

Heavy-Duty TechTips

TIMKEN
Where You Turn

Volume 4 • Issue 2

Maximizing bearing performance and life remains an objective throughout The Timken Company, from design teams and manufacturing associates to our field sales team and distributors. TechTips help you install and maintain Timken® bearings, seals and components to take advantage of their performance and the systems in which they operate. For more information regarding Timken heavy-duty products and services, visit www.timken.com/aftermarket or contact your local Timken distributor.

PROPER INSTALLATION OF BEARING COMPONENTS



Like other mechanical applications there is a right way and a wrong way to install tapered bearings. This TechTip describes the right way to install the inner races (cones) on shafts (spindles) and the outer races (cups) in housings to maximize bearing performance.



Example A

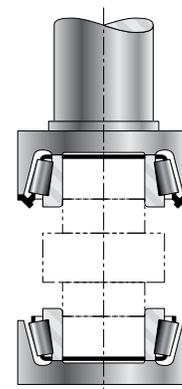
PROPER CONE INSTALLATION

When installing a cone on the shaft, it is important to be aware of the two most frequent problems, handling and

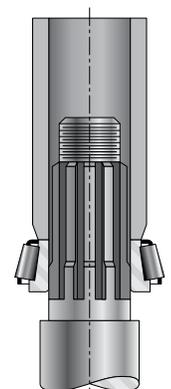
installation. These problems occur when the cone becomes misaligned relative to the shaft or the cage (retainer) is bent from contact damage. Before installing the cone it is important to check the shaft for any signs of wear. A worn shaft can lead to bearing misalignment which may reduce the bearing's service life. Example A shows the proper method to check for adequate seating of a cone against a shaft shoulder. To ensure proper cone seating, use a 0.002" (0.05mm) feeler gauge. Then, check for any gap between the cone backface and the shaft shoulder.

Any damage to the cage of a bearing may cause problems very early in the service life of the bearing. Cages that show any deviation from their factory shape and roundness should not be used and the cone assembly should be replaced.

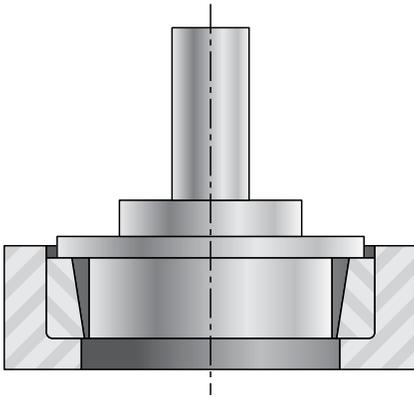
Cones that are mounted with a tight fit on a shaft should be pressed on the shaft using the proper drivers. These drivers are commercially available, or can be made easily from mild (soft) steel. It is important to notice how the cone drivers are made so there is no possibility that they will contact the cage. Cone drivers are illustrated in Example B and C.



Example B



Example C



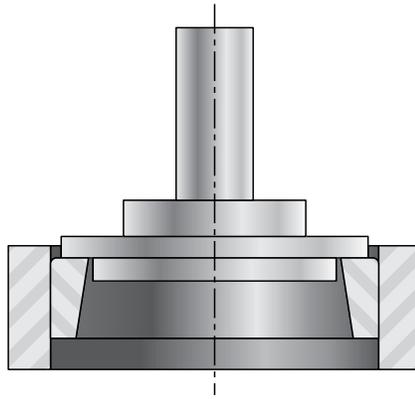
Example D

Tapered roller bearings can be cooled or heated to aid in assembly or removal where there is a press fit. Since temperature extremes can cause permanent metallurgical damage to the bearing, it is important to take proper precautions and use correct methods when heating and cooling bearings.

Take extreme care that bearings are never heated above 250°F (129°C). If bearings are heated above this temperature their metallurgical structure may soften, rendering them unsuitable for use.

There are a number of recommended methods for heating bearings. Electric ovens and electrically heated oil baths are commonly used. It is recommended that bearings be protected from the heat source with a simple wire screen holder or ceramic plate.

Place the hot cone solid against the cold shoulder on the shaft until the cone grabs on to the shaft. The hot cone will pull away from the cold shoulder unless it is held in position. Use feeler gauges to make sure the cone is fully seated against the shoulder after the parts are cooled. Many loose bearing settings (excessive end play) are



Example E

caused by an unseated cone working back against the shoulder in service.

PROPER CUP INSTALLATION

When installing a tightly fitted cup into a hub or housing, a simple driver can be used. These drivers are commercially available, or they can be made from mild (soft) steel. Consult your Timken representative for the proper sizes and details of these cup drivers. The cup drivers are designed to only contact the face of the cup, never the raceway surface. Any contact with the raceway may cause scratches, dents or raised metal that may eventually lead to premature bearing fatigue. Examples D and E show properly designed cup drivers. Always remember to check the cup for proper seating against the housing shoulder using feeler gages.

Cups that are to be assembled into hubs or housing units with a press fit, particularly aluminum hubs, may be shrunk in a deep freeze unit. Bearings can be cooled to -65°F for one hour before incurring potential damage.

To control temperature, it is best to use a thermostat along with a freezer unit or a properly calibrated thermometer. Commercial refrigeration

equipment can be used to chill outer races down to about -20°F. To reach colder temperatures, use a bath of dry ice (solid CO₂) and automotive antifreeze (ethylene glycol) in about a 50/50 mixture.

NOTE: Do not add water. Some dry ice contains embedded water ice and will not have the cooling ability of pure dry ice. In such a case, use a higher proportion of dry ice and less antifreeze. Consult your Timken service representative for additional details.

When education and proper care are used during the handling and installation process, you can maximize the life of your bearing and reduce your maintenance costs.



Hot oil pots, with a tray or hook to support the cone, effectively ease the installation of tight cones on shafts.



Thermostatically-controlled freezer units aid in the installation of tight-fitted cups in hubs.

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

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

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

This information 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

Timken® and Where You Turn® are registered trademarks of The Timken Company

© 2011 The Timken Company
Printed in U.S.A.
?M 05-11:29 Order No. 10461