

A photograph of a paper mill interior, showing a complex system of metal walkways, railings, and machinery. The floor is polished and reflects the overhead lights. The machinery is multi-level, with various pipes, valves, and structural elements visible.

**NTN-SNR,**  
solutions tailored to the  
**paper mill industry**

## NTN-SNR, working with paper manufacturers...

*NTN-SNR ROULEMENTS, is part of the 3<sup>rd</sup> world group in the bearings market, NTN Corporation, a major actor as a designer, developer and manufacturer. Customer proximity is the key to our success: what could be better than sharing know-how!*

*Today, and even more so tomorrow, the paper mill industry will attempt to improve its performance in terms of sustainable development (massive deforestation, high water consumption, energy-hungry industries, etc.).*

*These concerns are important for you, and they are also important for our teams which provide "responsible solutions", from an environmental, technical, commercial and human viewpoint. Our "ethical footprint" is a source of concern for us, on our plants and in your homes...*

*The Paper mill industry has technical particularities, for which we offer customized solutions. In recent years, we have indeed provided support for your technical development policies, including even the most state-of-the-art approaches. Our daily challenge is to develop innovative solutions meeting your specific requirements for you and with you.*

*We attempt to satisfy your requirements and ensure the long-term use of your installations, with ever more quality, customer listening and technical progress. We are constantly reconsidering our offers, to ensure we provide the best.*





# Our bearings are in the very fiber of the paper mill industry

*The transformation from tree to spotless paper requires a large number of operations.*

*Working and treating the fiber resulting from wood involves the use of numerous machines through each process.*

*Bearings are key components and because of its extensive experience, NTN-SNR can offer the paper mill industry the appropriate solution for each stage of the papermaking process.*

## **From logs to wood chips: obtaining the fibers**

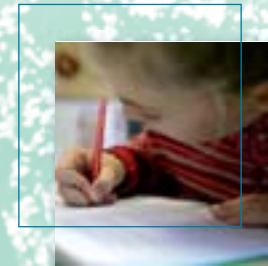
- **Bark-removal machine:** the bark is stripped off, as only wood is used in the papermaking process.
- **Cleaning machine:** logs are then washed and inspected to detect and remove any pieces of metal or stones.
- **Chipping machine:** clean logs are put into chippers where cutters reduce and sort the wood chips with an approximate length of 4 cm and thickness of 5 mm.

## **Pulping**

Wood is made up essentially of cellulose fibers bound by lignin. These fibers must be separated in order to transform the wood into pulp.

### **Two techniques are used:**

- **Mechanical pulp:** the wood is chafed then kneaded in a hot water bath to separate and break the cellulose fibers. Mechanical pulping is primarily used in newsprint production.
- **Chemical pulp:** chips are baked at high temperature with chemical products in huge autoclaves. The combined action of chemicals and heat dissolves the lignin and releases the long fibers from the wood without breaking them. This is why paper made from chemical pulp is extremely resistant.



# The best possible NTN-SNR solution for each stage of production

## Forming: sheet forming zone

The breastbox, a vital part of the machine, helps control the uniform distribution of the pulp on the wire gauze.

The wire gauze supports, conveys and coarsely drains the fibers that are further dewatered by the suction boxes.

### Fourdrinier machine, breast roll

- NTN-SNR double-row spherical roller bearing. **Series 22300, 23200, etc., standard clearance, W33 or D1**
- Tapered bore

### Fourdrinier machine, dandy roll

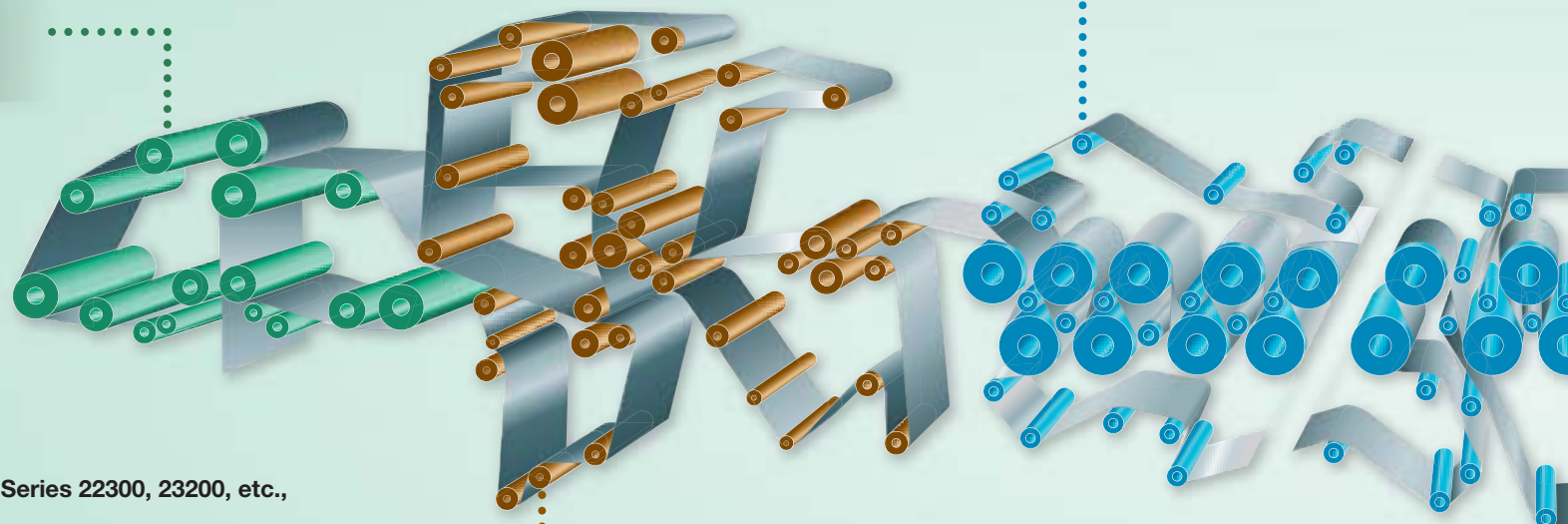
- NTN-SNR double-row spherical roller bearing. **Series 22300, etc., standard clearance, W33 or D1**
- Tapered bore

### Fourdrinier machine, couch roll

- NTN-SNR double-row spherical roller bearing. **Series 23000, 23100, 23200, etc., standard clearance, or C3, W33 or D1**
- Tapered or cylindrical bores
- Large dimensions:
  - Series 23000 (cylindrical or tapered bores)
  - Series 23900 (standard clearance or C3, W33 or D1)

### Fourdrinier machine, felt carrying roll

- NTN-SNR double-row spherical roller bearing. **Series 22200, 22300, 23200, etc., standard clearance, W33 or D1**
- Tapered bore



## Drying

The dryer section removes the remaining water.

### Felt carrying rolls

- NTN-SNR double-row spherical roller bearing. **Series 22200, 22300, 23200, etc., C3, W33 or D1**
- Tapered bore

## Pressing

Press rolls, the major de-watering process, is where large rolls under high compression remove as much water as possible from the wet fiber. They serve a dual purpose: increase the dryness of the sheet and improve the density and the strength of the damp sheet.

### Suction rolls

- NTN-SNR double-row spherical roller bearing. **Series 23000, 23100, etc., standard clearance, or C3, W33 or D1**
- Tapered or cylindrical bores

### Press rolls

- NTN-SNR double-row spherical roller bearing. **Series 23100, 23200, etc., standard clearance, or C3, W33 or D1**
- Tapered bore

### Wet felt carrying rolls

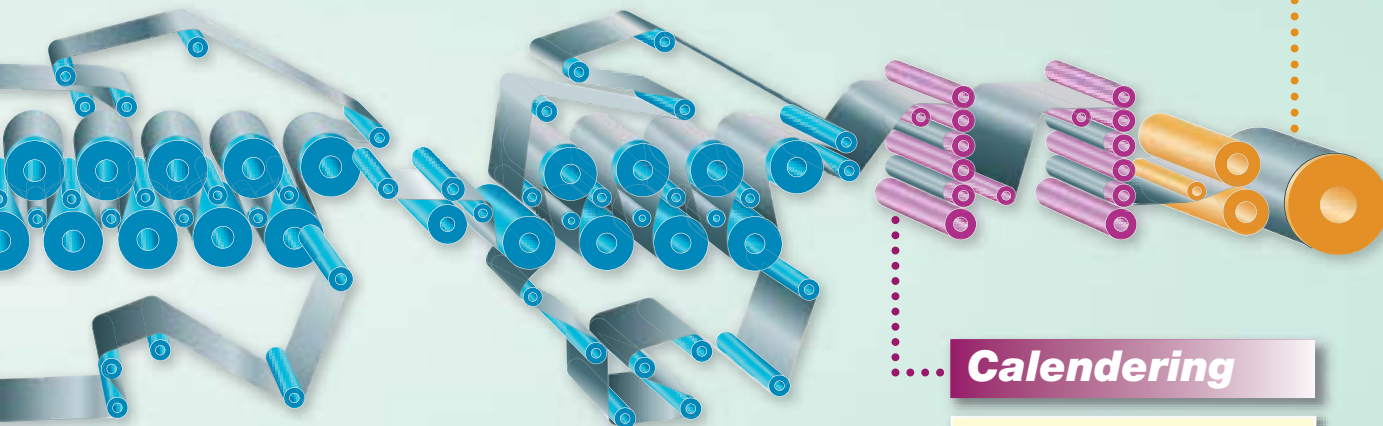
- NTN-SNR double-row spherical roller bearing. **Series 22200, 22300, 23200, etc., standard clearance, W33 or D1**
- Tapered bore



### Dryer rolls

- NTN-SNR double-row spherical roller bearing. **Series 23000, 23100, etc., C4, W33 or D1**
- Tapered bore
- Roller bearings with thermal stabilization treatment or cement steel

Large dimensions: series 23000 (cylindrical or tapered bores)



### Lower or upper press roll

- NTN-SNR double-row spherical roller bearing. **Series 22300, 23100, etc., C3, W33 or D1**
- Tapered bore

### Friction press

- NTN-SNR double-row spherical roller bearing. **Series 22300, 23100, 23200, 24100, etc., C3, W33 or D1**

Large dimensions:

- Series 23000 (cylindrical or tapered bores)
- Series 23900 (standard clearance or C3, W33 or D1)

## Reeling

A wind-up turret transforms the continuous strip from the reel winder into rolls, eliminating any defects in the processing.

### Reel Winder Cylinders and Drums

- NTN-SNR double-row spherical roller bearing. **Series 23100, 23200, etc., standard clearance, W33 or D1**
- Tapered bore

## Calendering

Calenders smooth the paper and give it its final surface finish.

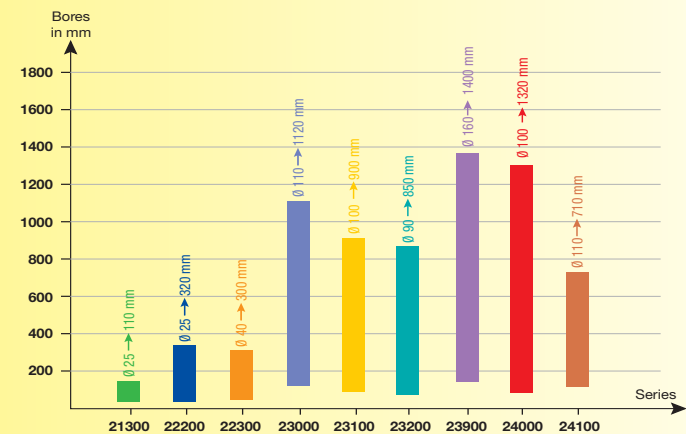
The reel winder then coils the continuous strip of paper produced by the machine onto a mandrel.

### Calendering machines & Super calenders

#### Non-Heated – Intermediate and Upper Calender Drive Rolls

- NTN-SNR double-row spherical roller bearing. **Series 23000, 23100, 23200, etc., standard clearance, W33 or D1**
- Tapered bore

## The spherical roller bearings range



#### Non-Heated – Lower Roll

- NTN-SNR double-row spherical roller bearing. **Series 23200, 24100, etc., standard clearance, W33 or D1**
- Tapered bore

#### Heated – Drive Roll and Intermediate Roll

- NTN-SNR double-row spherical roller bearing. **Series 23000, 23100, 23200, 24100, etc., C4, W33 or D1**
- Tapered bore
- Roller bearings with thermal stabilization treatment or cement steel

#### Heated – Lower Roll

- NTN-SNR double-row spherical roller bearing. **Series 23200, 24100, etc., C4, W33 or D1**
- Tapered bore
- Roller bearings with thermal stabilization treatment or cement steel

# A severe environment for bearings

The papermaking environment is particularly harsh for bearings:

- Presence of water and hot steam, therefore risks of corrosion
- High speeds and loads
- Need for precision rotation
- High temperatures
- Aggressive chemical products, particularly during the bleaching process
- Very high dust levels
- Precise and reliable lubrication at all points is critical

Suffixes	Characteristics
6E -	Inner ring case carburized
CN	Normal clearance (no designation)
C3	Clearance greater than normal
C4	Clearance greater than C3
WA...LL or EE	Spherical roller bearing with two integral seals
K	Tapered bore inner ring
M or L1	Precision machined brass cage
W33 or D1	Outer ring lubrication holes and groove
D1Xn	Inner ring lubrication
PX	Special dimensional tolerance
PX50	Extra close inner and outer ring running accuracy
PX51	Extra close inner ring running accuracy
PX52	Extra close outer ring running accuracy

## Spherical Roller Bearings



- **With steel cage**
  - Suitable for standard applications
  - Specific heat treatment for the inner and outer rings to ensure their dimensional stability at operating temperatures up to 200°C (390°F)
  - Window-type cage with roller enveloping pocket profile: precise roller guidance to avoid heating
  - A larger gap between the 2 rows of rollers allows:
    - Expansion of the lubricant reservoir
    - Improvement of lubricant flow within the bearing
    - Increased bearing life
- **With brass cage (suffixe M or L1)**
  - One-piece machined brass cage: excellent resistance to impact
  - Cage centered on the rolling elements to prevent from cage seizure due to thermal expansion
  - Re-lubrication groove and holes (W33 or D1)
  - Available up to bores of 1120 mm
- **Sealed Spherical Roller Bearings (WA... LL or EE)**
  - Reduced maintenance operations and increased service life
  - Limits the penetration of impurities in the bearings and delays damage to the grease and/or the bearings
  - Sealing possibly applied to standard housings
  - A sealed bearing can also be greased
  - The performance of the bearing remains effective, even when the bearing is misaligned (+/- 0.5°)
  - Available in large dimensions: > 260 mm

## Bearings with solid lubrication

LP03: -20°C to +60°C (80°C max.)  
 LP05: -20°C to +120°C (100°C max. continuous)



- **No regreasing required**  
Solves servicing problems when bearings cannot be accessed
- **Resistance to contamination**  
Bearings with solid lubrication resist aggression such as dust and humidity
- **No grease leaks**  
Solid lubricant: no detergent leaks occur and oil leaks are minor. Guaranteed clean operation for your applications
- **Suitable for centrifugal forces and vibrations**  
The solid mass of the lubricant ensures excellent resistance to centrifugal forces and provides the bearings with the right amount of oil for proper operation
- **Start-up torque**  
At ambient temperature, very low start-up torque (unlike lubrication using "conventional" grease)

## Constant velocity joint BJ, DOJ, TBJ

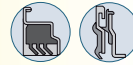


- **Rotation smooth**  
Enables smooth rotations without noise, or variations in angular speed
- **Reliability of sealing**  
Sealing with grease and caps, ensuring improved endurance and sealing performance, and maintaining a sound environment
- **Life-long lubrication**  
The high performance of the sealing of caps ensures long-term maintenance-free use, with grease supply, without any grease leaks or penetration of water

## Cast iron self-aligning bearing units



- Several forms (pillow block, flanged, take-up, cartridge, hanger-units)
- Delivered ready for assembly, regreasable and life-long greased insert bearings
- Sealing: seal with three lips (L3) or four lips (L4)
- Effective protection against pollution with stainless steel covers
- Effective protection against corrosion by chemical passivation
- Compensation of alignment defects (2° for regreasable bearing units)
- Easy assembly, installation of greasing nipples at 45°, positioning marks on most bearing housings



## Split plummer block units: standard SNC range



- High rigidity due to optimized housings
- Improved heat dissipation thanks to grooves in the housing and the regulation disc (up to 20°C less)
- Double-lip seal, felt strip seal, V-ring, labyrinth seal (200°C, round cord as standard) as standard solutions and high performance Taconite TA seal
- Grease evacuation holes as standard for all housings
- 2 versions of greasing nipples as standard
- Markings on the housing foot for the possible machining of new fixation holes
- Excellent anti-corrosion protection
- Markings on the housing foot to simplify assembly

Supply of specific models adapted to your applications upon request

## Special two-part bearing units



- Two variants:
  - 2-part pillow block housing (lubricated with grease and oil), with ball bearings or integrated double-row spherical roller bearings
  - one-piece bearing unit with any type of roller bearings or combinations (ZLOE version: one-piece bearing unit with 2 bearings, oil-lubricated)
- Several forms of housings: pillow block, take-up, one-piece bearing units with 2 or 3 bearings and flanged units.
- Material: grey cast iron (GG) as standard. Spheroid form cast iron (GGG) and steel cast iron (GS) upon request. Other materials available upon request
- One or several bearings fitted directly on the shaft, or to be fitted using an adapter sleeve
- Device for the relubrication of the bearing unit during operation
- Sealing systems

	SNOE	TVN	TN	ZLG	DLG	ZLOE	722500	F11200	SD3100TS
Felt seal		X	X	X	X		X	X	
V-ring seal	X			X	X	X			
Double-lip seal		X		X	X		X		
Labyrinth seal	X					X			X
End cover	X	X					X		X

## Maintenance and services

The maintenance of a paper plant must meet targets:

- **Economics**
  - reduced downtime
  - scheduled and quick operations
- **Technical proficiency**
  - increased service life for bearings thanks to precise and reliable lubrication
  - long-lasting installations thanks to the use of appropriate tools
- **Safety**
  - keeping staff away from at-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 pullers (up to a capacity of 20 tons)
- Hydraulic nuts (bore up to 1000 mm)
- Induction heater (for bearings up to 1200 kg)

These tools are also available to 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
- Automatic lubricators dispensing those 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, your systems.

### Customised services for each situation

- Technical assistance for the assembly and dismantling of bearings
- Renovation of bearings removed during preventive maintenance
- On-site training of maintenance teams
- Diagnostics for damaged bearings
- Analysis of vibrations for the bearing, reduction gear, frame and machine base



**NTN-SNR offers a full line of standard bearings for your accessory equipment (pumps, fans, electric motors, etc.), including:**

- Single and double row ball bearings,
- Tapered roller bearings,
- Cylindrical roller bearings.



A graphic featuring a stylized globe with various words for "contact" in different languages. The words include "contatto", "お問い合わせ", "contacto", "contact", "الاتصال ب", "kontak", "kontak", "contato", and "联系我的". A mouse cursor points to the website address [www.ntn-snr.com](http://www.ntn-snr.com) which is displayed in a dark blue banner across the globe. At the bottom of the graphic, the text "AUTOMOTIVE / AEROSPACE / INDUSTRY" is written in a light blue font.

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