

TIMKEN

Timken Industrial Services

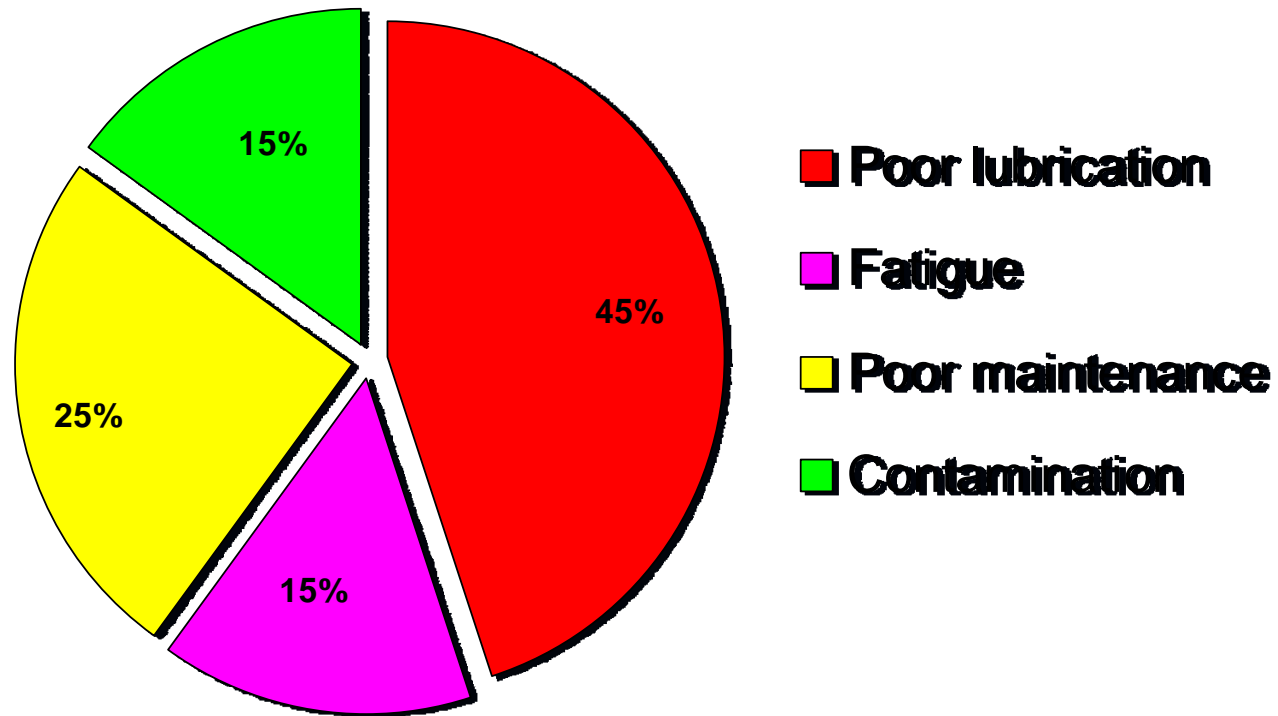
- *Bearing Repair Services*



Bearing Repair - Overview

- **Reasons of Bearing failure**
- **Advantage of Repair**
- **Criteria for Repair**
- **Damage Assessment**
- **What Can and What Cannot**
- **Where**
- **Customer Service**

Bearing Failures



Bearing Damage

There are many heads available on assessing or interpreting rolling element bearing damage. A common topic is how to identify the following damage.

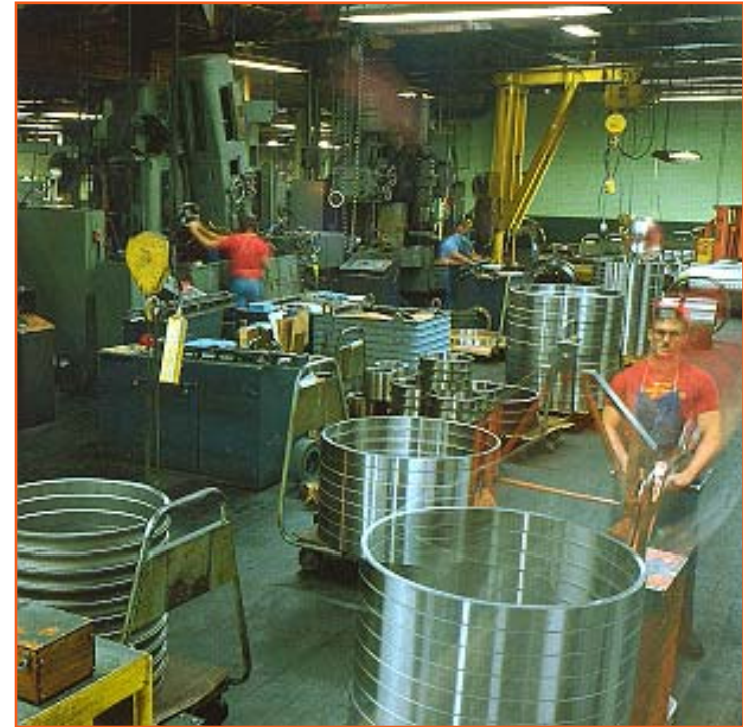
- **Chemical Damage : Stains,corrosion pitting,rust**
- **Heat damage : Discoloration**
- **Electrical Damage : Burns , Pitting**
- **Mechanical Damage : Fatigue , cracks & spalling, fracture, nicks,peeling or smearing,abrasive wear, Misalignment,Lubrication failure,Installation damage**

Bearing Repair – Advantage

- ◆ Reduction in Overall **Cost**
- ◆ Improved **Up Time**
- ◆ Improved **Product Quality**
- ◆ **Reduced Lead Times** as Compared to Buying New Bearings
- ◆ Minimized Application downtime by **detecting origin of the problem**

Bearing Repair - Advantage

- ◆ Prolongs the life of your bearings
- ◆ Extends the investments you have made



Is REPAIR Always the Best Alternative for Every Situation?

YES IF

- ◆ **Bearing isn't damaged beyond the salvation point**
- ◆ **Bearing has to be the right size to capitalize on the service's cost effectiveness**



Don't repair too soon, Don't repair too late!!!

Bearing cost

Zone A:
Bearings are not being used to their full potential. Good life still remaining in bearing when removed.

Zone B:
Bearings being repaired and operated in most economical manner.

Zone C:
Bearings being operated past the point of repair. New replacement bearings need to be purchased.

Amount produced

Criteria for Repair

- ◆ ID 250 mm and above
- ◆ 2 Row and 4 Row Bearing Assembly
- ◆ Cylindricals, SRB, TRB



- ◆ For Bearings other than TIMKEN/Torrington make we may not change parts but we can cannibalize between identical assemblies

Possible Indicators IF/WHEN Bearings need ATTENTION

- ◆ When bearing exceeds its suggested life and/or life per ton
- ◆ Bearing should not exceed an Operating Temperature of 130°C
- ◆ Excessive vibration indicates that a problem exists in a bearing's components
- ◆ A sudden drop or gain of lubricant or excessive temperature of the oil in contact with the bearing

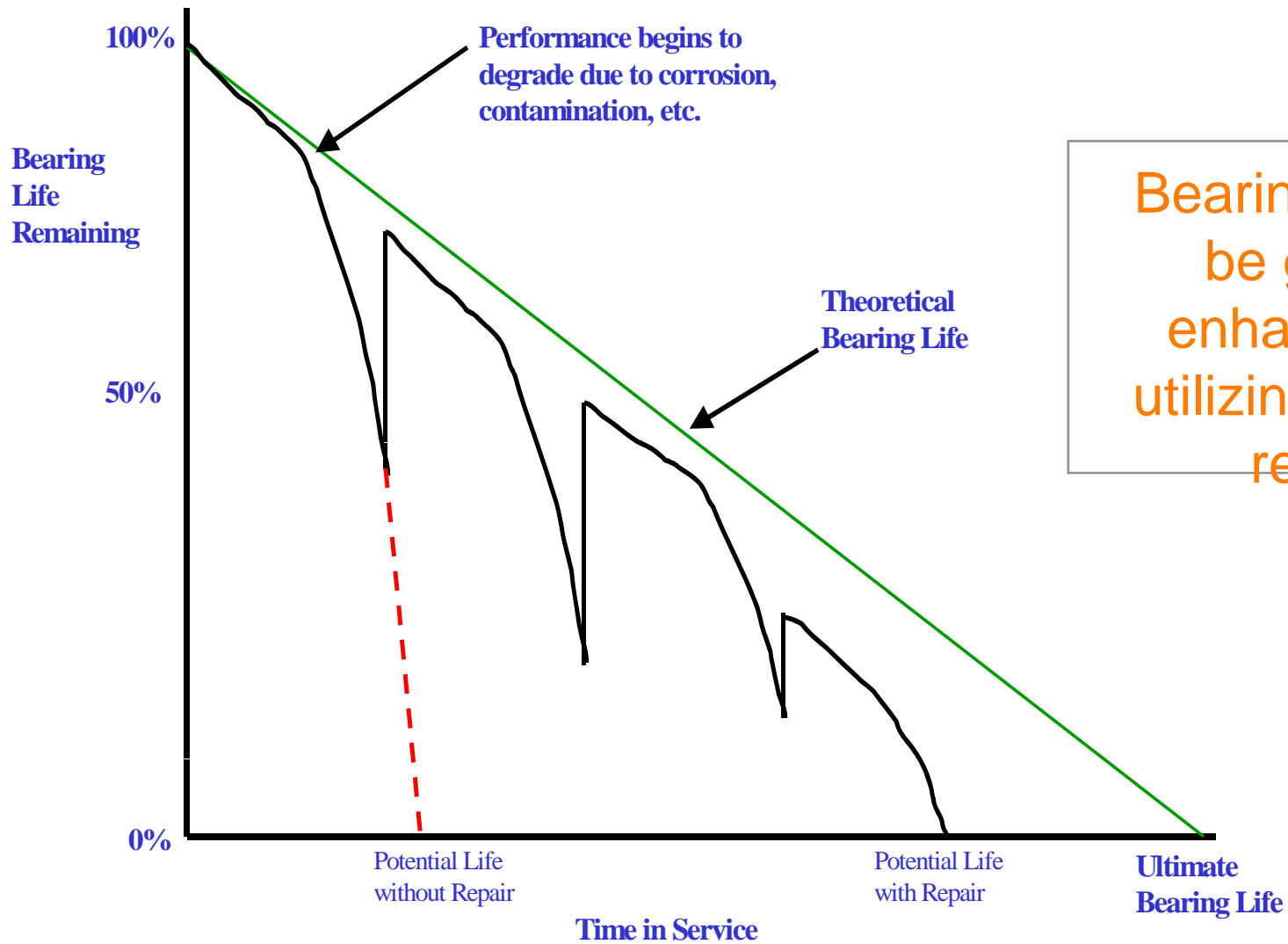
Assessing the Damage – Initial

- ◆ **Who and Why ?**
 - ◆ Familiar with bearing's specifications
 - ◆ Extensive knowledge on analysis of damage and repair facility
 - ◆ **TIMKEN SERVICE REPRESENTATIVE**



What is NOT Repairable ?

- ◆ Component can't be repaired if there is evidence of torch heat.
- ◆ A cone can't be repaired if there is spalling on the extreme large end.
- ◆ A component can't be repaired if there is any deep/heavy line or water etching across the raceway
- ◆ A component can't be repaired if there is any spalling across the raceway.
- ◆ A component can't be repaired if extreme out of round conditions exist for cup ODs and cone bores (we may straighten cups 30" OD and larger).
- ◆ A cone with an oversized bore can only be repaired with customer approval (loose cone fits).



Bearing life can be greatly enhanced by utilizing bearing repair.

What Can be Done Within Bearing Repair ?

- ◆ Cleaning of all components
- ◆ Close microscopic visual inspection of all components to identify reusable ones
- ◆ Dimensional check of components
- ◆ Track and roller polishing (track only for pin type)
- ◆ Grinding of Inner & Outer Races
- ◆ Cannibalizing of parts between identical assemblies
- ◆ Spacer gap measurement
- ◆ Regrinding spacers or supply of new spacers
- ◆ Replace unusable components
- ◆ Readjust assemblies to specified BEP

Common type of damage where cleaning and polishing required.

- **Fretting** : Also friction oxidation; usually shows up as red or black oxides of iron under close fit conditions.

- **Scuffing** : Also smearing, scoring or galling; removal and transfer of metal from one another under a condition of sliding contact.

- **Staining** : Surface discoloration with out pitting, such as from oil oxidation.

Common type of damage where regrinding is required

- **Wear** : A condition of surface degradation and attrition by mechanical action through use.
- **Corrosion / Etching** : Chemical action (rust) that attacks surface of bearing elements.
- **Debris Denting** : Localized surface depressions caused by debris or foreign material.
- **Brinelling** : Permanent deformation (displaced metal, not attrition) of bearing surfaces at roller / raceway contact areas from excessive load or impact.

Common type of damage probable replacement required

- **Spalling : Break away of metal on race way or rolling element in flakes or scale like particles; other names – Flaking , fine grains or course grain spalling.**
- **Heat cracks : Surface cracks caused by heat from sliding contact, usually formed in direction of motion.**
- **Cracks / Fracture : Visual surface cracks of significant size, usually resulting from abuse or unusual operating conditions**

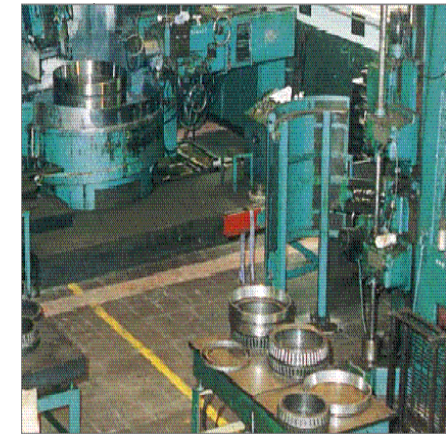
Common Repair Mistakes THAT can Render Bearing to Scrap

- ◆ **Improper roller polishing can create flat spots on the rollers**
- ◆ **Excessive deep spot grinding may prevent components from further repair**
- ◆ **Mixing of preset components can cause serious damage and machine downtime**

Bearing Repair - Where ?

Current Repair Facilities:

- ◆ Canton Ohio, USA
- ◆ Southbend Indiana, USA
- ◆ Ploiesti Prahova, Romania
- ◆ Jamshedpur Bara, India
- ◆ Wuxi, China
- ◆ New Joint Venture for bearing repair formed in Brazil in operational.



Customer Satisfaction

**A bearing being repaired by the people who
have all the specialized knowledge
required to do a perfect job**

TIMKEN

THANK YOU