PETE EICH

MESSAGE FROM THE PRESIDENT

Operational Excellence is an important part of any successful service oriented company. In late 2004 we made a decision to deploy a Six Sigma program to focus on improving our company. Six Sigma is a proven methodology that allows us to foster a continuous improvement environment based upon these basic principles:

Focus on the customer
Solve problems in teams
Use data to drive decisions
Eliminate waste and increase speed
Maintain gains over time
Replicate best practices

We began by identifying talented individuals to send to outside training classes to learn the methodology and how to implement this discipline for process improvement. Within the Six Sigma world these individuals are called black belts. We then assigned the black belts to lead cross-functional teams, to focus on improving critical areas within our company. Based on customer feedback, the first project was to identify improvements to our delivery performance. In 2005 and 2006, we completed three separate black belt projects aimed at improving our on-time delivery performance. I am happy to report that our tracking metrics indicate that our delivery performance has been steadily improving. We will continue to make this initiative a priority until we are able to achieve our goal and meet your expectations.

The strength of any company is primarily a function of the quality of its people. At NTN, we have an abundance of excellent employees. We also are fortunate to have many great customers. Working together we can both continue to improve and prosper.

Best Regards,
Pete

NTN TRAINING SCHOOL

SPRING SESSION
MAY '07

Visit **www.ntnamerica.com** *For Upcoming Detail On Spring Session Registration*

This unique workshop delivers comprehensive bearing training to personnel from NTN Authorized Distributors and their end-users, located in the U.S. The curriculum includes classroom, hands-on and break-out sessions, as well as, tours of manufacturing and test facilities. Whether you are new to bearings or experienced, this workshop will give you a greater understanding of bearing fundamentals and increased confidence.

SALES OFFICES:

EASTERN REGION
191 Sheree Blvd. Suite 101
Exton, PA 19341
Tel: (610) 524-1477
1-800-394-4686
Fax: (610) 524-1577

SOUTHEAST REGION
5475 Peachtree Industrial Blvd.
Norcross, GA 30092
Tel: (770) 448-4710
1-800-241-0568
Fax: (770) 448-6969

GREAT LAKES REGION
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Mt. Prospect, IL 60056
Tel: (847) 298-7500
1-800-252-8123
Fax: (847) 294-1364

CENTRAL REGION
111 W. Washington St.
Suite 310
East Peoria, IL 61611
Tel: (309) 699-8600
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WESTERN REGION
5800 Campus Circle Dr. E
Suite 108A
Irving, TX 75063-2708
Tel: (972) 751-1818
1-800-441-0825
Fax: (972) 751-1836

AUTOMOTIVE GROUP
39255 West 12 Mile Rd.
Farmington Hills, MI 48331
Tel: (248) 324-4700
1-800-929-3892
Fax: (248) 324-1103

CORPORATE OFFICE
1600 East Bishop Court
Mt. Prospect, IL 60056
Tel: (847) 298-7500
1-800-468-6528
Fax: (847) 294-1230

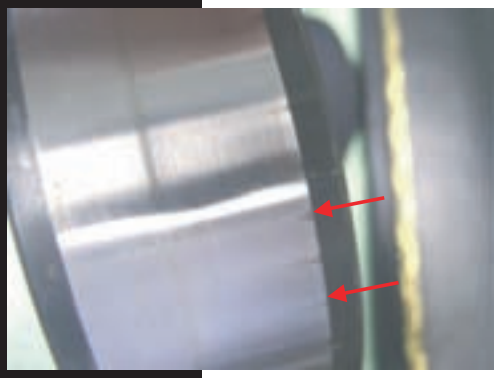
TECHNICAL TIPS

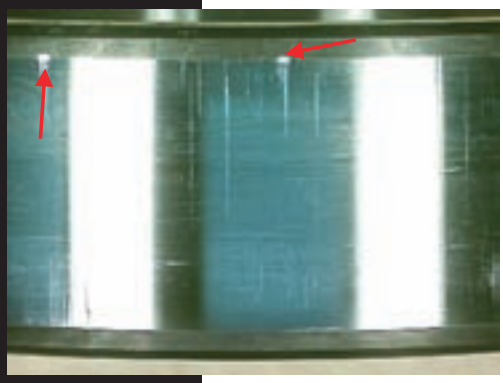
GEOFFREY BIDLACK
Applications Engineering
NTN - Norcross, GA

CYLINDRICAL ROLLER BEARING INSTALLATION

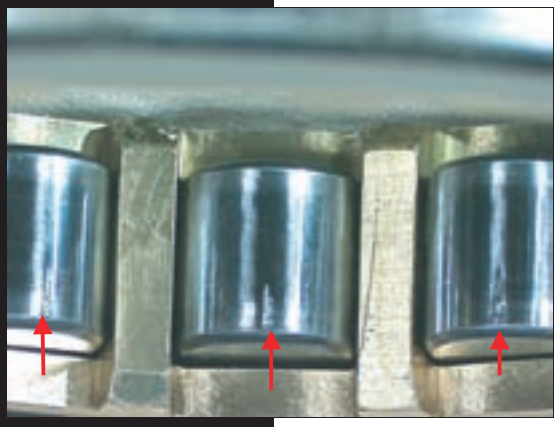
Here are examples of typical CRB damage created by poor installation technique

Inner Ring





Outer Ring



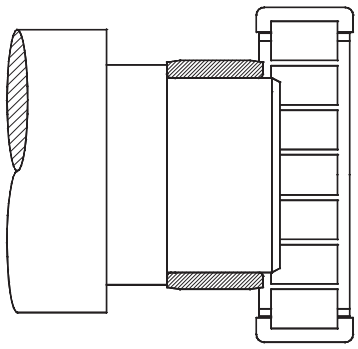
NEVER FORCE A BEARING TOGETHER
Parts Should Slide Into Place!

Cylindrical roller bearings are made to exacting tolerances and have very fine surface finishes. Although the hardened bearing steel used to manufacture bearing components can withstand heavy pressures during operation, bearings are vulnerable to the stresses of metal-to-metal contact that occurs when they are mishandled.

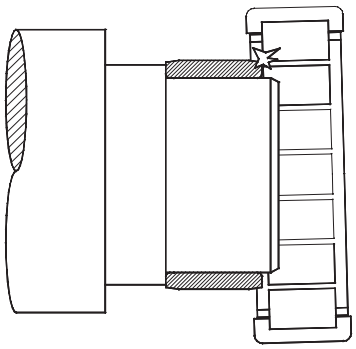
Maximum performance and anticipated life from rolling bearings can be achieved by taking extreme care during the installation process. Preparation is the first step to any successful bearing installation. An organized work area must be created that insures cleanliness, safety and easy access to all required tools.

The most common problem when cylindrical roller bearings are installed is poor alignment of the components. When this happens, the ends of the rollers catch and lift material off the chamfer of the mounted ring. This material is then dragged onto the raceway causing smearing.

CORRECT ALIGNMENT



INCORRECT ALIGNMENT - DAMAGE RESULTS -



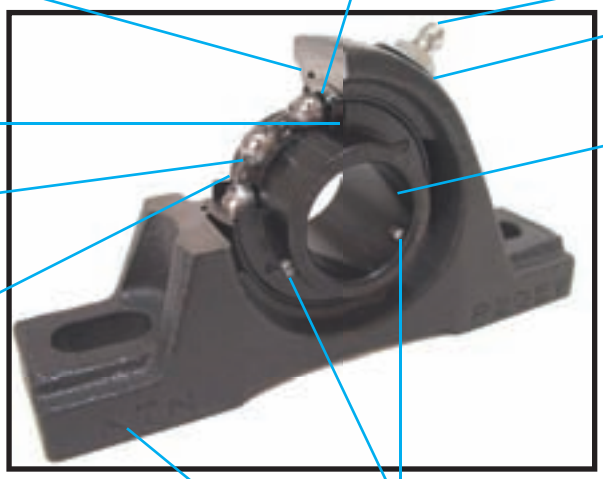
Immediate noise and/or vibration is observed when the above occurs. For ease of assembly, simultaneously turn one of the races as the parts are mated. Should the parts jam, disassemble, inspect the components and start again.

In the examples, notice the spacing of the score marks, caused by rollers being forced onto the ring. In both instances, the inner rings were severely damaged by rollers. Turning of the mating part would have prevented this.

If you follow the simple reminders discussed here, brinelling, scuffing and scoring of cylindrical roller bearing components can be avoided, thus insuring longer bearing life and optimum application performance.

NTN® INNOVATION

ULTRA-CLASS BEARING UNITS



Innovative Design

- **Rugged housing with solid base can take more abuse, dampens vibrations and provide protection against over-tightening of bolts**
- **Black oxide coated inserts provide protection against corrosion**
- **Flinger combined with a full contact molded rubber seal provides superior protection against contamination. Triangular fins (protrusions) on the outside face of the flinger act as fans to throw water and contaminants away from the bearing**
- **Ball- point setscrew is an exclusive NTN design that is much more superior to cup point setscrews. It is difficult to work loose, can be used repeatedly and provides superior holding force. It does not mark the shaft as the cup point setscrews do**
- **Insert bearing raceways are of electric motor quality with super finished raceways and tighter run out tolerances**
- **Units have a metallic name plate showing the complete unit part number, making it easier for stocking on the shelf and identification of parts for replacement**

NTN Premium Product Out Performs The Competition.

Since their introduction into the marketplace, NTN Ultra Class Bearing Units have provided users with reliable performance through a number of engineering improvements, utilizing extensive field experience. The results were an array of unique features that included robust sealing, reliable locking and smooth running precision that elevated mounted units to a higher level of performance.

Engineering and Maintenance personnel across all industry sectors attest to Ultra Class' reliability. Experienced End-Users are quickly switching to NTN after conducting field tests in their facilities. In case after case, results have shown Ultra Class to last longer and out perform competitors in every category. Features like a solid base, ballpoint set screw and black oxide coating have propelled NTN into a leadership position in the industry. NTN Ultra Class offers all this at a competitive price that have end users singing its praises. NTN has developed a bearing unit that combines cutting edge engineering and industry experience. In so doing, a product that offers unmatched design features, reliability and ease of installation became a leader in the industry.

Dr. Pete's CORNER

PETER LORENTZ
Sr. Product Analysis Engineer
NTN - Wheeling Test Lab

ELECTRICAL PITTING AND EROSION

Electrical pitting and erosion is a failure mode that is very common in all types of industries and can be very easily detected once the bearing is cut open. Although this failure is most common in electric motors it can also occur in any application that is exposed to electric current.

The damage seen below is attributed to current passing through the bearing from either improperly grounding the electric motor or by grounding on the machine while welding near by. As we all know electricity will take the path of least resistance, and sometimes that may be the bearing itself. The "stray" current will arc from surface to surface through the bearing trying to find a ground. This leaves behind a distinct pattern across the raceways of the inner and outer ring. Essentially what is happening is that once the current "arcs" across the surface it heats up that contact point to fuse the raceway surface. If the bearing is rotating and current flowing through the bearing is relatively continuous, then the pattern will be very visible and evenly spaced across the raceway surfaces (Fig. 1). If the bearing is not rotating or rotating very slowly or if there is a sudden release of a built up charge, then the current will melt the surface of the raceway (Fig. 2), giving the appearance of a weld bead. This will eventually result in a bearing that will be audibly noisy and will result in a drastically lower bearing life.

It is crucial that proper grounding is achieved when rebuilding an electric motor. At times the ground connection can become corroded and thus grounding is not achieved. Also, when welding near or on a machine, do not ground to the shaft or the bearing housing.

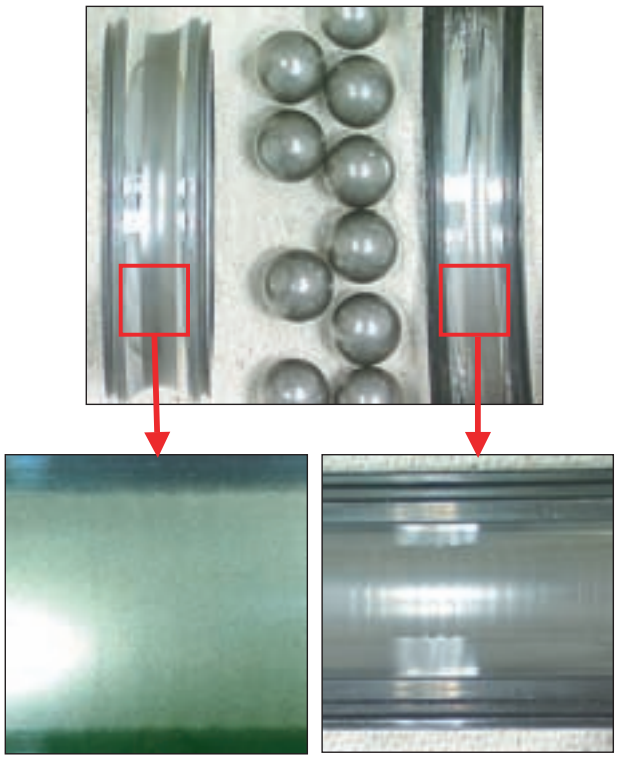


Figure 1: Electrical Fluting – Bearing was rotating / Constant current flow

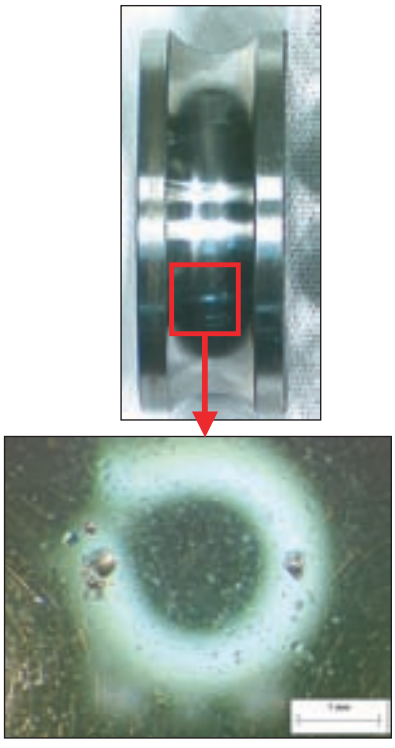


Figure 2: Electrical Pitting – Bearing was not rotating / Release of built-up charge

Dr. Pete's Corner. . ..

A new section has been added to the NTN Newsletter entitled Dr. Pete's Corner. In each issue, Dr. Pete will provide an in-depth review of a different bearing failure mode. Pete Lorentz (Dr. Pete) is the resident failure analysis expert at the NTN Test Lab located in Wheeling, IL. Since joining NTN in 1990, Pete has completed more than 1,500 failure analysis reports covering a wide range of bearing, failure and application types. These failure analysis reports have helped many NTN customers with correcting bearing failure issues in their applications. Dr. Pete's Corner will be a unique opportunity for Pete to share his knowledge of failure analysis with the readers of the NTN Newsletter.

BOWER®

MACOMB, IL PLANT

NTN-Bower is celebrating 103 years of products and services "**Made In The USA**".

What began in 1904 as a newly designed thrust controlling roller bearing to combat the problem of horse-drawn carriages losing wheels has grown to an organization committed to producing the highest quality bearings. Today all Bower products are still made in the United States and are 100% case carburized.

In June 2005, NTN-Bower's Macomb plant completed a 290,000 sq. ft expansion, increasing its size to 750,000 sq. ft.

This Plant Manufactures:

- **CYLINDRICAL ROLLER BEARINGS**
- **TAPERED ROLLER BEARINGS**
- **VARIETY OF ASSEMBLIES INCLUDING:**
  - ***Fan Drive***
  - ***Clutch Arm***
  - ***Differential Cartridges***

Primary Industries:

- **CONSTRUCTION**
- **AGRICULTURE**
- **LIGHT TRUCK**
- **HEAVY DUTY TRUCK**
- **GEARBOX**
- **STEEL MILL**

With Advanced Technology:

- **HL-ROLLER TECHNOLOGY FOR POOR LUBRICATION**
- **AS- AUSTENITE STRENGTHENING HEAT TREATMENT**
- **COMPLEX RACEWAY PROFILING**

NTN Bower is proud to be behind the important "Firsts" in Cylindrical and Tapered Roller Bearings including:

> *Honing of raceways*
> *Spherical roller heads for tapered roller bearings*
> *Crowned cylindrical and tapered rollers*
> *Cold-formed tapered roller bearing rings*
> *Electron beam welded one-piece steel cages for cylindrical roller bearings*
> *Two piece, ultrasonically joined Fibron cages for cylindrical roller bearings*
> *Hot forged powder metal bearing components*
> *Hot pressed silicon nitride cylindrical roller bearings*
> *Signature bearings*

NTN-Bower bearings have been numerously recognized as a superior product in regard to precision and performance. New bearing designs, improved manufacturing techniques, and new materials continually are introduced to enhance our products.

NTN BEARING CORPORATION OF AMERICA
1600 E. BISHOP COURT MT. PROSPECT, IL 60056

www.ntnamerica.com

NTN MVP LINE-UP

GARY SCHEPKER

NTN Service Engineers focus on providing technical support to our end-user customers. They work with the mechanic, installer or maintenance superintendents. These Engineers have proven track records, with varied backgrounds in many different industries requiring and using industrial type bearings. NTN's Western Regional Service Engineer is Gary Schepker. Gary attended the University of Nebraska and started his career on the distribution side of the bearing industry. After spending 18 years in distribution, Gary joined a major bearing manufacurer. Joining NTN in 1999, Gary has continued to expand his knowledge and most recently was promoted to the position of Service Engineer.

We asked Gary to share some personal insight on the following subjects.

What has been your most interesting End-User Call?

The most interesting call has to be the inspection of the final drive shaft bearings in a Los Angeles class nuclear submarine for the US Navy. The bearings were 230/630 mounted in noise damping housings between the turbine and the propeller. A bearing starting to fail would make sounds that would be detectable with sonar and could give away the subs location. The Navy takes this very seriously and needs answers. I had to go through a security check and the personal inspection was just a little more intense than the TSA. Those subs are huge and just like an underwater city. After the inspection there was a briefing with the Captain and the maintenance officers to discuss the problems with the bearings. We decided what needed to be done and we received an order for six bearings. Not just another day at the mine site.

What was your most difficult problem solved?

It was probably a fan application. A large cement company was having a problem with the out board bearing on a 500hp ID fan. Fans are high speed with almost no load compared to the bearing load ratings. They always lose the outboard bearing, which on this fan was a SAF 22528 X 4 15/16. This bearing would only last a few months and would fail. The problem stems from the fact that when the dampers are adjusted or closed it creates tremendous forces on the bearing. Being the typical application the outboard is the float bearing. This along with improper mounting practices caused the bearing to fail prematurely. I recommended that they switch the fixed and float positions to eliminate the axial forces on the float bearing. In this application it worked and they are now getting many more months of service from these fans.