TIMKEN INDUSTRIAL BEARING SERVICES:

SAVE TIME, MONEY AND YOUR BOTTOM LINE

- *All bearing brands can be remanufactured*
- *Customer-specific situation assessment*
- *Repair capabilities from as small as 4" OD*
- *AP, Z-Mill and caster*
- *Spherical, cylindrical, thrust, ball and tapered*
- *Value-added engineering expertise, evaluation and advice*
- *Three levels of service to suit your needs*
- *Timken warranty on all bearing repairs*
- *Expanded services to repair auxiliary equipment*
- *Customized preventative maintenance programs*

To find out how your company can benefit from precisely remanufactured components, contact your Timken sales or service representative today, or visit us on the web at www.timken.com

TIMKEN

WORLDWIDE LEADER IN BEARINGS AND STEEL

TIMKEN®

INDUSTRIAL BEARING SERVICES

The Value Of Bearing Remanufacture

THE TIMKEN COMPANY

THE VALUE OF REMANUFACTURING

SAVE TIME, MONEY AND YOUR BOTTOM LINE

If you are involved in the everyday operations of a plant, you know that accuracy, throughput, up time and performance all help to positively contribute to your bottom line. As part of our customer centric focus, The Timken Company offers comprehensive bearing repair work through Industrial Bearing Services, the company's full service, turn-key remanufacturing operation, that help keep your bottom line in line.

Used bearings often can be returned to their original specifications for less time and money than purchasing a new bearing. In fact, reconditioning a bearing can save up to 90 percent of the cost and time of purchasing a new one.

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THE TIMKEN DIFFERENCE – WE MEET YOUR NEEDS

Industrial Bearing Services is designed to provide you with the best refurbishing options available, no matter the brand, type or size of bearing. In this program, we provide optimum solutions to you through our experienced service representatives, global presence and continuously refined processes.

EXPERIENCED SERVICE REPRESENTATIVES

Our service engineering team will assist your maintenance crew in assessing the damaged bearing and analyzing the cause of the problem. Together, our service team and your crew will work to prepare a corrective action plan. Our expert associates also will train your personnel on the various types of bearing damage and suggest ways in which to prevent them.

GLOBAL PRESENCE

With operations on six continents, you can rest assured that you will find efficient, helpful Timken support in any part of the world through our sales and service engineering network. Our remanufacturing facilities are located around the world.

QUALITY WORKFORCE AND PROCESSES

Experience in recognizing various types of damage is the only way to fully ensure an accurate inspection and repair. Our trained associates carefully evaluate and repair each bearing in order to return it to its original specifications. In addition, we use only the highest quality remanufacturing processes and equipment, allowing us to restore your used bearing to "good as new."

ASSESSING THE SITUATION

Most bearings that are nearing fatigue life can be refurbished if a preventative maintenance program has been followed. Timken facilities can accommodate bearings for repair as small as 10" in outside diameter (OD). In addition, Industrial Bearing Services has a reclamation process in place that utilizes proprietary finishes to clean bearing assemblies from 4" to 10" OD. So no matter the type or original manufacturer of the bearing, Timken's Industrial Bearing Services can save you time and money in a wide range of sizes. Plus, when you implement preventative maintenance programs with reconditioning, your bearings will be capable of reaching their fullest potential.

DOES YOUR BEARING MEET THE REMANUFACTURING CRITERIA?

Perhaps the most difficult task is determining if and when a bearing needs to be reconditioned. This determination requires much more than a quick visual inspection. Below are some signs to look for when inspecting bearings that may need to be repaired to prevent further damage:

- ***The bearing is nearing its suggested life expectancy.***
- ***The bearing has exceeded an operating temperature of 200 degrees Fahrenheit [93 degrees Celsius].***
- ***The bearing has been exposed to excessive vibration.***
- ***The bearing has experienced a sudden drop or gain in lubrication.***

Paying attention to these details during regular maintenance checks can help you determine if a bearing needs maintenance and address it before it causes unnecessary downtime and expense. Careful observation is the first step to creating a program to monitor your bearings and surrounding operations.

Pay close attention for signs of bearing failure during routine maintenance checks.

To determine if a bearing is in need of reconditioning requires much more then a quick visual inspection.

BEARING DAMAGE

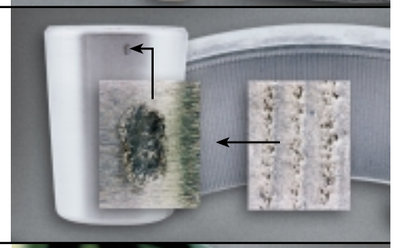
To apply the proper remedy to the damaged bearing, the cause and the extent of the damage must be assessed. Environmental issues, such as ingress of contamination and water into the bearing chamber, are the common causes of premature bearing failure. The following are some typical causes of damage found on large bearings and some precautions you can use to prolong bearing life.

To apply the proper remedy to the damaged bearing, the cause and the extent of the damage must be assessed.

IMPROPER HANDLING
Cage deformation and nicking can result from improper installation, handling or removal.
Precautions: Use proper handling, mounting and disassembly tools.

INADEQUATE LUBRICATION
Scoring of components or severe bearing deformation can result in too little or incorrect lubrication.
Precautions: Improve lubrication system and change the lubricant at correct intervals.

CORROSION AND ETCHING
Water exposure can lead to pitting and rusting of bearing components. Line spalling may result from bearings operating after etching damage.
Precautions: Check seals regularly, ensure proper sealing and store bearings properly.



ELECTRIC CURRENT
Passage of electric current while a bearing is rotating may cause fluting or grooving. Improper electric grounding while a bearing is stationary can create small burns.
Precautions: Shunt the current around the bearing by proper earth connection before welding.

FOREIGN MATERIAL
Abrasions, bruising and grooving can result from abrasive particle contamination and debris.
Precautions: Remove the debris, change the lubricant and check the seals.

MISALIGNMENT
Geometric stress concentration or spalling can result from misalignment, deflections or heavy loading.
Precautions: Machine the bearing seats and shoulders accurately.

INDUSTRIAL BEARING SERVICES' OPTIONS

Once the damage of the bearing has been assessed, a reconditioning prescription can be written. Depending on the extent of the damage, the bearing should be sent to a Timken repair facility. In some instances, onsite repairs are possible.

TYPE I RECONDITIONING

Typically, Type I Reconditioning is used to assess the bearing's condition and perform minor trouble-spot repair. The bearing may require thorough cleaning, polishing, and resetting of internal clearances. In addition, small surface breakouts or spalls may require spot grinding.

TYPE II REMANUFACTURING

Type II Remanufacturing involves major repairs and is used when it is necessary to regrind or replace one or more of the bearing's major components. At this level, components that are not repairable are replaced.

TYPE III REMANUFACTURING

When one or more major components are beyond repair, the required bearing remanufacture procedure is similar to Type II Remanufacturing except that it also includes the replacement of one or several major components.

Small repairs and internal clearance readjustments on bearings can sometimes be easily carried out by a Timken representative within the maintenance shop of the operator.

REMOVING THE BEARING

Before a bearing is sent out for reconditioning service, it first must be removed from its shaft housing. It is important to use great care during the removal process to ensure the bearing, shaft and housing are not damaged.

Bearing removal is best accomplished by using a bearing puller for standard bearing outer and inner rings, which is available through many manufacturers, including Timken. When removing bearings that have a backing shoulder that extends beyond the cone large rib, a puller that pulls through the rollers should be used.

Hydraulic pressure is another available method to remove bearings. Pullers or wedges also may have to be used to remove the bearing after the hydraulic pressure has expanded the race. Hot oil or heat may be used along with the pullers or wedges. When the puller has been placed on the bearing and pressure is applied, the bearing race should expand and be easily removed. Always use extreme caution when working with hot oil or steam. Because contact with hot oil or heat sources can result in serious bodily harm, protective clothing and safety glasses should be worn at all times.

There are a number of valid methods you may use to remove a bearing from its shaft. No matter which method is used, be careful not to expose any surface of the bearing to the flame of a torch. Any torch heat damage renders the bearing as scrap. A bearing's hardness and metallurgical structure is dramatically altered by torch heat.

When it is necessary to drive out inner or outer rings, extreme care should be taken to prevent bearing seat damage, backing shoulder damage or burrs on any surface. Damage to these surfaces will prevent proper seating of the bearing and its new components when reassembled in the application.

TIMKEN EXPANDED SERVICES

We have the capability to offer a number of value-added services like chock, drive spindle, roll neck and gear-box drive repair. Like bearing refurbishment, these repairs are custom-designed to meet the component condition, application requirements and customer needs. For more information on our full-service offerings, contact your Timken sales or service representative.

INDUSTRIAL BEARING SERVICES – TAKE THE NEXT STEP

1. Contact your Timken sales or service representative, visit www.timken.com, or call (800) 223-1954 for your customized solution to bearing repair.

2. Your Timken service representative will work with you to assess your bearing repair needs.

3. Our repair facility will assess the bearing's condition and provide a quotation.

4. When you have authorized the repair, our facilities will perform all necessary repairs and return the bearing to you within the promised leadtime.

If you decide not to proceed with the repair, we can arrange for the disposal or return of the damaged bearing.

Detailed knowledge and experience are key to successfully reconditioning damaged bearings.