Product Catalog for Paper Manufacturing Machinery
Various types of bearings are used for paper manufacturing machinery. Paper machines are extremely large, and the properties required of bearings differ significantly from section to section.

NTN offers a wide assortment of products designed to increase bearing life and reduce cost of replacement, while providing dimensional stability at high temperatures and higher speed capability for all parts.
SIZE PRESS
- Applying of solution for sizing
  Main bearings used
  Self-Aligning Roller Bearings
  Constant Velocity Joints <BJ> <DOJ>

CALENDER
- Adding gloss
  Main bearings used
  Self-Aligning Roller Bearings LH Series
  Bearings with solid grease

REEL & WINDER
- Winding and rewinding
  Main bearings used
  Self-Aligning Roller Bearings LH Series
  Large Self-Aligning Roller Bearings
  Constant Velocity Joints <BJ> <DOJ>
Wire section & Press section

Function of paper-making machine section

<table>
<thead>
<tr>
<th>Wire section</th>
<th>Required features of bearings</th>
<th>Main bearings used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire section</td>
<td>Filters raw materials</td>
<td>• Large self-aligning roller bearings</td>
</tr>
<tr>
<td></td>
<td>Forms paper layer by removing moisture</td>
<td>• Sealed self-aligning roller bearings</td>
</tr>
<tr>
<td>Press section</td>
<td>Compacts fibers of wet paper by wringing, improves paper quality</td>
<td>• Constant velocity joints (BJ cupped type) (large DOJ) (TBJ)</td>
</tr>
</tbody>
</table>

- **Large self-aligning roller bearing**
  - CAT. NO. 2250/E
  - Ability to self-align and large load capacity makes these bearing suitable for places subject to vibration, impact or large loads.

- **Sealed self-aligning roller bearing WA type**
  - CAT. NO. 3702/E
  - Effectively prevents penetration of foreign material.
  - Can be mounted on standard plummer block.
  - Although sealed, the bearing can still be greased.
  - Sealing performance remains stable even when the bearing is aligning itself.

- **Constant velocity joints**
  - CAT. NO. 5603/E
  - Smooth rolling
    - Realizes smooth and quiet rolling and movement with no fluctuation of angular velocity.
  - Reliable sealing
    - Sealed with grease and boots that offer superior endurance and sealing performance to maintain a cleaner, more sanitary environment.
  - Doesn’t require grease supply.
    - Superior sealing performance of boots enables long-term use without maintenance such as supplying grease, without grease leakage or water penetration.
Dryer section and size presses

<table>
<thead>
<tr>
<th>Dryer section</th>
<th>Function of paper-making machine section</th>
<th>Required features of bearings</th>
<th>Main bearings used</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Drying by heat</td>
<td>• Heat resistance treatment and heating by steam passed through hollow shaft • Intermittent operation • Quick start-up and higher speed</td>
<td>• Self-Aligning Roller Bearings LH Series • Bearings with solid grease • Constant velocity joints (BJ) (large DOJ)</td>
</tr>
<tr>
<td>Size presses</td>
<td>Application of size liquid</td>
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<td></td>
</tr>
</tbody>
</table>

Can be used in temperatures ranging from room temperature to 250°C

**Self-aligning roller bearing LH Series**

STJ2 is a new bearing material developed by NTN for longer life at higher temperatures. The temp. range is room temp. to 250°C. This material is now the standard material for most self-aligning roller bearings. The LH Series is a new series of self-aligning roller bearings using STJ2 to realize long life for high temperature use. Because it is used for high temperature applications, the LH Series is standardly equipped with pressed or machined cages as standard.

**High temperature life**

The results of testing at 200°C using thrust type specimens are given in **fig.1**. STJ2 specimens are 30 times more resistant to peeling than SUJ2.

<table>
<thead>
<tr>
<th>Cumulative failure probability (%)</th>
<th>Life (load count)</th>
</tr>
</thead>
<tbody>
<tr>
<td>99</td>
<td>$10^5$</td>
</tr>
<tr>
<td>80</td>
<td>$10^6$</td>
</tr>
<tr>
<td>70</td>
<td>$10^7$</td>
</tr>
<tr>
<td>60</td>
<td>$10^8$</td>
</tr>
<tr>
<td>50</td>
<td>$10^9$</td>
</tr>
<tr>
<td>40</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
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<tr>
<td>20</td>
<td></td>
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<tr>
<td>10</td>
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</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**High temperature dimension stability**

**Fig. 2** shows dimension change rate when kept in high temperature of 250°C. After 2,500 hours, there was almost no change. This is the same for heat-treated SUJ2.

**Fig. 1** Results of high temperature life test for thrust type specimens

**Fig. 2** Dimension change at high temperature
## Calenders

<table>
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<tr>
<th>Function of paper-making machine section</th>
<th>Features of bearings</th>
<th>Main bearings used</th>
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</thead>
</table>
| Calenders                               | Adds gloss to paper. | • Faster rolling  
• Higher precision rolling | • Self-Aligning Roller Bearings LH Series 
• Bearings with solid grease |

### Bearings with solid grease

**CAT. NO. 3022/E**

#### Minimal lubrication leakage
Because solid grease is a solid after heat treatment, a large quantity of lubricant can be kept inside. Lubricant leakage is minimal because the lubricant is gradually supplied to the rolling surface by heat from the bearing and centrifugal force.

#### Superior lubricating characteristics
Lubricant doesn't tend to leak even when strong vibration or centrifugal force is applied to the bearing. Solid grease doesn't emulsify and flow out even if the bearing is penetrated by water. Lubrication characteristics are therefore superior to that of conventional lubricating grease.

#### Low bearing torque
With spot-pack bearings with solid grease specifications, polynube is not stirred like grease, so there is little stirring resistance, thus producing minimal bearing torque.

#### Seal effect
Solid grease forms a barrier against foreign material from outside (water, dust, etc.), but it is not enough to serve as a seal. We therefore recommend a directly applied rubber seal (deep groove ball bearing, bearing unit) or separate seal (other bearings) if used in a place requiring better sealing performance.

### Self-Aligning Roller Bearings LH Series

**CAT. NO. 3027/E**

#### Long life at temperatures from room temperature to high temperature
- Life at room temperature is 3.5 times that of SUJ2.
- Life at high temperature (200˚C) is 30 times that of SUJ2.

#### Resists surface damage
- Peeling resistance strength is 7 times that of SUJ2.
- Smearing resistance strength is 1.4 times that of SUJ2.
- Wear resistance strength is 2.5 times that of SUJ2.

#### Dimensional stability at high temperatures
- Almost no dimension change when temperature is maintained at 250˚C.

#### Enhanced cracking fatigue strength
- Cracking fatigue strength under high temperature / high fitting stress is 2 times that of SUJ2.
- Rolling cracking fatigue strength is 2 times that of SUJ2.

#### Simplified repair/storage management
- Applications ranging from room temperature to high temperature (250˚C) can be handled with a single type of standard bearing.
Reels & winders

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<tbody>
<tr>
<td>Reels</td>
<td>Faster rolling</td>
<td>Self-Aligning Roller Bearings LH Series</td>
</tr>
<tr>
<td></td>
<td>Higher precision rolling</td>
<td>Self-Aligning Roller Bearings</td>
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<tr>
<td></td>
<td></td>
<td>Bearings with solid grease</td>
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<tr>
<td></td>
<td></td>
<td>ECO-TOP Tapered Roller Bearings</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Constant Velocity Joints &lt;BJ+DOJ&gt;</td>
</tr>
<tr>
<td>Winders</td>
<td></td>
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</tbody>
</table>

Reels & winders

- **Constant velocity joints** [CAT. NO. 5603/E]
  - Combination of BJ and DOJ enables joint expansion/contraction accompanying angle change during operation to be absorbed.

- **Self-Aligning Roller Bearings** [CAT. NO. 2202/E]

- **ECO-Top tapered roller bearings** [CAT. NO. 3026/E]
  - Under contaminated lubrication conditions, life is 10 times longer than standard bearings.
  - Doubles life with clean lubrication.
  - Realizes at least 10% lower torque in practical rolling range.
  - 25% better seizure resistance
  - Preload loss reduced by 50%.
  - Assembly facilitated by 50% reduction in the number of rotations until bearing stand height stabilizes.