**WARNING!**

Never spin a bearing with compressed air. The force of the compressed air may cause the rollers to be expelled with great velocity, creating a risk of serious bodily harm.

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**Inadequate lubrication***

- Roller end scoring — Metal-to-metal contact from breakdown of lubricant film.
- Cone large rib face scoring — "Welding" and heat damage from metal-to-metal contact.

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**Handling damage**

- Roller spaced nicking — Raised metal on races from contact with roller edges.
- Roller nicking/denting — Rough handling or installation damage.
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**Fatigue spalling**

- Inclusion origin — Spalling from oxides or other hard inclusions in bearing steel.
- Geometric stress concentration — Spalling from misalignment, deflections or heavy loading.
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**Excessive preload or overload**

- Rapid and deep spalling caused by unusually high stresses. Full race width fatigue spalling is caused by heavy loads creating a thin lubricant film and possible elevated temperatures.

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**Excessive end play**

- Scallopng — Uneven localized wear resulting from excessive end play.
- Cage pocket wear — Heavy contact between the rollers and cage pocket surfaces caused by bearing operating too loosely.

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The most common types of bearing damage that may result in a reduction of bearing or application life are often caused by:

- insufficient maintenance practices
- mishandling
- improper installation and adjustment practices
- inadequate lubrication

The following offers a quick reference to the common causes of bearing damage.

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**Tapered Roller Bearing Damage Analysis**

The Timken Company

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<table>
<thead>
<tr>
<th>Damage Type</th>
<th>Description</th>
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<tr>
<td>Abrasive wear</td>
<td>Fine abrasive particle contamination.</td>
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<td>Bruising</td>
<td>Debris from other fatigued parts, inadequate sealing or poor maintenance.</td>
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<tr>
<td>Grooving</td>
<td>Large particle contamination imbedding into soft cage material.</td>
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<tr>
<td>Cage damage</td>
<td>Cage Deformation — Improperly installed or dropped bearing.</td>
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<td></td>
<td>Rollers binding and skewing — Cage ring compressed during installation or interference during service.</td>
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<tr>
<td>Corrosion / etching</td>
<td>Etching — Rusting with pitting and corrosion from moisture/water exposure.</td>
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<tr>
<td></td>
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<tr>
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<td>Line spalling — Roller-spaced spalling from bearings operating after etching damage.</td>
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<tr>
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<td>Cone bore damage — Fractured cone due to out-of-round or oversized shaft.</td>
</tr>
<tr>
<td>Electric current</td>
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</tr>
<tr>
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</tr>
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**High spots in cup seats**
- Localized spalling on the cup race from stress rizer created by split housing pinch point.

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**Total bearing lock-up**

- Rollers skew, slide sideways and lock-up bearing.

**Roller end scoring**

- Total bearing lock-up — Rollers skew, slide sideways and lock-up bearing.

**Excessive end play**

- Excessive preload can cause damage similar to inadequate lubrication damage.

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