Heavy-Duty TechTips

TIMKEN
Where You Turn

Volume 2 • Issue 1 Part 1 of a 2-Part Series

TAPERED ROLLER BEARING DAMAGE ANALYSIS

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 types/causes of bearing damage.

FATIGUE SPALLING

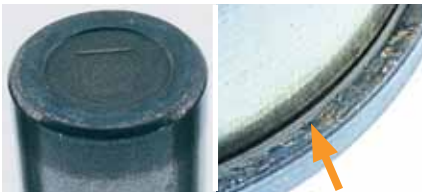
Geometric stress concentration (GSC): Spalling from misalignment, system deflections or heavy loading.

Inclusion origin: Spalling from oxides or other hard inclusions in bearing steel.

Point surface origin (PSO): Spalling from debris or raised metal exceeding the lubricant film thickness.

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.

Cone large rib face deformation: Metal flow from excessive heat generation.

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

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

HANDLING DAMAGE

Roller spaced nicking: Raised metal on races from contact with roller edges.

Roller nicking/denting: Rough handling or installation damage.

Cup-face denting: Indentations from hardened driver.

CAGE DAMAGE

Cage Deformation: Improperly installed or dropped bearing.

Rollers binding and skewing: Cage ring compressed during installation or interference during service.

PEELING

Micro-spalling due to thin lubricant film from high loads/low RPM or elevated temperatures.

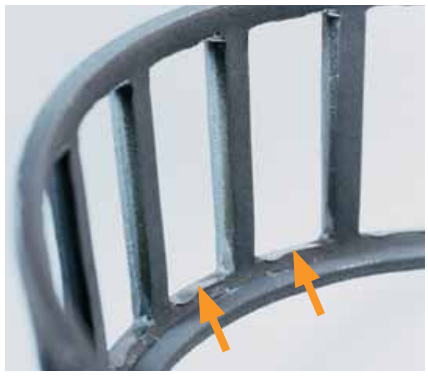
EXCESSIVE PRELOAD OR OVERLOAD

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 elevated temperatures.

Cone bore polishing: Contact wear/creeping on the shaft, with no lubrication between the cone bore and shaft OD, caused by cone bore contraction resulting from excessive tight setting (preload).

EXCESSIVE END PLAY

Scalloping: 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.

⚠ WARNING ***Failure to observe the following warnings could create a risk of serious injury.***

Proper maintenance and handling procedures are critical. Always follow installation instructions and maintain proper lubrication.

Never spin a bearing with compressed air. The rollers may be forcefully expelled.

TechTips is not intended to substitute for the specific recommendations of your equipment suppliers.

Every reasonable effort has been made to ensure the accuracy of the information contained in this writing, but no liability is accepted for errors, omissions or for any other reason.

TIMKEN
Where You Turn

www.timken.com

Printed in U.S.A.
83M 07-09-29 Order No.10308