PRODUCTIVITY AND MAINTENANCE SOLUTIONS FOR MINES AND QUARRIES



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With You



NTN-SNR ROULEMENTS IS AMONG THE LARGEST GLOBAL PROVIDERS OF PRODUCTS AND SOLUTIONS IN THE BEARING MARKET.

For us, being close to you is the keystone to your success: what is better than sharing knowledge? Irrespective of the type of activity (mines or quarries or opencast mining), these significantly change landscapes. It is difficult to measure the long-term negative impacts but the quarry workers have been thinking about reducing them for several years (vibrations from blasting and transport by truck, noise, dust, etc.). The environmental integration of the sites at the end of life is henceforth taken into account right from the opening of a site or of the renewal of its license. With concerns regarding environment preservation, NTN-SNR develops innovative and efficient solutions so that your facilities respect the measures taken by the quarry workers. In addition to maintenance products and services, NTN-SNR provides bearings adapted to vibrations, high-efficiency seals that guard against dust, permanent lubrications solutions, etc. Our engineers develop with You, for You, products resistant to the harshest conditions.

YOUR DAILY CHALLENGE: **THRIVING IN HARSH APPLICATIONS, MAINTAINING PRODUCTIVITY**

The work done in a quarry is more than just the extraction of ore. A complete mechanical process is required to obtain a product with a specific granulometry. At each step of the process, bearings play a vital role in a particularly demanding environment.

TRANSFORMING BLOCKS OF ORE INTO AGGREGATES

Once the blocks of ore are extracted, the first step is to reduce them to a size suitable for transportation and handling: this is the fragmentation process that involves crushing and then grinding.

Aggregates obtained are not uniform and thus need to be sorted in order to classify them by granulometry. This is the screening process.

BEARINGS PUT THROUGH HARSH TESTS

In a quarry, bearings operate in an extremely demanding mechanical environment. Major difficulties include:

High Radial Loads

Every day, quarry conveyor belts carry thousands of tons of ore. Corresponding belt bearings are subject to extremely high radial loads.

Pollution

Bearings are in constant contact with a dusty, damp and abrasive atmosphere.

Unbalanced Loads and Vibrations

The irregular shape of the aggregates in the crushers and screeners of the unbalanced loads causes continuous vibrations as well as extremely violent impacts.

High temperature

Quarrying machinery, shocks, vibrations and high loads generate temperatures than can exceed 100°C (212°F/100°C).

Rotation speed

The speed is relatively low in most steps of the process, but can turn out to be relatively large taking into account the size of bearings.

Misalignment

Misalignments are numerous in this type of environment.

To overcome the above difficulties, the number of moving parts in the bearing must be minimised, appropriate lubrication must be provided and the mechanical design and assembly must be flawless.

AT EVERY STEP IN THE PREPARATION PROCESS, NTN-SNR HAS THE ADAPTED SOLUTION

CRUSHING

Single or double jaw crusher / Double toothed-roll crusher

- NTN-SNR bearings, Series EF800 or UA
- NTN-SNR cylindrical roller bearings small and medium series) with solid copper alloy cage (G1)
- NTN-SNR tapered roller bearings for transmission system and angle drive



Rotary Impact Mill

- NTN-SNR Single or double-row cylindrical roller bearing
- NTN-SNR tapered roller bearings for transmission system and angle drive
- NTN-SNR single or double-row cylindrical roller thrust
- NTN-SNR single- row tapered roller thrust bearing

Secondary

area

Loading -



Each type of grinder, depending on grinding process used, determines the choice of bearing.

Impact grinding mill

- NTN-SNR spherical roller bearing (EM or B), series 22300, 23200... C3
- Tapered or cylindrical bores

Jointed percussion hammer mill

- NTN-SNR bearing special screen series EF800 or UA (EM), C4, specific tolerances
- Tapered or cylindrical bores

Jaw compression mill, for eccentric shaft

- NTN-SNR spherical roller bearing (EM or B), series 23100, 23200... C3
- Tapered or cylindrical bores

Jaw compression mill, for main support

- NTN-SNR spherical roller bearing (EM or B), series 22300, 23200... C3
- Tapered or cylindrical bores

Cage mill

- NTN-SNR spherical roller bearing (EM or B), series 22300, 23200, 24100... C3
- Tapered bore

Grinding mill, ball & rod mill, rotary impact mill

- NTN-SNR bearings, series EF800 or UA

SCREENING

To extract the under-sized materials from the crushed ore, three successive screening techniques are used:

- Primary coarse mesh screening, with vibrating bars or rotating screens
- Secondary fine mesh screening, out of balance vibrating screen using perforated metal plates, meshes or various types of polymers.
- Tertiary, several series screens end to separate aggregates «cuts» of increasingly fine.

Eccentric disk feeder, out of balance, resonance screen or ellipsoid

- NTN-SNR range, Series EF800 or UA

- NTN-SNR cylindrical roller bearings (small and medium size) with solid brass cage (G1)



CONVEYING

Ore is carried from station to station by a number of means: loaders, washers, pumping units, conveyor belts.

Exit

Primary area

> Tertiary area



Alternating apron or belt conveyor

- NTN-SNR cast-iron plummer blocks in 2 parts equipped with self-aligning ball bearings, Series 1200,1300, 2200, 2300 or spherical roller bearings, Series 21..., 22... and 23.,
- NTN-SNR cast-iron self-aligning bearing (triple seal)
- Solid lubrication bearings
- Spherical roller bearings sealed

Pumping units

- NTN-SNR cast-iron plummer blocks in 2 parts
- NTN-SNR spherical roller bearings, Series 22200 and 22300 (machined or sheet metal cage)
- NTN-SNR angular-contact ball bearings

OUR OFFER FOR ALL YOUR APPLICATIONS

NTN-SNR offers a wide range of spherical roller bearings designed to withstand all constraints of the quarry environment. In the light of its experience, NTN-SNR increases the service life of its bearings to guarantee an optimum operation of your installations. The new ULTAGE spherical roller bearings range is designed to meet the harshest requirements of mechanisms such as primary and secondary crushers or public works machines.

ULTAGE SPHERICAL ROLLER BEARINGS: MORE PERFORMANCE, LESS MAINTENANCE

ULTAGE

With a high load capacity, high speed limit, operating up to 200°C and sealed, our bearings offer you compact solutions with an improved service life, higher rotation speed which reduce operating and maintenance costs.

AN EFFICIENT RANGE DEDICATED TO VIBRATING APPLICATIONS SUCH AS VIBRATING SCREENS AND CRUSHERS

EF800 or UA series

- Designed for particularly harsh applications
- Single piece brass cage: optimum stiffness and vibration resistance to increase the service life
- Cage centred on raceway providing more reliability: no locking in case of thermal variations (only for EF800 series)
- Optimised assembly: reduced outer diameter and bore tolerances, reduced clearance for easier mounting and simplified adjustment of the final clearance to prevent detrimental radial preloading
- Series 22300 available with bore from 40 to 170 mm
- Series 22200 available with bore from 80 to 110 mm

EF800 and UAVS2 versions

With You



Special radial clearance:

C4, positioned at upper 2/3rds of the C4 tolerance range (special clearance also available in C0 and C3 classes)

- Recommended adjustments:
 - Tight at housing, P6 class
 - Sliding at shaft, G6 class

UA version

• Bearing with specially treated inner ring whose function is to delay the onset of corrosion (MX Prefix)



ASYMMETRIC ROLLERS

AN EXTENSIVE RANGE FOR ALL APPLICATIONS

ULTAGE[•] The spherical roller bearings range Bores 1600 1400 1200 1000 800 600 400 200 21300 22200 22300 23000 23100 23200 23300 23800 23900 24000 24100

With steel cage (EA)

- Suitable for standard applications
 Specific cage shape: perfect roller guidance to avoid overheating
 - to avoid overheating - Increased lubricant volume between the
 - 2 rows of rollers to optimize the flow and improve the service life
 - Available up to 190mm bore

With machined cage (EM or B)

- Suitable for harsh applications
- Single-piece cage: excellent shock resistance, high stiffness (B type: 1 massive cage by row)
- Cage centred on raceways for increased reliability: no locking in case of thermal expansion
- Available up to 1400mm bore



Sealed (10X...EE or WA...LL)



- Reduces maintenance operations and increases service life
- · Prevents ingress of contamination which delays grease degradation and bearing life
- The sealing system can be fitted on standard bearing housings
- Although bearings are sealed, lubrication is possible
- Up to $\pm 0.5^{\circ}$ misalignment with same bearing performance
- Available in dimensions < 260mm outside diameter



CAST IRON SELF-ALIGNING BEARINGS



- Several housings (plummer block, flanged, take-up, big-end or cartridge type)
- Supplied pre-assembled, relubricatable or with for life lubricated insert bearing
- Efficient protection against corrosion by passivation
- Sealing solutions for operation in harsh environments



• Optional additional covers, cast iron or pressed steel, with double lip seal to increase tightness and service life

SPLIT PLUMMER BLOCK UNITS: SNC / SNCD



- Excellent rigidity and stability under all loading conditions
- Optimised to enhance resistance to vibration
- Improved heat dissipation characteristics
- · Reduced stress levels in the bearing
- Extended service life for the bearing
- Comprehensive assortment of sealing options: Taconite, labyrinth, double lip,- felt and V-ring seal
- · Ready for use, easy to fit
- Shaft diameter: 20 mm 160 mm
- Also available in spheroidal cast material

On request, supply of specially tailored designs adapted to your applications

BEARINGS SPW/SFCW*/SPAW**

- Quick assembly and interchangeable with SN / SNL/ SNH /SNA assemblies
- Quick assembly to minimize downtime and maximise productivity
- · Equipped with sealed spherical roller bearings, W222xx series
- · Housing in one part
- Excellent sealing characteristics
- Compounds treated with black iron oxide for anticorrosive protection
- . Housing can be used as a fixed or floating bearing due to a spring retaining ring adjustment

*available on request

** Bearing with shaft height in inches

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SPLIT PLUMMER BLOCK HOUSINGS SNCD31/30



- Made from spheroidal cast material for highest shock resistance and good low temperature behaviour
- Extended life duration though optimised design features
- Superior performance with NTN-SNR Ultage series
- Designed for cylindrical and tapered bore bearings
- Interchangeable with SD series according ISO 113
- For demanding environments also available with Taconite seal

SPECIAL BEARINGS FOR CRUSHERS

- Bearings and thrust bearings of special dimensions for gyratory crushers
- Cylindrical or taper rolles
- Machined brass cage
- Crowned rollers to support very high loads

Example: 2R5215CS140PX1 = Rolling bearing for Rollercone 45'

SOLID LUBRICATION BEARINGS

LP03 : -20°C to +60°C (80°C max.)

LP05 : -20°C to +120°C (100°C max. continuously)



- Re-lubrication not necessary Solves maintenance problems when bearings are not easy to access.
- Resistant to contamination Bearings with solid grease resist contamination such as dust, humidity.
- No lubricant leaks Solid lubrication: eliminates grease leakage which ensures clean running applications.
- Suitable in cases of centrifugal force and vibrations The solid mass of the grease ensures an excellent resistance to centrifugal forces and ensures a consistent supply of lubricant necessary for effective operation.
- Starting torque At ambient temperature, very low starting torque (unlike conventional grease lubrication).

TRANSMISSION JOINTS: BJ, DOJ, TBJ



- Smooth and quiet rotation Allow smooth and quiet rotation, without angular speed variations.
- Reliability of seals Sealing with grease and caps that offer better endurance and high seal performance in order to keep a clean atmosphere.
- Permanent lubrication High performance of cap seals allow a long service life without maintenance (no grease top-up, leakage or water penetration).



With You

NTN-SNR puts at your disposal its entire range of standard bearings for your equipment:

- Tapered roller bearings
- Single or double-row cylindrical roller bearings (SL, E version)
- Thrust roller bearings (tapered, cylindrical or spherical)
- Etc...

MAINTENANCE AND SERVICES

THE MAINTENANCE OF MINES AND QUARRIES MUST MEET THE FOLLOWING OBJECTIVES

- Economy
- reduced downtime
- scheduled and quick operations
- Technical proficiency
 - increased service life for bearings thanks to precise and reliable lubrication
 - permanence of installations thanks to the use of appropriate tools
- Safety
 - keeping staff away from risk areas: high temperatures, rotating parts, corrosive products and pollutants
 - preparation of operations
 - training of technicians in the safe use of the appropriate tools

EXPERTS & TOOLS MEETS THESE TARGETS WITH ITS RANGE OF MAINTENANCE TOOLS AND PRODUCTS COMBINED WITH ITS SERVICES



Tools suitable for paper machines

- Self-centring hydraulic extractor (up to a capacity of 20 tonnes)
- Hydraulic nuts (bore up to 1000 mm)
- Induction heater (for bearings up to 1200 kg)
- These tools are also available on hire.

The complete LUB'SOLUTIONS range for reliable, safe and precise lubrication*

- VIB, HEAVY DUTY and HIGH TEMP greases for the environmental limitations of each stage in the process
- Independent automatic lubricators dispensing the same greases
- Pumps and accessories for centralised lubrication up to 1000 points

Our experts can also provide their know-how to define, or even install, these systems.



Customised services for every situation

- Technical assistance for the assembly and disassembly of bearings
- Reconditioning of bearings removed during maintenance campaigns
- On-site training of maintenance teams
- Diagnosis of damaged bearings
- Analysis of vibrations for the bearing, reduction gear, frame and machine base

*Offer limited to certain areas - Please contact us

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