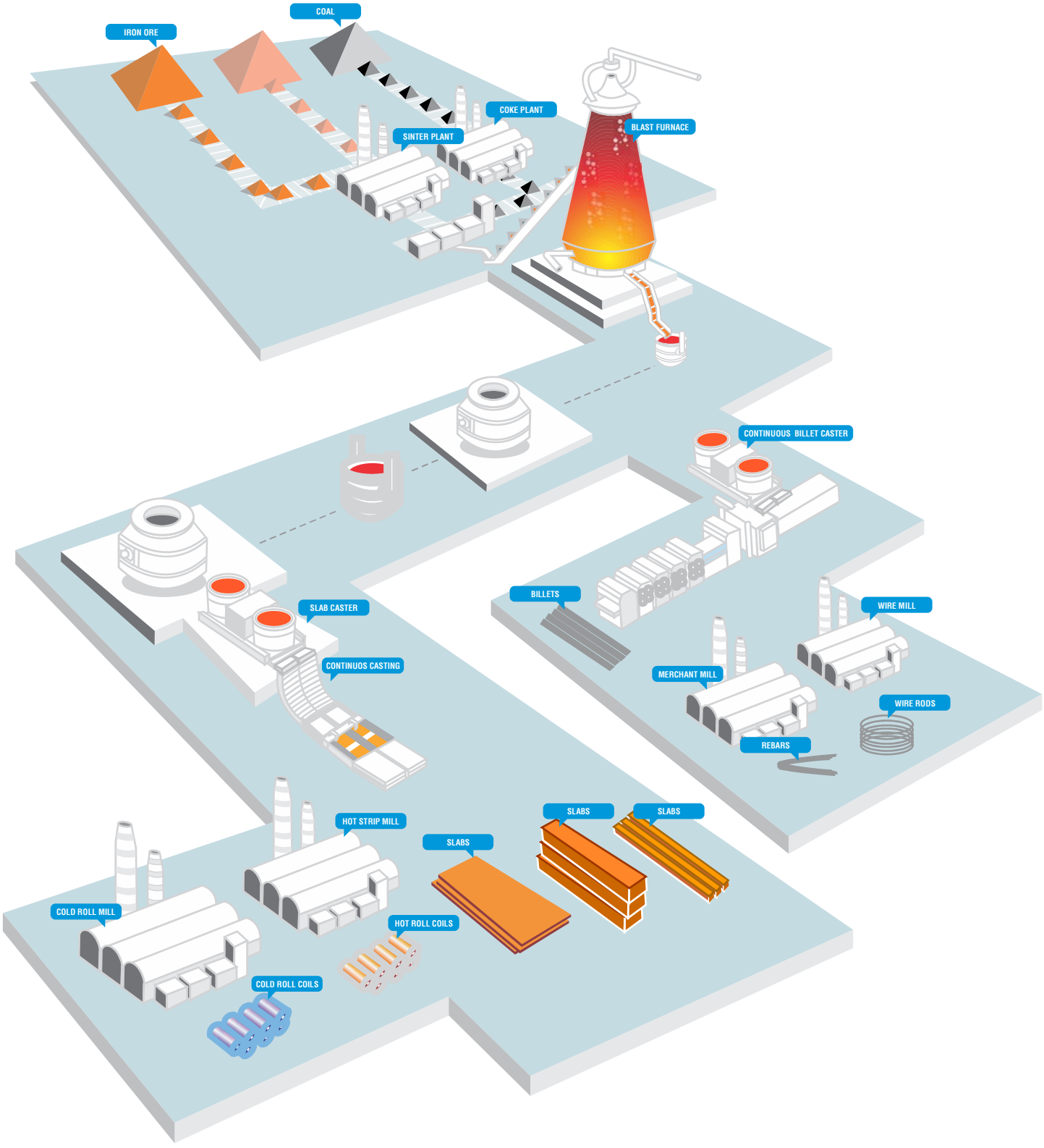
- Hot rolled sheets
- Cold rolled sheets
- Flat products
- Galvanized sheets

Long Products

- Long rail products
- Rolled wires
- Seamless pipes

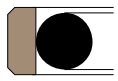
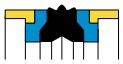
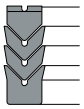
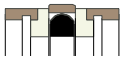
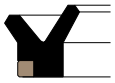
Steel Making Process

Max Spare Seals are present at all different stages in steel industry across the globe. Start from iron ore processing till finished coils. Max Spare has been providing technically advanced seals solutions to meet the needs of applications in these industry. Max Spare involvement starts from application study, designing, material compounding, manufacturing to installation and monitoring performance.

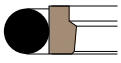
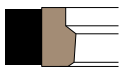
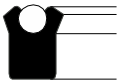
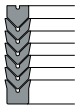
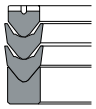
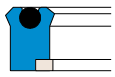
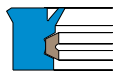
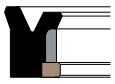


Max Spare Product Line for Steel Industry -

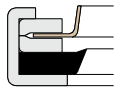
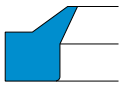
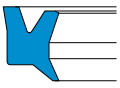
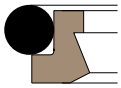
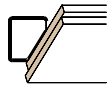
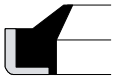
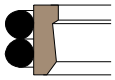
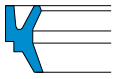
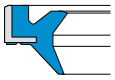
Piston Seal

									
PTA	PCA	PVB	PTC	PCI	PCJ	PUB	PFC	PFA	PBA

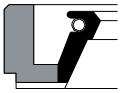
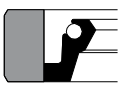
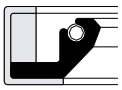
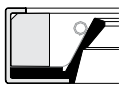
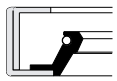
Rod Seals

									
RTA	RTC	SUJ	RVB	RVC	RUB	RFD	RBI	RBD	RBC

Wiper Seals

									
WCE	WRC	WDA	WTC	WRL	WCA	WTB	WDD	WRD	WCC

Rotary Shaft Seals

									
AFA	AFB	AFC	AFL	ACI	ACL	AFJ	AIG	ACB	AFD

AFQ	ATF	ATE	AFN	ATG	ATA	ACK	AFO	AZI	AZD

V-Rings

VRA	VZA	VZB	VRS	VRL	VRE	VAX	VRM	VRN	VRF

Pneumatic Seals

PPB	PUE	PUG	PUI	PDC	RUF	RUK	RUH	WIE	WDB

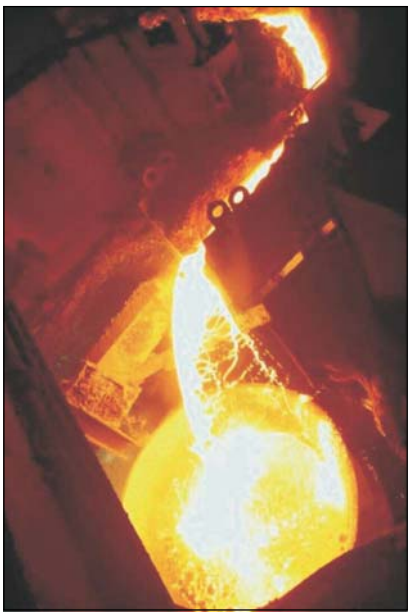
Jet Express Seals

MPUB	MPBH	MPUP	MPBL	MPPK	MRBT	MPVC	MPEB	MPEM	MRUC


Blast
Furnace
Blast Furnace

High Temperature Application

The hottest place in the steel making process is in the blast furnace where the seals are exposed to high temperature. Max Spare had developed the seals for some of the critical equipments used in blast furnace in combination of elastomer and Teflon.

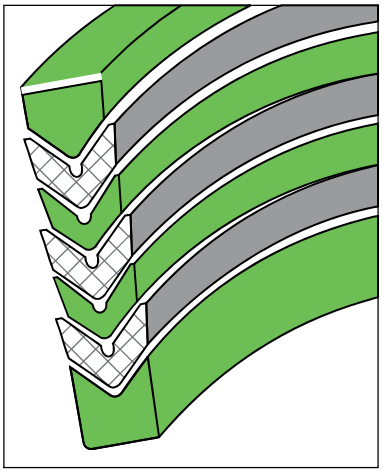


Tap Hole Drilling

The Tap Hole drilling used for tapping the furnace hearth for casting or draining iron and slag down is exposed to extremely high temperature. Thus, replacement of standard sealing system by a special designed seal kit made of teflon & elastomer achieved extension of lifetime of the seal in working condition.

Mudgun Ramming Cylinder

With the combination of Teflon & High Temperature resistance material, seals are developed for robust and reliable working conditions for such high end applications.



V-Packing Set consists of two support rings and two centre rings in Teflon & 3 centre rings in FKM fabric.

Working Conditions	
Pressure	400 Bar
Temperature	-40^0 C to +250^0 C
Speed	1 mtr/sec

Coke Oven

Coke Oven

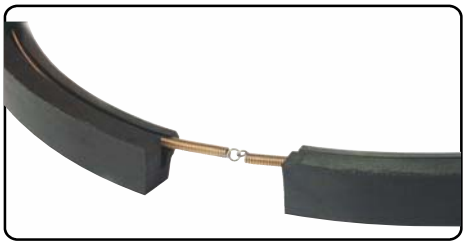
High Temperature Application

For one of the critical application in coke oven where the reliability is most concern, Max Spare had developed sealing profile in combination of elastomer and Teflon which achieved a tremendous extension of the lifetime of the seal.

Converter

Dismantling equipment and replacing seals is time consuming and therefore expensive. Max Spare offers its split seal range for such applications which reduces down time and production loss.

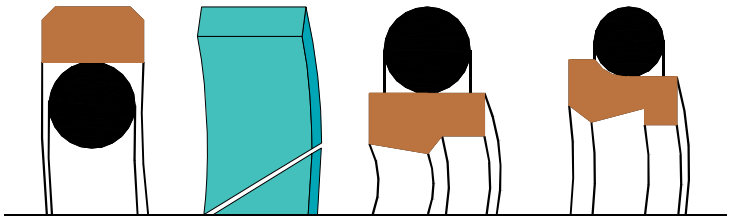
Max Spare had developed Split Seals which enables to reduce down times for replacing the seals with its range of profiles with combination of rubber fabric material.



Continuous Casting

Continuous Casting Plant is operating 7 days a week. Thus required reliability of seals. Shutdown of this process leads to high production losses.

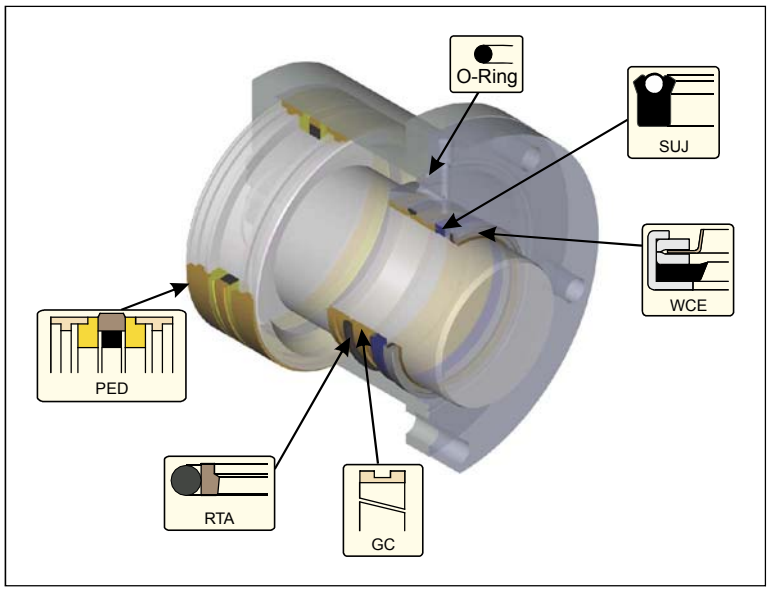
Max Spare offers high end Rubber & Thermoplastic Material in combination of seal profile which given optimum life of the seals in working condition.



Sealing system for Guide Segment Hydraulic Cylinders in CCP

Working Conditions	
Pressure	400 Bar
Temperature	-40° C to + 250° C
Speed	10 mtr/sec

Hot & Cold Rolling Mill



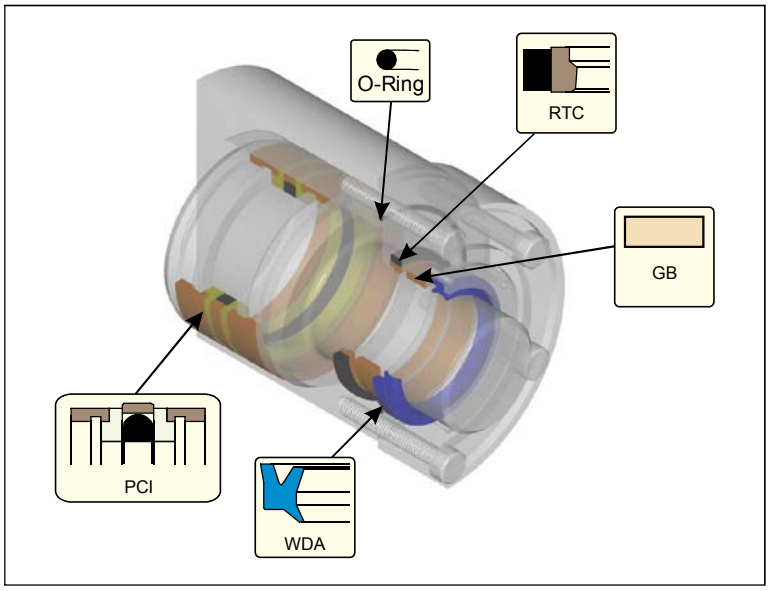
Max Spare Sealing System for Work Roll Bending Cylinder / Back-up Roll Balancing Cylinder

Working Parameters	
Pressure	Upto 300 Bar
Temperature	-30° C to +100° C (Viton matl. upto +220° C)
Speed	1 mtr/sec
Size Range	Upto 7”

Max Spare Sealing System for Hydraulic Automatic Gauge Control (HAGC) Cylinders

Scope of Developments -

- In house modifications for existing grooves
- Long Term effective solutions
- Standard Size
- Cost Saving

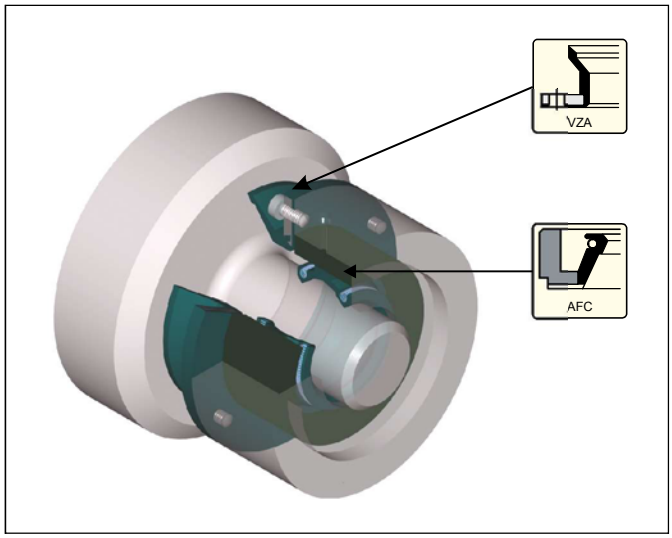


Features -

- High Load Bearing Rings
- Very Low Friction. No Stick-Slip
- Proven Design
- Heavy Duty Seal Profile Construction
- Long Service Life.
- Easy Installation

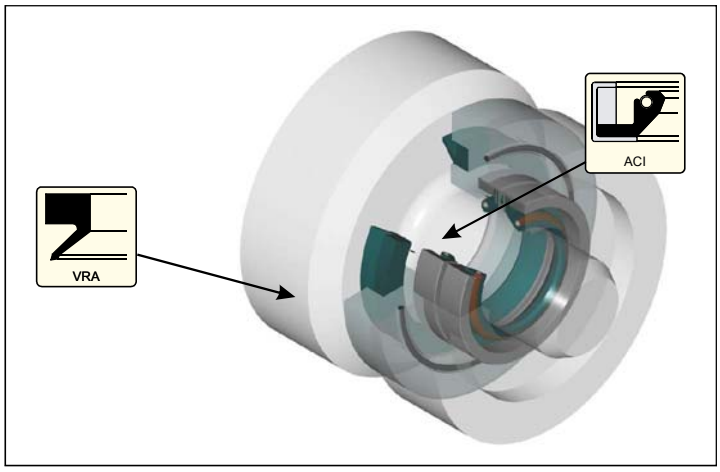
Working Parameters	
Pressure	Upto 500 Bar
Temperature	-30° C to +100° C (Viton matl. upto +220° C)
Speed	1 mtr/sec
Size Range	20” to 60”

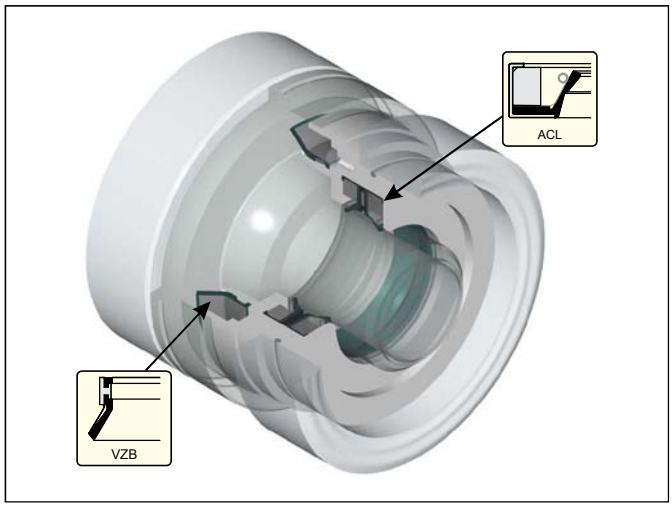
Max Spare Sealing System for Roll Shop Work Rolls and Back-up Rolls



Working Parameters			
	NBR	HNBR	FKM
Temperature	-30° C to +100° C	-30° C to +140° C	-40° C to +220° C
Speed	10 m/s	15 m/s	20 m/s
Size Range	1” to 40”		

Working Parameters			
	NBR	HNBR	FKM
Temperature	-30° C to +100° C	-30° C to +140° C	-40° C to +220° C
Speed	20 m/s	25 m/s	30 m/s
Size Range	5” to 60”		

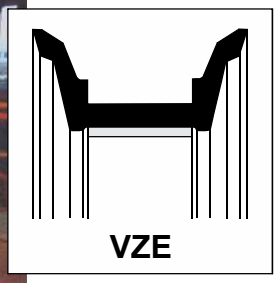




Working Parameters			
	NBR	HNBR	FKM
Temperature	-30° C to +100° C	-30° C to +140° C	-40° C to +220° C
Speed	30 m/s	32 m/s	35 m/s
Size Range	10” to 60”		

(Given Speed Values may vary depending upon actual working parameters)

Application Overview



FRONT VAVLE SEALS

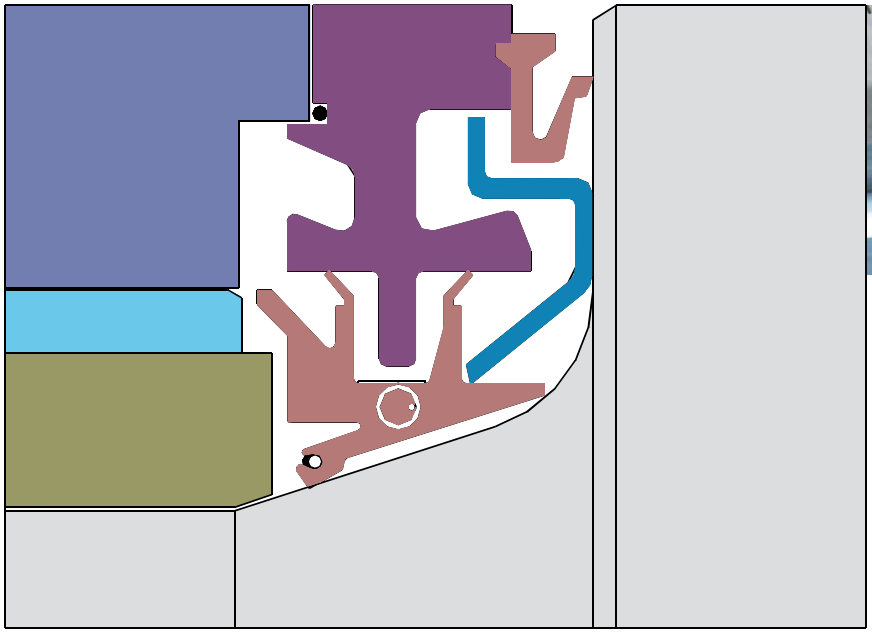
This seals are developed in WRM for module. Specially design sealing element with steel band offers high wear resistance and excellent performance.

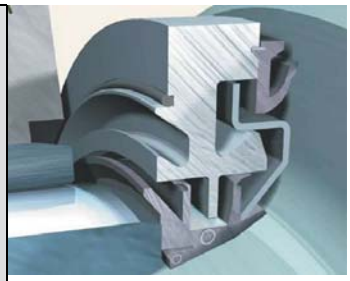
- Speed - 2 mtr/sec
- Size Range - 4", 6" and 8"

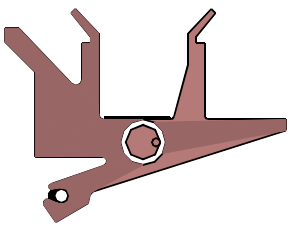
NECK SEALS

Max Spare had developed Neck Seals for domestic and international steel industries. This neck seal series is available in both ANA & ANB style to meet customers requirement. With the special material compound and stringent manufacturing process this neck seal had proven good performances and optimum service life.

Every size of neck seal can be supplied along with its corresponding watergard seal or the single neck seal and watergard seal.

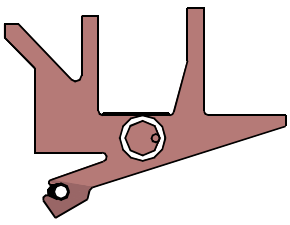






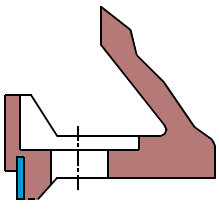
TYPE:- ANB

Developed Sizes -
12", 16", 21",
44", 46", 48", 50"



TYPE:- ANA

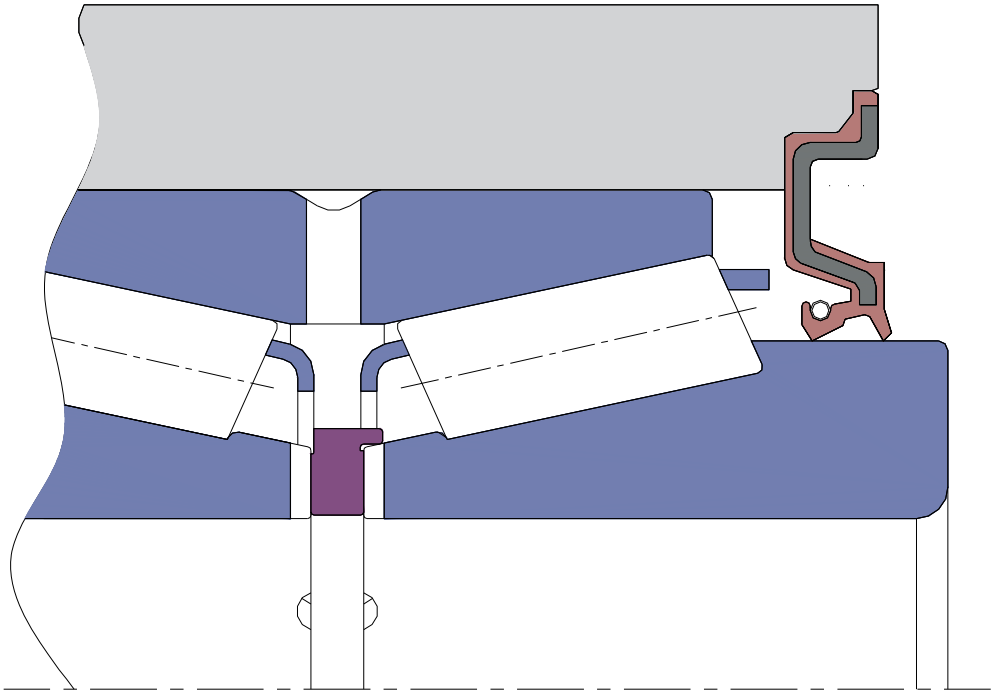
Developed Sizes -
10", 14", 16", 18",
24", 48", 50", 54"

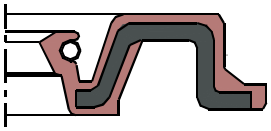


TYPE:- WATERGARD

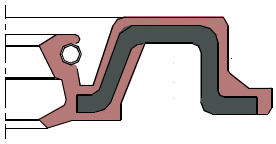
Taper Roller Bearing Seals -

Max Spare had developed inner & outer seals for Taper Roller Bearings used in work roll and intermediate roll chocks. AZI & AZZ seals are constructed with a metal insert with rubber covered outer diameter. Spring loaded single and dual lip made out of FKM or HNBR elastomer.

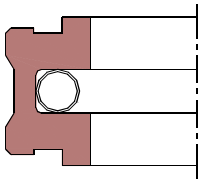




TYPE:- AZI



TYPE:- AZZ

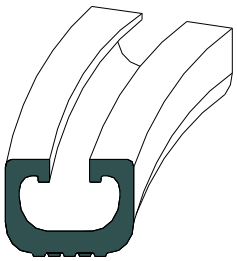
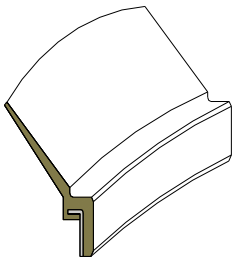
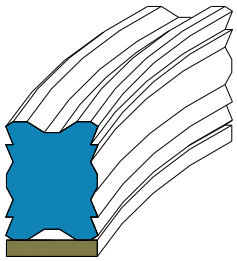
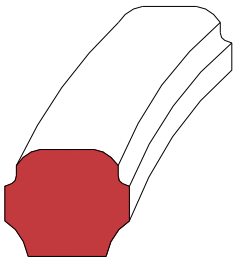
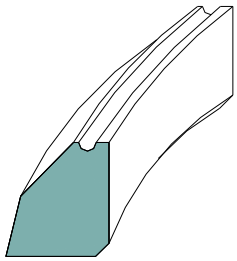


TYPE:- AYO

* Assembly shown is just for an example purpose, it may vary to the actual bearing assembly.

Special seals for different application in steel making process -

Max Spare is involved in supplying specially developed seals in various applications in different stages of steel making process. Seals for valves, actuators, accumulators, rolling mills, furnace equipments are supplied in different elastomer materials. The size range of these seals are covered upto 2 mtr. in diameter. You can place your trust on Max Spare for these kinds of special requirements.

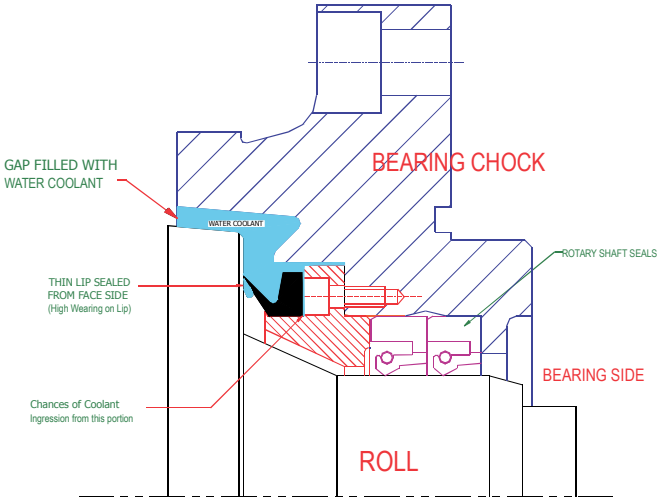
				
Location : Pellet Plant Description : Sealing ring for discharger air sealing of HBFS 120/10 Size : ∅1500.00 mm	Location : Rolling Mill Description : Oil seal for model Y for R2 work roll chock assembly Size : ∅900.00 mm	Location : Coke Oven Description : Piston seal for stove accumulator Size : ∅350.00 mm	Location : Blast furnace Description : Seal for lower seal valve Size : ∅1000.00 mm	Location : Blast Furnace Description : Bleeder Valve Seals Size : ∅800.00 mm

Success Stories

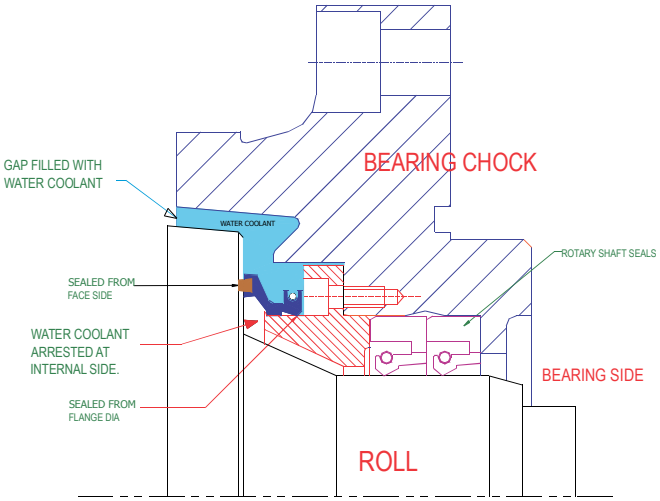
Development of Topguard: -

Max Spare is offering customised sealing solution in steel mill according to the requirement and encountering the problems by giving best sealing solution without doing major modification in existing assembly. Below shown design is one of an example of such development.

Old Design

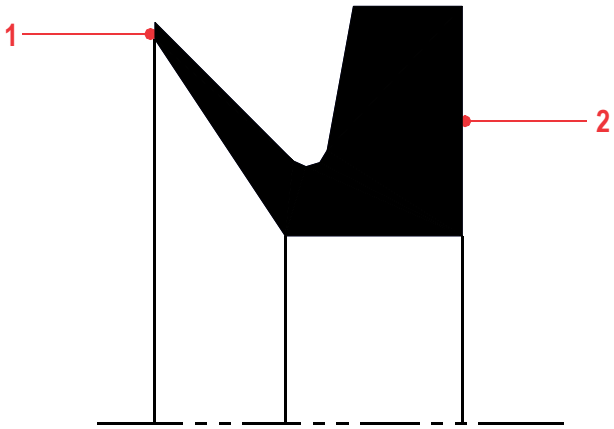


New Design



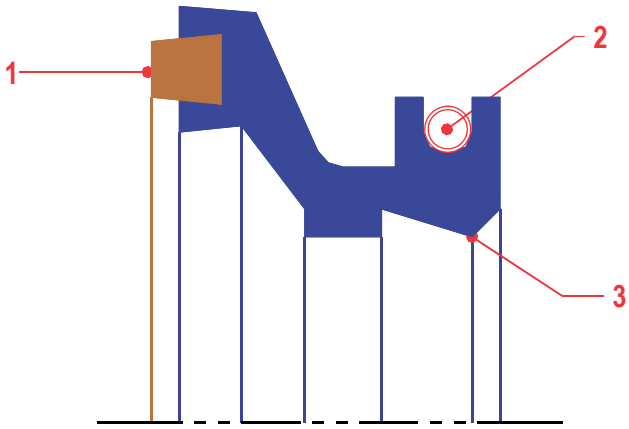
Max Spare proposed assembly with new developed TOPGUARD coolant seal

Old Design V-Ring Concept



1. Thin Lip surface in contact with roll face
2. Flat body contact with uneven surface of flange

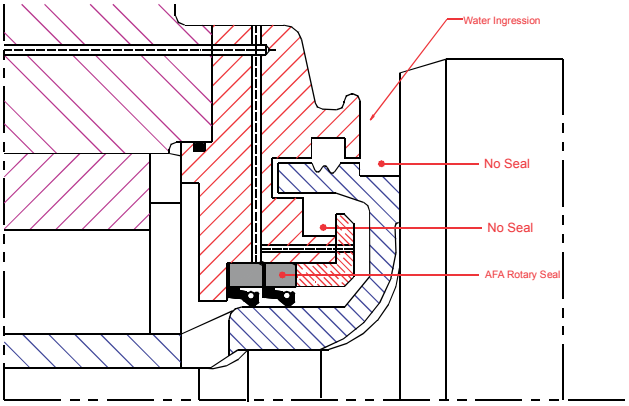
New Design TOPGUARD Concept



1. Bronze filled PTFE insert Lip for good wear resistance
2. Spring to hold the Lip tight on flange
3. Sealing lip profile to seal coolant from opposite side

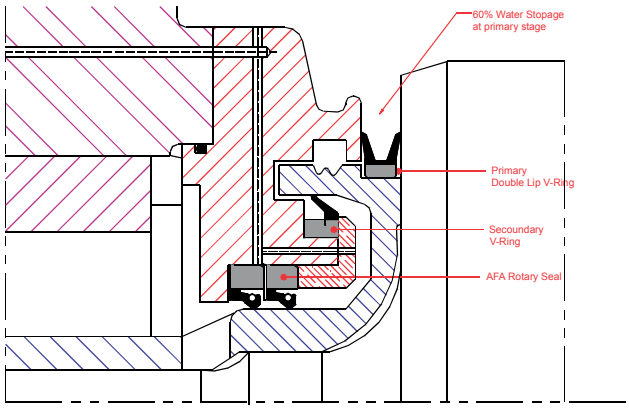
Development of Sealing Solutions for Backup Roll: -

Old Sealing System



BACKUP ROLL CHOCK

New Max Spare Sealing System



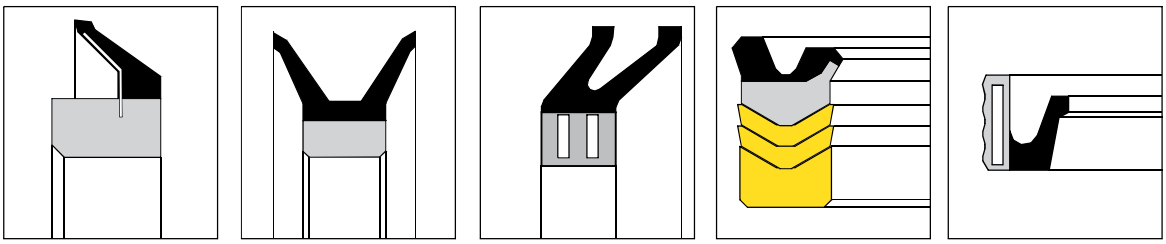
BACKUP ROLL CHOCK

Above is an example of development in one of the steel mill done by Max Spare which had proven the performance and drastically reduced the ingression of coolant into the bearing and had increased the life & performance of an expensive bearing.

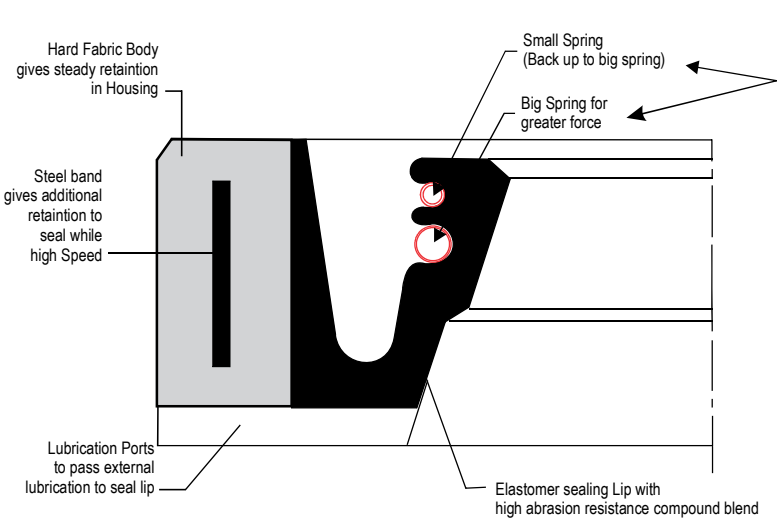
Development of Customised Profile: -

Highlights :-

Max Spare has developed sealing solutions for Hydraulic and Rolling Mills for Steel Industry by offering customized sealing concepts to overcome the existing problems by developing new sealing profiles with suitable material according to the working parameters. The below given seals profiles are some of the examples developed.



Force - 2K10 type Rotary Seal for Backup Roll Chock. (Hot Rolling & Cold Rolling Mill)



Both Springs adjacent to each other give good force on the sealing Lip, and grip on the shaft during high speed and also keep Lip in contact with shaft incase of mis-alignment

Working Parameters	
Pressure	1 Bar
Temperature	-40^0 C to +140^0 C
Speed	15 mtr/sec

Seal Material

Elastomers

Materials (Commonly known as)	Material Description	Temp. Range
Nitrile	Acrylonitrile Butadiene Rubber (NBR)	-40° C to +100° C
Viton®	Fluro Rubber (FKM)	-40° C to +220° C
Silicon	Silicon Rubber (VMQ)	-70° C to +200° C
EPDM	Ethylene Propylene Diene Rubber	-40° C to +120° C
Neoprene®	Chlorobutadiene Rubber (CR)	-20° C to +100° C
VAMAC®	Polyacrylic Rubber (ACM)	-10° C to +125° C

Thermoplastics & Thermosets

Materials (Commonly known as)	Material Description	Temp. Range
PU	Polyurethane	-30° C to +100° C
Teflon®	Polytetrafluorethtlene (PTFE)	-200° C to +260° C
	PTFE Compounds (Bronze / Glass / Carbon / Graphite)	-200° C to +260° C
TPE	Polyester Elastomer	-50° C to +110° C
PF	Phenolic Resin Bonded Fabric	-20° C to +120° C
Delrin®	Polyacetal (POM)	-40° C to +140° C
G.F. PA66	Glass Filled Polyamide (Nylon)	-20° C to +220° C
PEEK	Polyetherether Ketone	upto +315° C

Acrylonitrile Butadiene Rubber (NBR)

Hardness	Max Spare Code
NBR 70°/75° Shore 'A'	NT4/b
NBR 80°/85° Shore 'A'	NT5/b
NBR 90°/95° Shore 'A'	NT6/b

Commonly known as **NITRILE** or **BUNA-N.**

Nitrile rubber is the sealing material most frequently used in Hydraulic & Pneumatic systems because of its excellent resistance to mineral oil based fluids, greases, water & hydrocarbon fuels. It has good physical characteristics such as abrasion resistance and good compression set.

NBR is not suitable to Aromatic hydrocarbons, chlorinated hydrocarbons, automotive brakes fluids, and some fire resistant hydraulic fluids.

Fluoro Rubber (FPM)

Hardness	Max Spare Code
FPM 70°/75° Shore 'A'	VT2/b
FPM 80°/85° Shore 'A'	VT3/b
FPM 90°/95° Shore 'A'	VT4/b

FPM Rubber is commonly known by DU PONT trade name **VITON**. The main characteristics of FPM are that it is resistant to high temperature & their chemical stability. Also displays minimal weight loss in high vacuum & also, its permeability to gases is low.

VITON is compatible to fire resistant Hydraulic fluids, hot oils, greases, hydrocarbon, chlorinated hydrocarbons & most organic acids, even at high concentrations and with / against a number of organic compounds. It has excellent resistance to hot water and to steam.

FPM, however is not resistant to methanol, keytones, esters and ethers.

Hydrogenated Acrylonitrile Butadiene Rubber (HNBR)

Hardness	Max Spare Code
HNBR 70°/75° Shore 'A'	NT42/a
HNBR 80°/85° Shore 'A'	NT42/b
HNBR 90°/95° Shore 'A'	NT34

HNBR has good heat resistance, oil resistance & resistance to number of aggressive chemicals. The material exhibits high mechanical strength and improved abrasion resistance. It also has superior resistance to weathering, ozone and hot air and very good resistance to technical oils, even in the presence of hydrogen sulphide and amines.

HNBR with PTFE Filler

Hardness	Max Spare Code
HNBR 80°/85° Shore 'A'	NT34/b

This specially developed compound is very good for low friction and low abrasion resistance. Mostly this material are used for seals subjected to dry run.

Polyurethane (PUX)

Hardness	Max Spare Code
92°	PUX

PUX material is a special grade polyurethane capable to withstand temperature upto +110°C, compared to normal grade PU material. Besides temperature resistance it exhibits good wear & tear properties, abrasion resistance, extrusion strength and good flexibility.

Polyamide (Nylon)

Hardness	Max Spare Code
M 95°	NY-X

NY-X grade polyamide have capability to withstand temperature upto +290°C compare to other grade polyamide. It has good slide and wear characteristics. The materials are continually resistant to solvents, grease, fuels, oils and acids. Strong acids, alkalis and hot water attack polyamide.

Win With Max Spare

STEEL MILL

» HAGC Cylinder
» Bending & Balance cylinder
» Work Roll & Backup Roll chock

OIL & GAS

» Extreme Pressure
» Robust working conditions
» Long service life

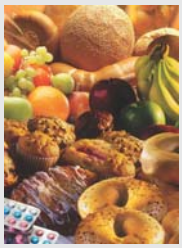
POWER PLANT

» Turbines
» Boilers
» Coal Pulveriser
» Roller Journal Assy

PULP & PAPER

- Pneumatic Valves
- Pneumatic Actuators
- Hydraulic Cylinders
- Pneumatic Cylinders
- Calendar Roll Seals

FOOD & PHARMA



» Food Compliant Material
» Aggressive Fluids – CIP & SIP Process
» High Temperature Solutions in Bakery products

TYRE INDUSTRY

» Tyre Curing Presses
» Bladder Machine

EARTH MOVING INDUSTRY

» Steering Cylinder
» Boom Lifting Cylinder
» Bucket Cylinder
» Telescopic Cylinder
» Axial Grease Seals

PRESS FORMING INDUSTRY

» Heavy Duty Presses
» Hydraulic Presses
» Mechanical Stamping
» Presses
» Forming Presses

ALUMINIUM INDUSTRY

» Crust Breaker Cylinder
» Point Feeder cylinder
» Tapping Breaker cylinder
» Vacuum seals
» Pneumatic Breaker

CHEMICAL & FERTILIZER

» Sealing of a coolant compressor with multiple mechanical seals
» PTFE gaskets and tapes
» Metal expansion joints

SUGAR INDUSTRY

» There are numerous rotating equipment which require sealing in sugar industry.

AUTOMOBILE INDUSTRY

» Transmission Gear Box
» Axels
» Shock Absobers

VALVE INDUSTRY

» Petroleum Line Valves
» Gas Line Valves
» Valve Seat
» Butterfly Valve Seat

WIND MILL

» Gear Box
» Pitch Cylinder
» Pulse Encoder Seals
» Main Bearing Rotary Seals

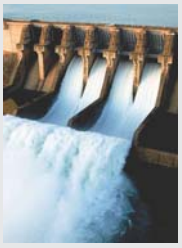
HYD. & PNEU. CYLINDERS

» All types of Piston single and double acting seals for pressure range start from 0 to 2500 bar.

ENGG. & FABRICATION

» Various types seals and customised solutions are available in this segment. From machine tools to maintenance & overhauling work.

HYDRO POWER



- Keplan Turbine Blades
- Wicket Gates
- Servomotors & Navlock Cylinders

CEMENT

» All types of Piston single and double acting seals for pressure range start from 0 to 2500 bar.

TEXTILE INDUSTRY

» Motors
» Spinning

PUMP MOTOR & GEAR BOX

» High Speed
» High Pressure
» Temperature resistance
» Media resistance
» Operating reliability

Our Esteemed Customers:

- Arcelor Mittal (Germany)
- Thyssen Krupp Steel (Germany)
- Tata Steel
- JSW Steel
- Steel Authority of India (SAIL)
- Essar Steel
- Bhushan Steel
- Uttam Steel

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IN TECHNICAL COLLABORATION WITH
UKSEALS & POLYMERS LTD. (ENGLAND)