

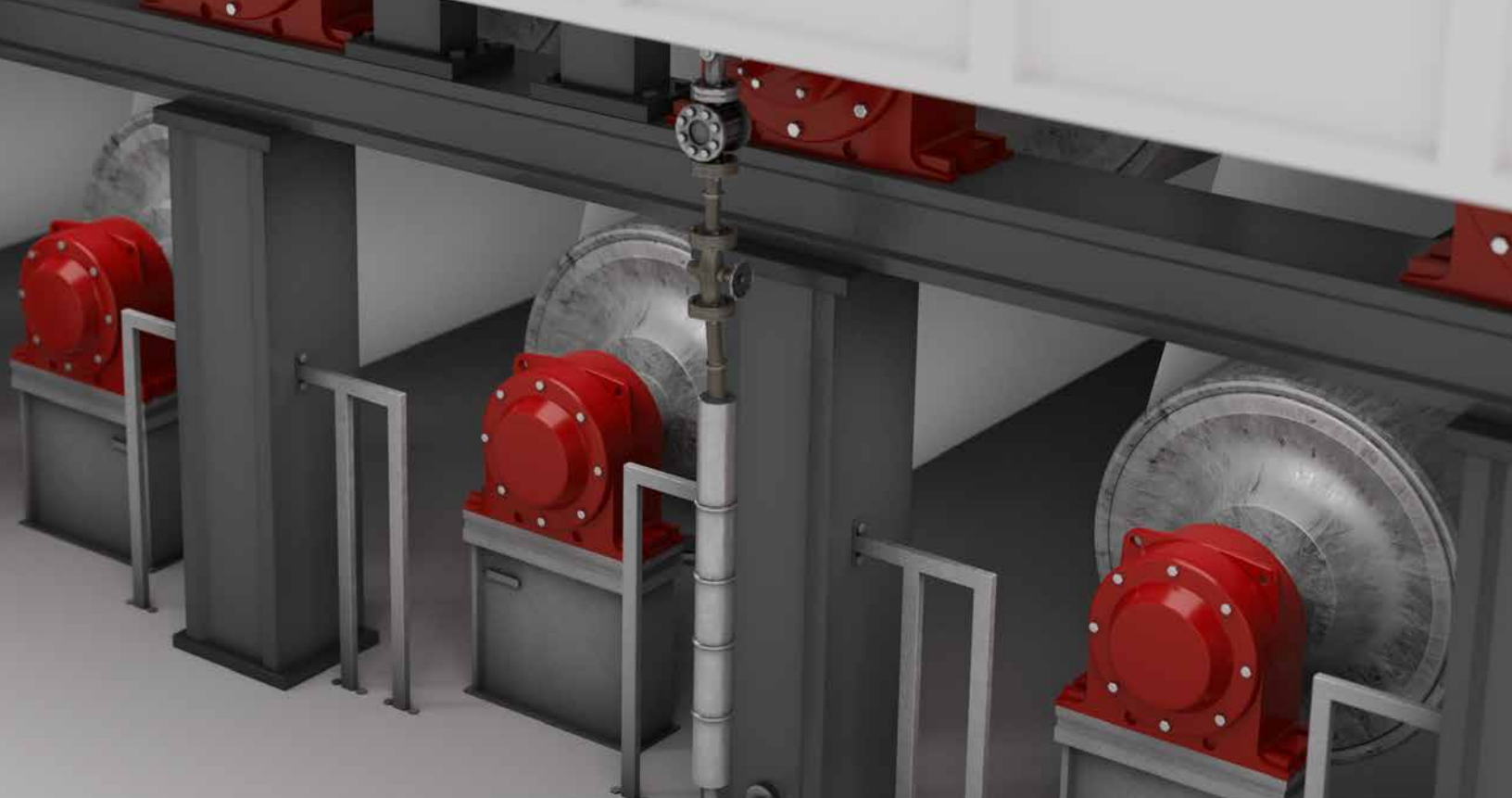
NSK

TL-RUB SELF-ALIGNING CYLINDRICAL ROLLER BEARINGS

TOUGH AND LONG-LIFE PERFORMANCE IN PAPERMAKING MACHINES



STAY IN MOTION. STAY IN CONTROL.



AT HIGH SPEEDS. UNDER HIGH LOADS. IN HIGH HEAT.

BEARINGS FOR PAPERMAKING MACHINERY

High speeds. Moisture. Intense heat. The forces at work on the bearings used throughout these massive mechanical marvels are extreme. And the stakes are high.

With throughput as great as thousands of feet per minute — hundreds of tons each day — a single bearing failure can bring the paper that flies across a machine's interdependent rolls to an abrupt halt. At a significant cost.

Reliability is paramount.

For NSK, product development and design is focused squarely on withstanding the manifold operating and environmental stresses of these applications with:

- › increasing capacities for high loads and high speeds
- › advanced materials for durability, wear resistance and longer life
- › lubrication and seal technology for smooth and clean running

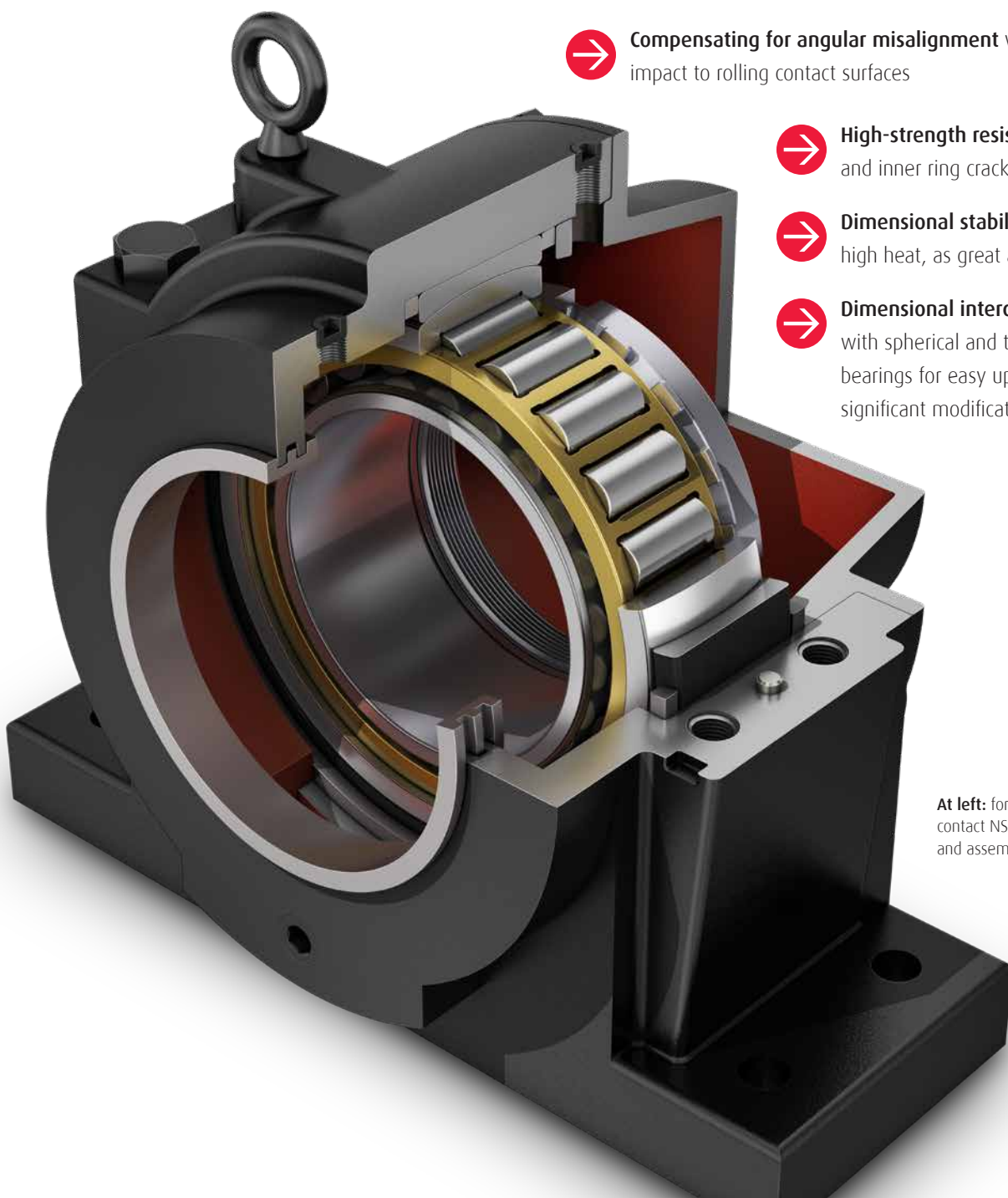
Our product solutions are designed to optimize the performance of machinery and equipment, to assure predictable reliability and to deliver total cost-efficiency.

OUTSTANDING PERFORMANCE ENGINEERED IN

The guide-end bearings that support paper machine dryer cylinders operate under a uniquely severe combination of thermal and mechanical challenges. NSK's TL-RUB self-aligning cylindrical roller bearings have been designed specifically to deliver low wear and long-life performance under these conditions, achieving an uptime outcome for continuous long-duty cycles as result of:

- ➔ **Smoothly accommodating thermal expansion** with free axial displacement in both directions
- ➔ **Compensating for angular misalignment** with negligible impact to rolling contact surfaces

- ➔ **High-strength resistance** to hoop stress and inner ring cracking
- ➔ **Dimensional stability** under extremely high heat, as great as 200°C
- ➔ **Dimensional interchangeability** with spherical and toroidal roller bearings for easy upgrade without significant modifications



At left: for extensive conversion projects, contact NSK for custom-designed housings and assembly solutions

DESIGN FEATURES AND OPERATING CHARACTERISTICS

Pictured from left: dimension series 23 and dimension series 22 self-aligning TL-RUB cylindrical roller bearings



DESIGN FEATURES

- › Special design NU-type cylindrical roller bearing with an aligning ring
- › High-capacity internal design with optimized roller size and complement
- › Inner rings are manufactured with fracture-resistant Tough and Long-life TL steel
- › Corrosion-resistant phosphate-coated aligning ring
- › With heavy-duty roller-guided machined brass cage
- › High-temperature dimensional stability up to 200°C
- › Dimensionally equivalent to spherical and toroidal roller bearings
- › For dimension series 22, 23, 31 and 32; additional series designs are possible — contact NSK
- › Available with C-Normal, C3, C4, C5 and custom internal radial internal clearance
- › With tapered bore



COMPENSATION OF ANGULAR MISALIGNMENT

Compensation for misalignment of the bearing seat that may occur during mounting or operation is achieved between the spherical outer ring and the aligning ring. Phosphate coating on the aligning ring mitigates wear and any detrimental impact on bearing life.

Because no self-alignment occurs within rolling contact areas, any effects of edge loading on the rollers is minimized.



SMOOTH THERMAL EXPANSION

The ribless bearing inner ring allows for free axial displacement in both directions, smoothly accommodating thermal expansion of the heated dryer roll.

Optimized rolling contact between the rollers and the inner ring raceway ensures that running characteristics and load-carrying capacity are retained in any position — even in the case of significant axial growth.

TOUGH AND LONG-LIFE DURABILITY

NSK's TL steel technology has been developed specifically to countermeasure inner ring cracking and fracture damage occurring in bearings that support the dryer cylinders of papermaking machines.

By adopting an advanced, chrome-augmented material composition in conjunction with a carbonitriding heat treatment process, TL roller bearings withstand the unique thermal stress inherent to the application by delivering considerable performance advantages, including:

- ➔ **Exceptional ring fracture resistance** from high compressive residual stress after heat treatment
- ➔ **Long-life wear resistance** with high surface hardness exceeding conventional through-hardened and carburized steels
- ➔ **High-temperature dimensional stability** at operating temperatures as great as 200°C

DESIGNATION SYSTEM

TL-RUB SELF-ALIGNING CYLINDRICAL ROLLER BEARINGS

Material Specification		Bearing Type		Internal Design		Split Ring Feature		Phosphate Coating	
TL	190	RUB	22	A	K	P	g3	S8	CCG
Bore Diameter		Dimension Series		Bore Type		Carburization		Radial Internal Clearance	

DESIGNATION	ATTRIBUTE	
Material specification	TL	Tough and Long-Life material technology
Bore diameter		expressed in millimeters
Bearing type	RUB	special NU-type single row cylindrical roller bearing with aligning ring
Dimension series	22	in accordance to ISO standard
	23	
	31	
	32	
Internal design symbol	A	assigned by NSK

DESIGNATION	ATTRIBUTE	
Bore type	K	1:12 tapered bore
Split ring feature	P	single split line on the aligning ring
Carburization	g3	bearing inner ring
Phosphate coating	S8	on aligning ring external surface
	blank	normal clearance
	C3	greater than normal
	C4	greater than C3
Radial internal clearance	C5	greater than C4
	CCGXX	special clearance, in microns



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