



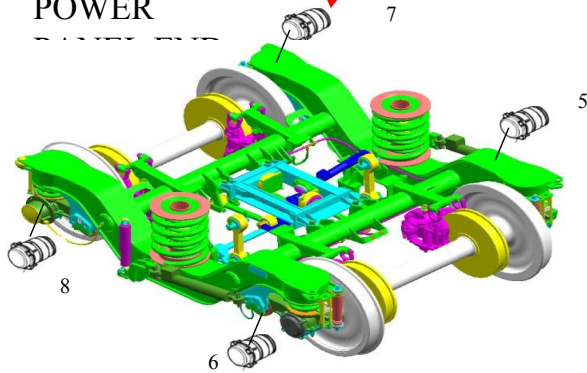
Presentation on UIC 130 CTRB

MMVGK RAJU
SSE/WHEEL/LGDS

COACH & BOGIE CONFIGURATION



NON
POWER

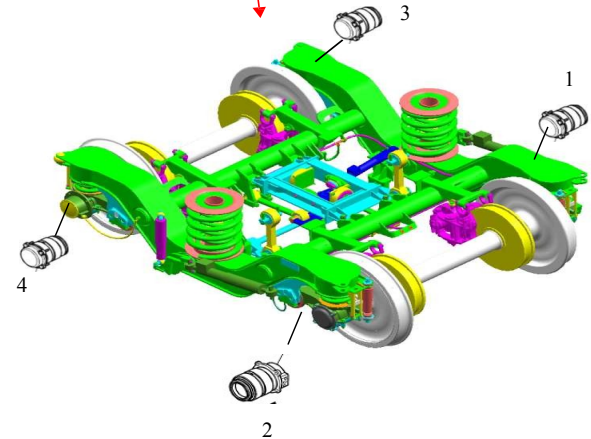


1 & 8 – Axle bearing
with current return
device

3 & 6 – Axle bearing
with no sensor

2, 4, 5 & 7 – Axle
bearing with WSP
sensor

POWER
PANEL END



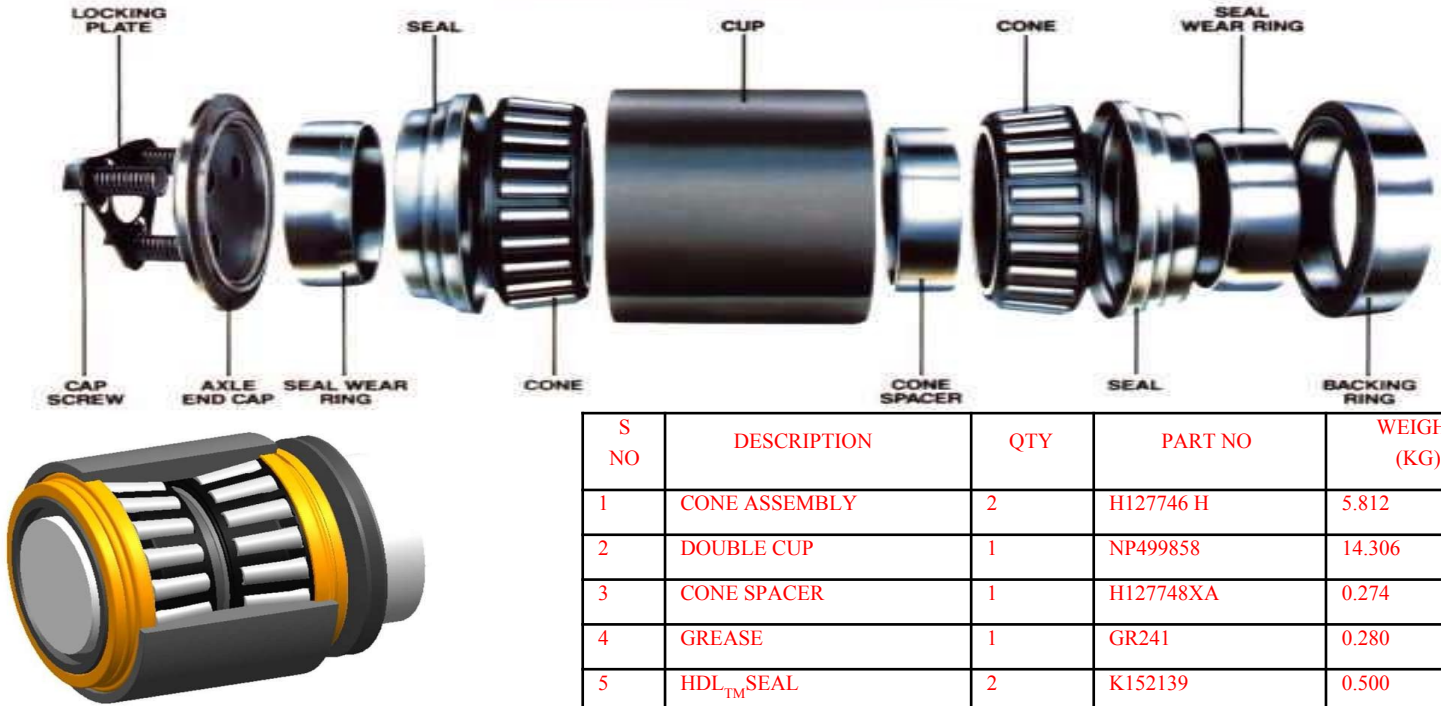
Recently configuration followed as
R.....1, 2, 3, 4,

L.....1, 2, 3, 4 from PP end.

BEARING

ASSEMBLY

Bearing components



S NO	DESCRIPTION	QTY	PART NO	WEIGHT (KG)
1	CONE ASSEMBLY	2	H127746 H	5.812
2	DOUBLE CUP	1	NP499858	14.306
3	CONE SPACER	1	H127748XA	0.274
4	GREASE	1	GR241	0.280
5	HDL TM SEAL	2	K152139	0.500
6	BACKING SPACER	1	K153064	1.393
7	SEALING RING	1	K157653	0.910
8	BACKING RING	1	K798870	3.012
TOTAL WEIGHT				32.799

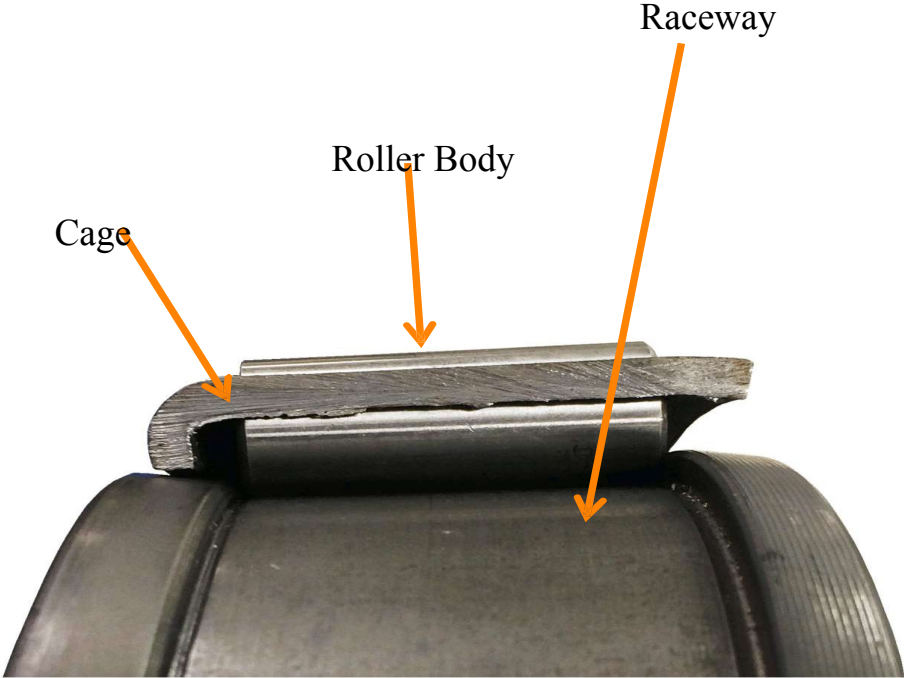
BEARING CUP

Cup outer diameter will have a part number, manufacturing date, and serial number

Two tapered raceways



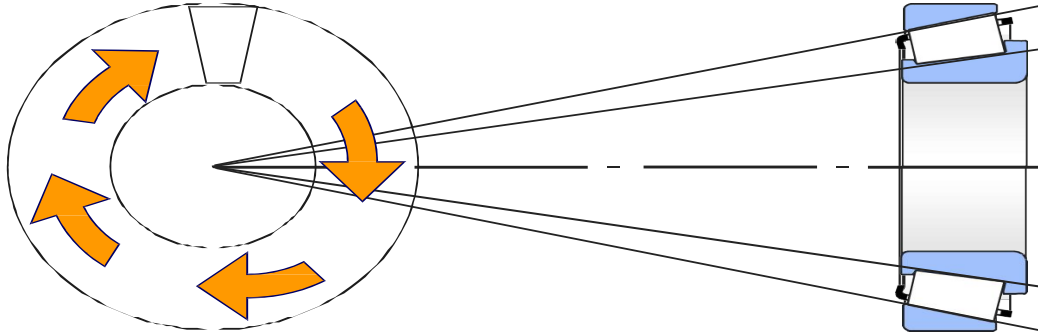
CONE



TRB FEATURES:

TRUE ROLLING MOTION

- Very efficient with low / no slip



EQUIPMENT FOR INSPECTION, INSTALLATION & REMOVAL

- Press attachments (horseshoes, pressing rings, tie-bars etc.)
Pilot sleeves and bolts
- Micrometers, and gauges
- Hand tools (sockets, ID stamps, etc)
- Torque wrenches

BEARING REMOVAL

Portable Press (OTC)

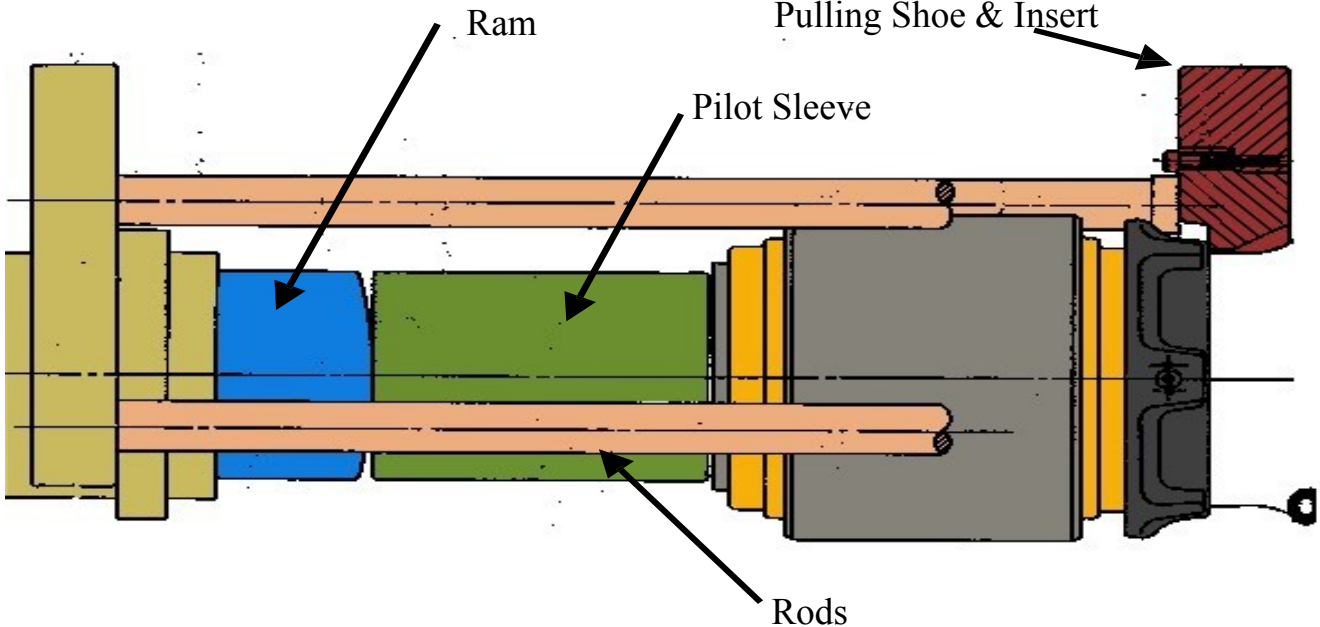


BEARING REMOVAL



BEARING REMOVAL

Removal schematic



Axle Inspection

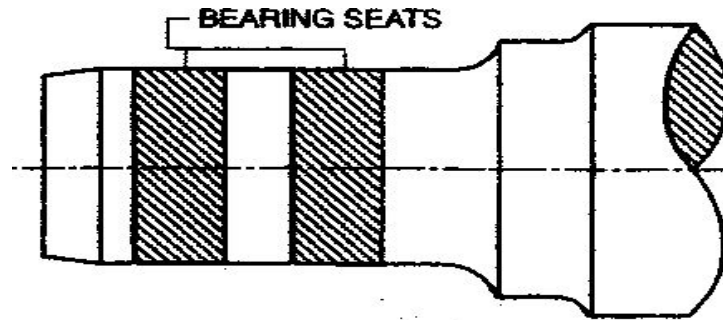
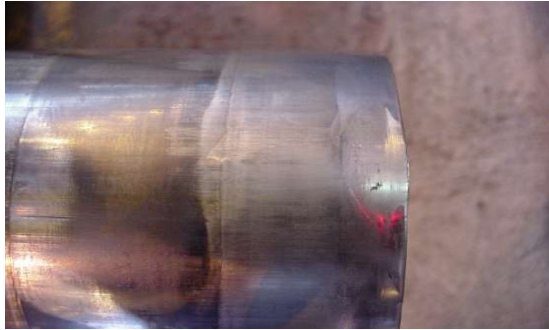
JOURNAL INSPECTION

- Things to check:
 - Axle journal condition
 - Average axle journal size
 - Upset journal
 - Dust guard condition
 - Dust guard size (fitted applications)
 - Fillet radius condition
 - Cap screw threads

Axle condition



JOURNALS



- No Pitting
- No Dents
- No Out of Spec on seats
- No Nicks and Burrs

MEASUREMENT

BEARING

MOUNTING

Measurements

4 Locations Inboard

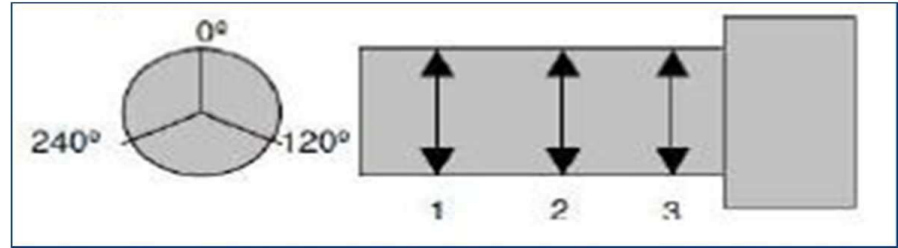
Cone Seat Center

Outboard Cone Seat

Dust guard

Total of 12

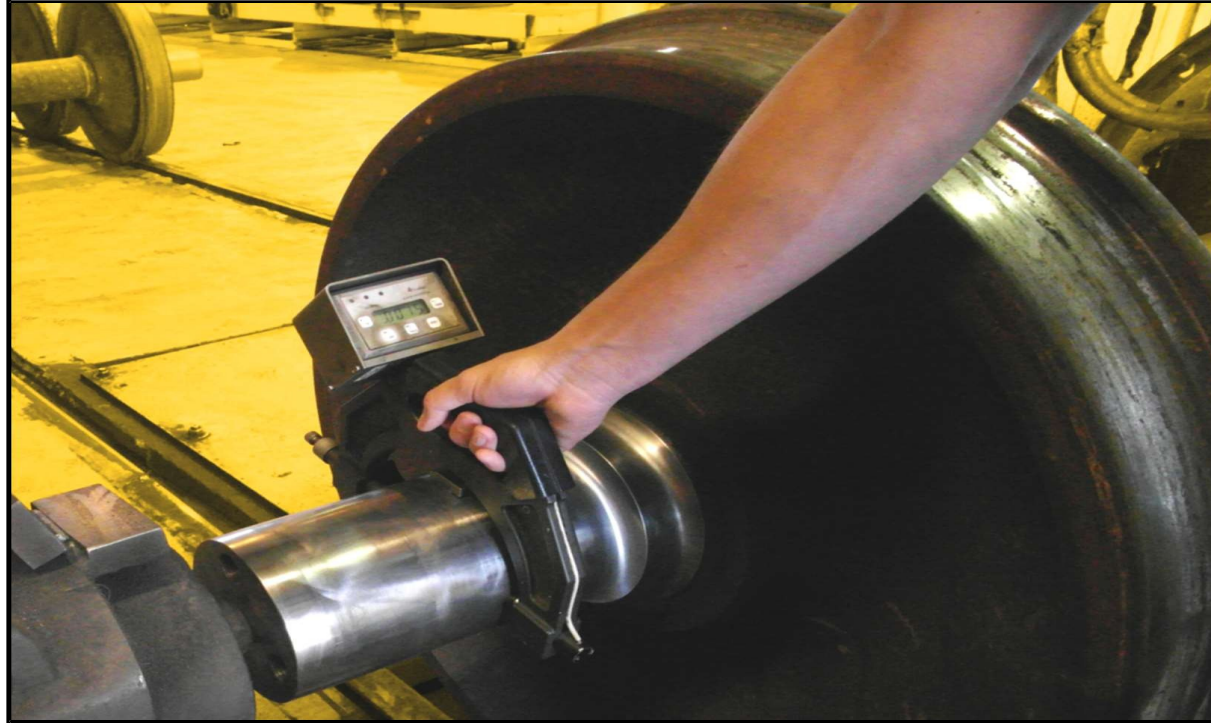
Measurements Taken



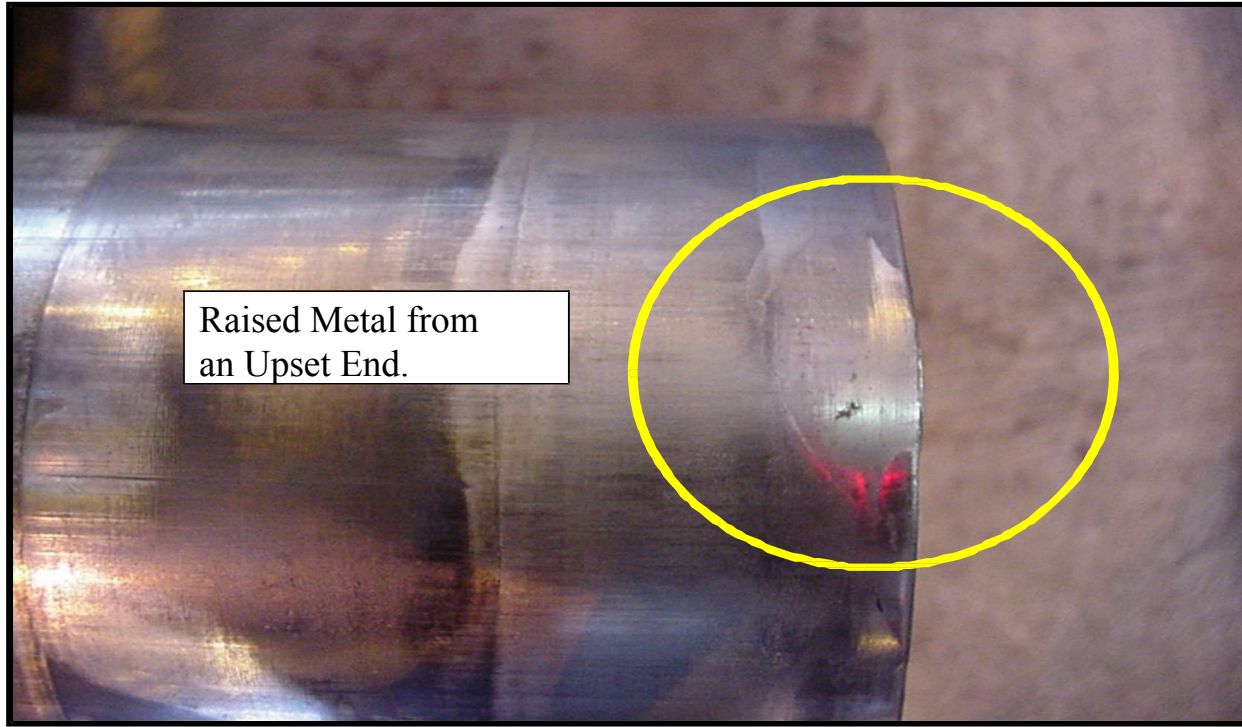
cone seats: 130.043mm to 130.068mm

Shoulder seats: 160.174 mm to 160.134mm

Thermal Compensating Journal Gauge



JOURNAL UPSET

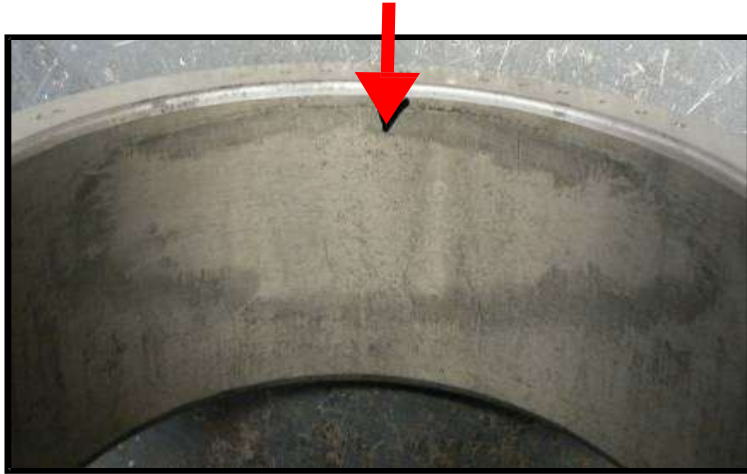


WHAT CAN AN UPSET END LEAD TO?

- Displaced Seals



WHAT CAN AN UPSET END LEAD TO?



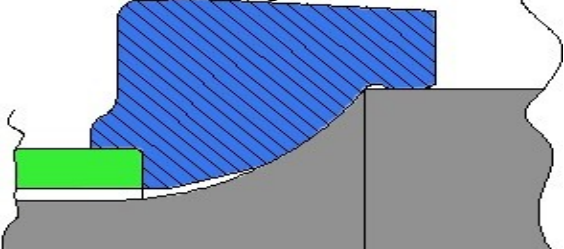
- Stress Loads on Cone Races



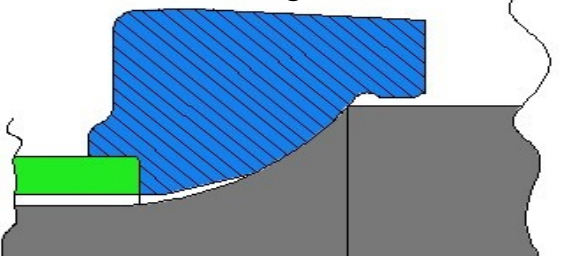
DUST GUARD TOLERANCE



Fitted Backing Ring with Tolerance Dust guard



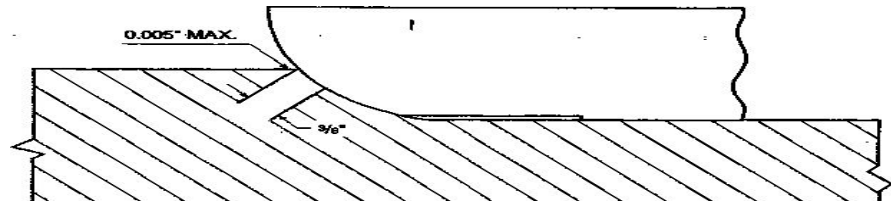
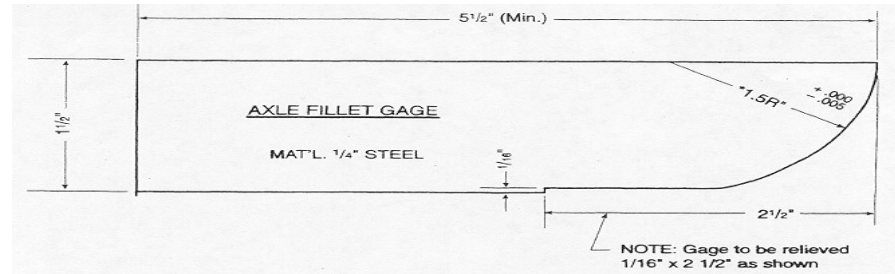
Fitted Backing Ring with Undersized Dust guard



DUST GUARD FILLET



Fillet ring gauge



WHAT IS WRONG HERE?



CAP SCREW HOLE ALIGNMENT GAUGE



THREAD CONDITION



Bearing Installation

BEARING MOUNTING

CLEAN JOURNALS BEFORE MOUNTING BEARINGS



Foreign material on the axle will cause lubricant to be ineffective



BEARING MOUNTING

Journal fillet and Dust Guard rust preventative and mounting lubrication



BEARING MOUNTING



Lubrication

Journal lubrication is required to press on the bearing due to the interference fit.

BEARING MOUNTING

LUBRICATION

- Journal lubrication
 - Journal must be clean prior to applying lubrication
 - Use a medium to heavy weight mineral oil (SAE 40 or 50, or equivalent)
 - A molybdenum disulphide and oil mixture can be used if preferred
 - Journal lubricants must be kept free of contaminants
 - Lubricant must be AAR approved
 - Lead compounds may be detrimental to lubricating oils by acting as an oxidation catalyst

BEARING MOUNTING

RUST PREVENTATIVE

- Rust Preventative – AAR Approved List

(GII Appendix A)

- Tectyl 506 EH-WD – Dauber Chemical Company
- Texacoat 1044 – Texaco Company
- Rust Veto 342.1 – E.F. Houghton & Co.
- CN-471 – Perolin-Bird Archer, Ltd.
- Keystone Sealing Compound – Pennwalt, Inc.
- Keycote 601 – Pennwalt, Inc.
- Tectyl 571 – Ashland Petroleum Company
- RP-103 – Diversey Corporation

BEARING MOUNTING

Pressing Bearing with the help of a Hydraulic press



BEARING MOUNTING

Seating Force

- Has to overcome total contact pressure due to interference fit.
 - Seating force is 50% more than the total pressing force.
 - Ensure all components are equally tight
-
- UIC-130 seating force = 37-42 tons

BEARING MOUNTING

Calibrated pressure gauge on Hydraulic press



TIMKEN

Stronger. Commitment. Stronger. Value. Stronger. Worldwide. Stronger. Together. | Stronger. By Design.

BEARING MOUNTING

AXLE GALLING

Poor press alignment or lack of lubricant



BEARING MOUNTING

Use feeler gage to check backing ring is properly seated



BEARING MOUNTING

Torqueing caps screws using
Click Type Torque Wrench

Torque value = 200 Nm



BEARING MOUNTING

Bearing Mounted clearance check

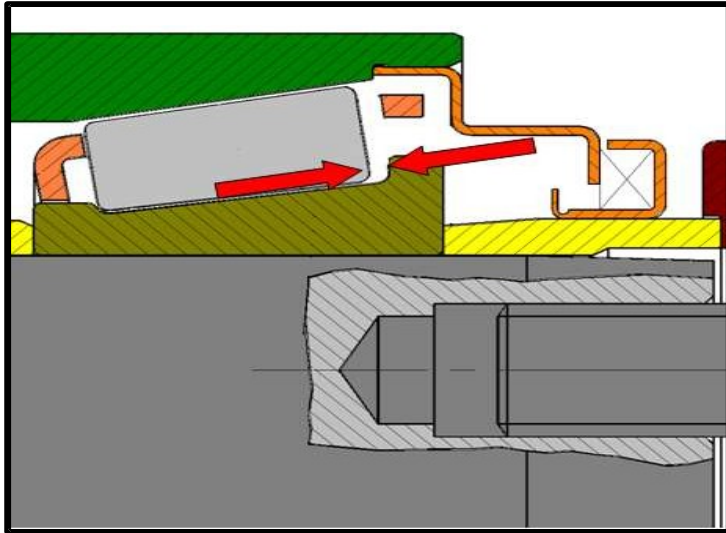
0.025-0.330mm for new bearing and in service bearing 0.025 to 0.500 mm.



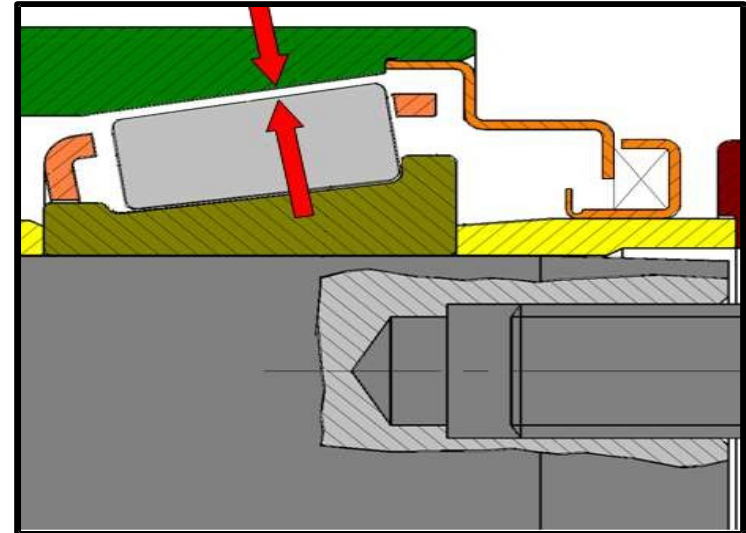
BEARING MOUNTING

HAND ROTATE BEFORE MEASURING ENDPLAY

False Endplay Reading

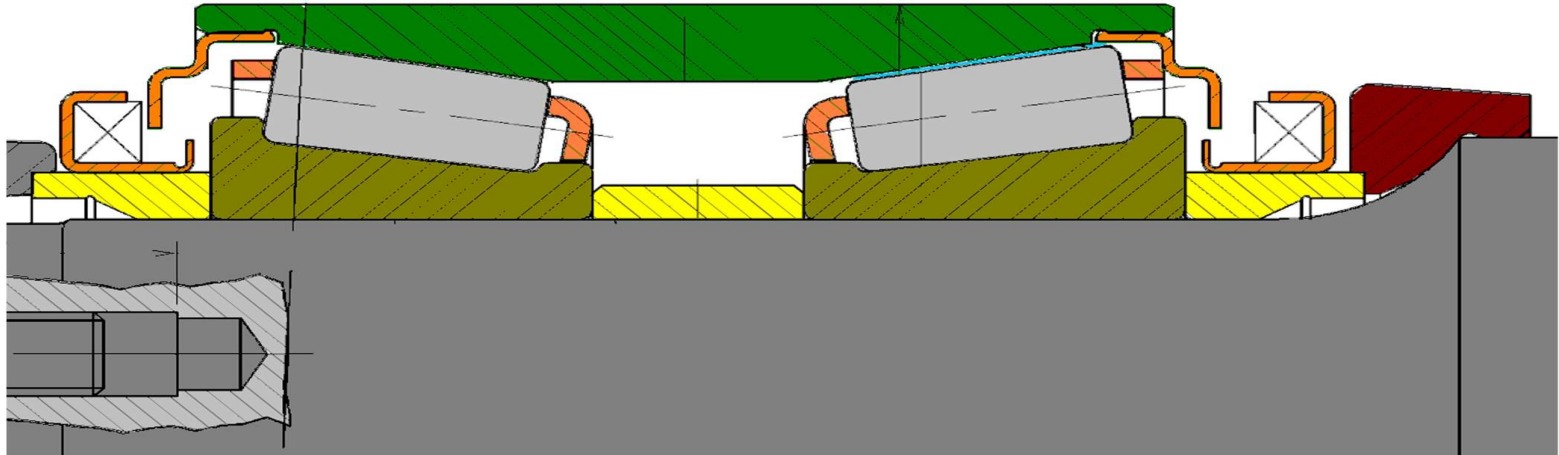


Internal Axial Clearance Or
Endplay



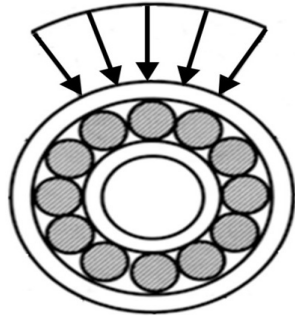
BEARING MOUNTING

MOUNTED END PLAY



BEARING MOUNTING

EXCESSIVE MOUNTED LATERAL

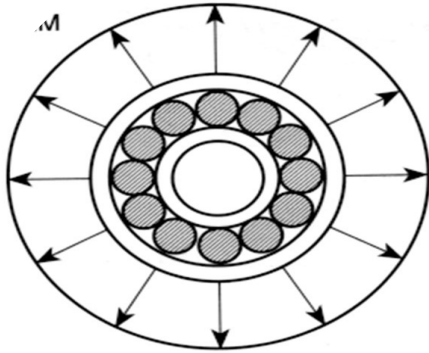


- Excessive lateral doesn't distribute load well
- Allows a lot of free movement of components when not in the load zone
- Leads cage fatigue and possibly raceway scalloping



BEARING MOUNTING

PRELOADING (NEGATIVE LATERAL)

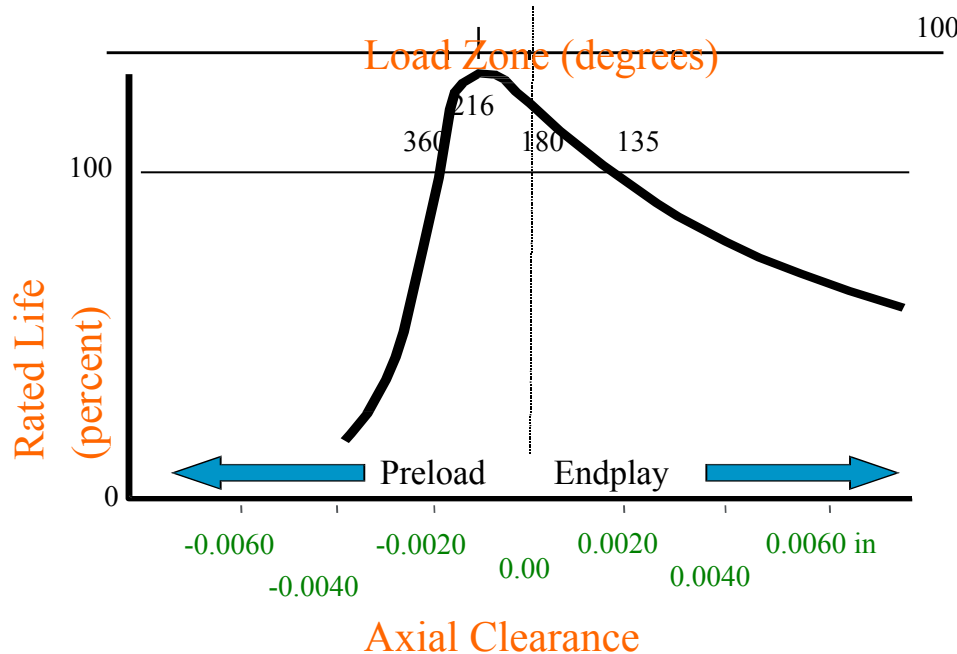


- A large preload could mean that all the rollers are constantly loaded.
- This does not allow a proper lube film between rolling components.
- Leads to heavy fatigue spalling very quickly.



BEARING MOUNTING

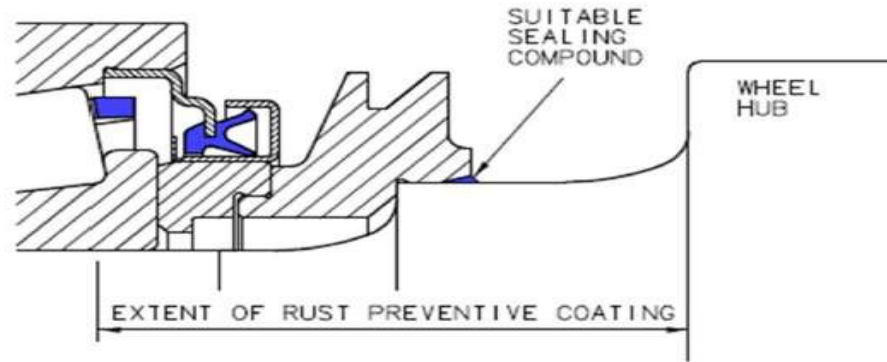
WHY ALLOW A ZERO LATERAL?



- Experience and testing has found that allowing a small amount of preload extends bearing life.
- The loads applied to the bearing are shared among more rollers without inhibiting lube film

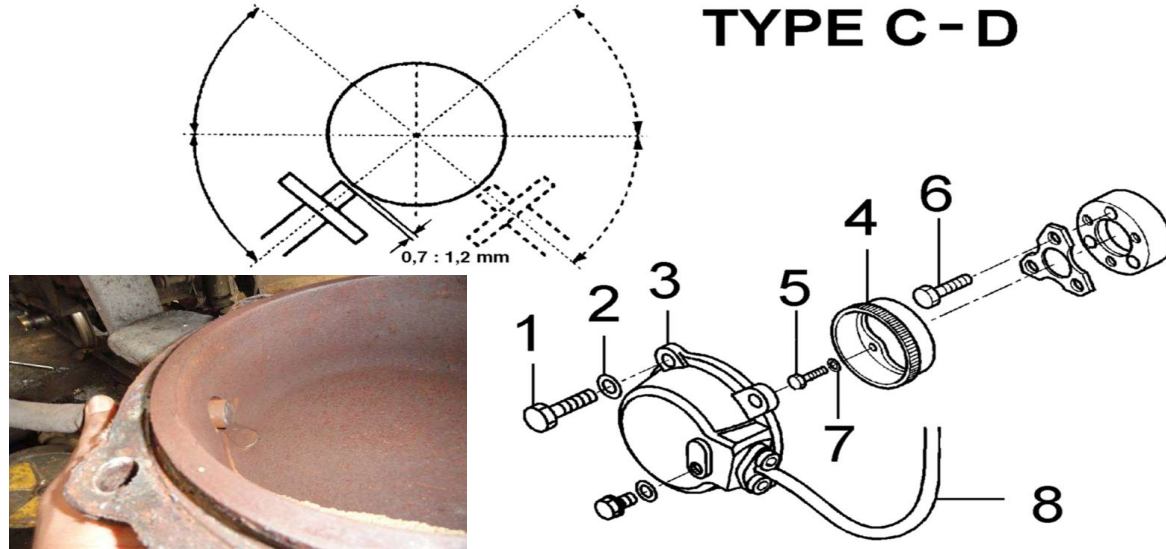
BEARING MOUNTING

Apply sealant



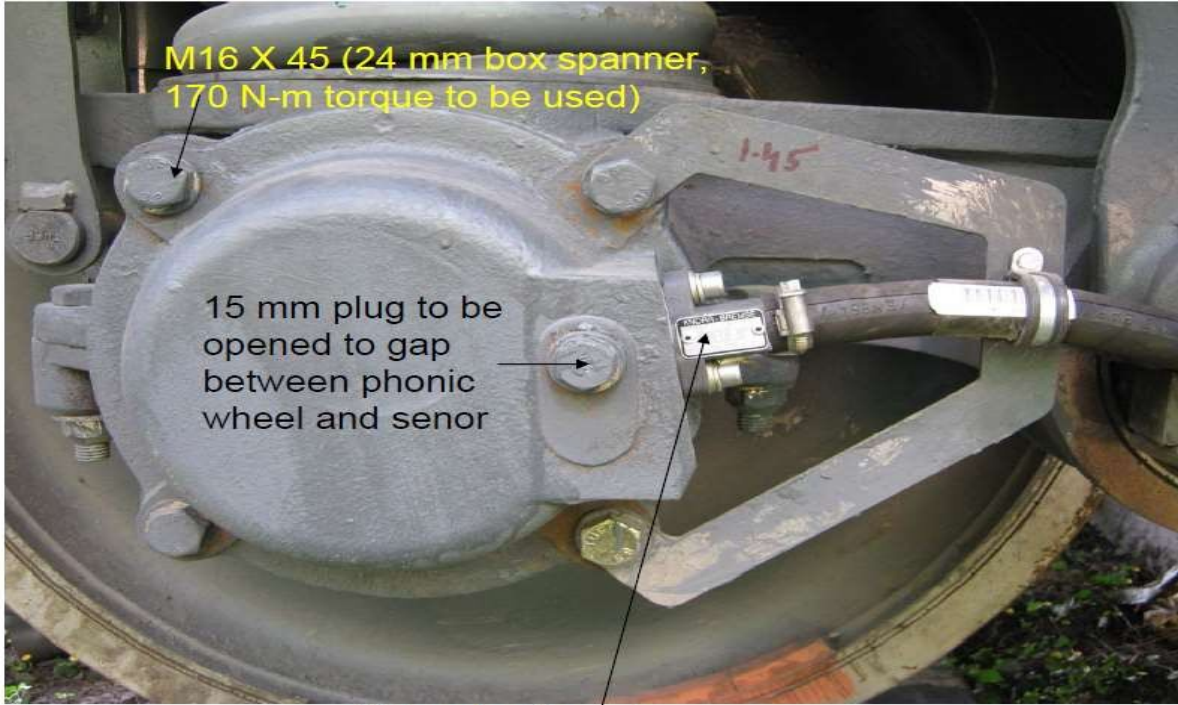
Apply suitable sealant between backing ring and axle interface. This will minimize risk of ingress of water through backing ring contact area.

SPEED SENSOR / PHONIC WHEEL



This hole provided here is to check the gap between the probe and the phonic wheel which is to be $0.9 - 1.5 / 2 \text{ mm}$

This check needs to be done whenever the reassemble the bearing



KB make Speed sensor

Gap between sensor and teeth:

0.9 mm to 2 mm



M20 bolt
tightened in
axle by 200
N-m

M8 X 35 bolt to be
tightened by ~~20~~ 21 N-m
torque

Phonic cowwheel for speed sensor
(80 Teeth)- fitted for speed sensing

BEARING MOUNTING

Inspect the control arm housing



Upper half



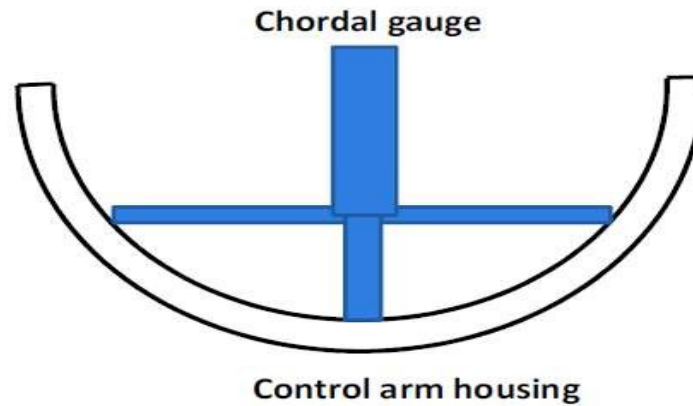
Lower half

- Control arm must be free from cracks or any kind of physical damages
- Both upper and lower control arms must have proper edge chamfer

TIMKEN

BEARING MOUNTING

Measure the upper and lower control arm diameter using chordal gauge



Storage & Handling

BEARING STORAGE

- Do not remove the bearing from box until it is ready for assembly.
- Store the bearing boxes at dry place, stack up of boxes should not be more than 2 high.



BEARING STORAGE

Bearings stored in moisture place



Bearings stored in dry place

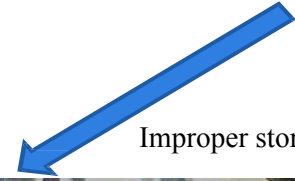


Bearings in stock should be kept at closed dry place.
Stored bearings should be inspected periodically, any undesirable condition like above If found should be intimated to The Timken Company.
Stored bearings should be used in the order in which they were stored, oldest stock first.

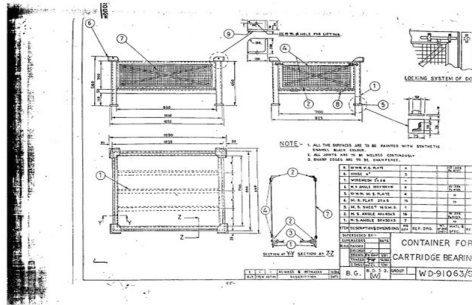
IMPROPER STACKING



Heavy weight of Channel
might damage seals



Improper storage



RDSO sketch for Container



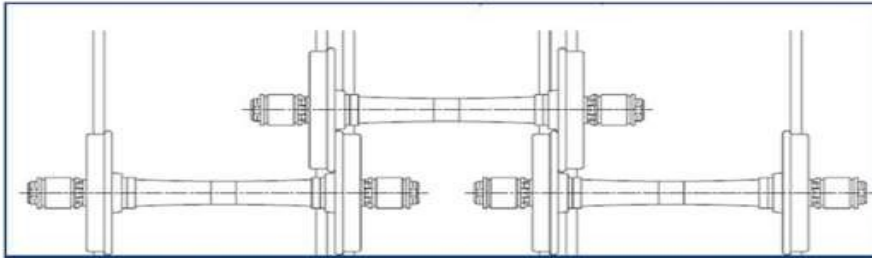
Do NOT chain a wheelset across bearings during shipping

Following such practices will damage the grease seal of the bearing which further result en-route damage of the bearing



BEARING STORAGE

- Once the bearing is pressed on to axle store the wheel set assembly at dry place.
- Wheel set assembly need to be stored as shown below, bearing should not be in physical contact with any other component.



Recommended Wheel



- **Storage & Handling**

- Unmounted bearing assemblies should be protected from dust and moisture
- Stored assemblies should be used in the order in which they were stored, i.e. oldest stock first. Over time oil can separate from the grease and leak out of a palletized bearing
- Bearing assemblies which show evidence of moisture having entered the bearing, should be disassembled for cleaning and inspection
- Wheelsets with mounted assemblies should be stored so the wheel flanges cannot contact adjacent bearings
- Trucks that have been stationary for one year should be moved one car length

SERVICE INSPECTION:

Visual Inspection in open line

MAINTENANCE SCHEDULE

12.1 GENERAL

The following maintenance schedules are to be carried out.

Coaching Depot Schedule

- Schedule D1 : Every Trip/Weekly
- Schedule D2 : Monthly \pm 3 days
- Schedule D3 : Half Yearly \pm 15 days

Shop Schedule

- Shop Schedule I : 18 months + 30 days/ 6 lakhs Kms whichever is earlier
- Shop Schedule II : 36 months/ 12 lakhs Kms whichever is earlier
- Shop Schedule III : 72 months/ 24 lakhs Kms whichever is earlier

The details of activities to be carried out during these schedules are given below and a summarized checklist is given in Annexure 12.5.

12.2 SCHEDULE D1 (EVERY TRIP/WEEKLY)

The following items shall be attended during schedule D1.

Bearings

- Carry out bearing feeling for detection of hot bearing.
- Check bearings for grease leakage.

SCHEDULE D2 (MONTHLY)

Perform all the items of schedule D1. In addition to this perform the activities- as given below.

SHOP SCHEDULE-I (18 MONTHS)

Bearings

Rotate the bearing assembly to detect any abnormal condition. Check the bearing mounted end play. If end play is beyond permissible limit or if any roughness is detected while rotating the bearing, dismount the bearing and send for reconditioning.

Note:

1. Bearing reconditioning is to be carried out whenever bearing is removed from axle due to wheel-shelling / bearing failure.
2. If new bearing or reconditioned bearing is fitted, a metal identification tag with the mounting date shall be crimped to the brake disc near the bearing.
3. If the wheelsets are sent for re-profiling without dismounting bearings, lubricate the lathe centers with heavy grease.
4. For reconditioning of bearings, please refer to OEM's instructions

SHOP SCHEDULE-II (36 MONTHS)

Bearings

Dismount the Bearings and send for inspection/reconditioning

VISUAL INSPECTION IN OPEN LINE

Abnormal Noise

During rolling in and rolling out examination, try to listen for any unusual/ abnormal noise or grinding etc. Bearings should be given a visual inspection at terminals for proper positioning of control arm.

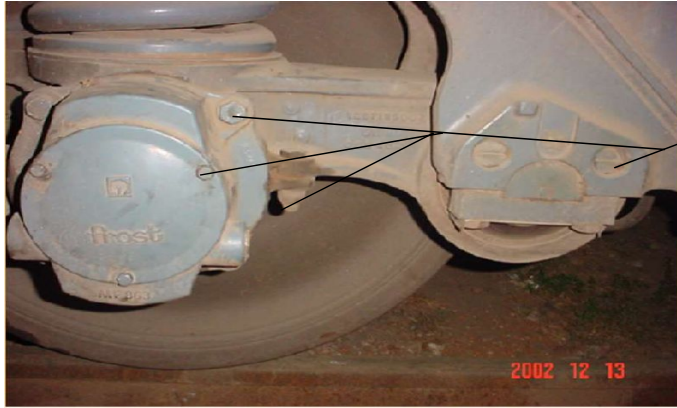
Bearing Running Temperature

The temperature should measure at the Top Control arm (may be at side). If the bare hand cannot be held on the housing and the bearing is noticeably warmer than the other bearings on the vehicle, it should be checked with temperature indicating crayon 80°C or a direct reading pyrometer on the outside face of the housing. If the temperature of the axle box is found excess the bearing should be examined in more details. If the differences between two bearings are greater than 20°C the warmer bearing should be removed

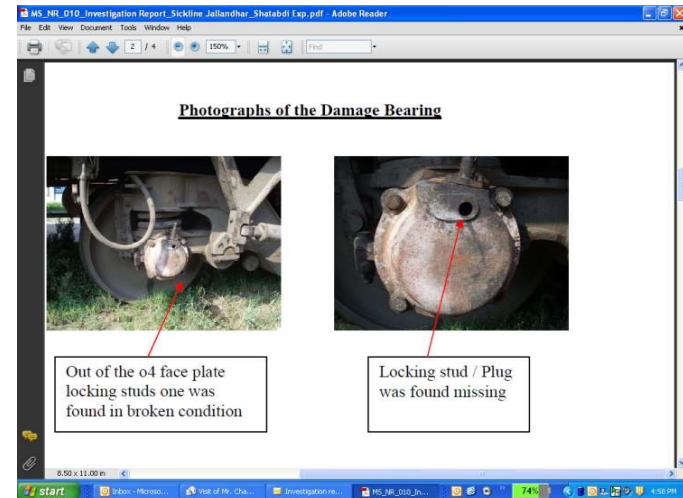
VISUAL INSPECTION IN OPEN LINE

- LOOSE OR MISSING / BROKEN AXLE END BOLTS
- If one cap screw is found to be loose or missing, remove all of the bolts, Check the end play & apply a new locking plate, properly torque all three cap screws and bend all tabs against the flats of the bolt head. If two or more axle end bolts of different pairs are found loose or missing, the wheel set must be removed from the coach. Remove the end cap. If there is any evidence that the bearing is not properly seated or if the end play is 0.75mm or more remove the bearings from the axle for a complete inspection to determine the cause and possible resulting damage.
- Grease Leakage
- A small amount of grease leakage around the seals may be expected during the initial run-in period. This leakage will reduce to normal “weeping” after this period.
- Grease weepage from seals is normal. These small quantities of grease weepage may give the appearance of a problem, but are normal in the absence of any visual damage

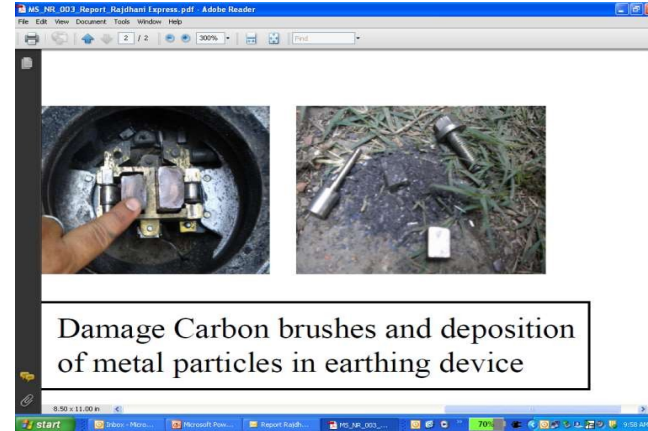
VISUAL INSPECTION IN OPEN LINE



If any bolts are loose-Please
remove wheel sets

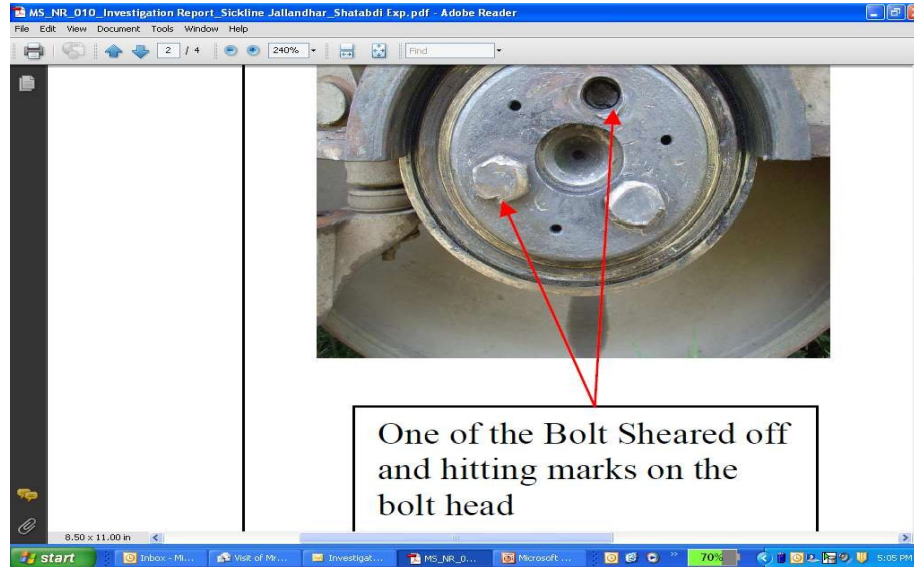


VISUAL INSPECTION IN OPEN LINE



Missing Bolts/Accumulated Burnt Grease/Damage Carbon Brush/displaced oiler ring call for removal of wheel sets. Please do not put the bearing back in service if seal damage or temperature rised.

VISUAL INSPECTION IN OPEN LINE



Sheared/Missing Bolt calls for removal of wheel sets

VISUAL INSPECTION IN OPEN LINE



Missing



Missing /Broken Phonic /Missing phonic wheel bolt Wheel calls for wheel set removal

SERVICE INSPECTION – AT MAIN LINE

Bearing running temperature



**CHECK THE BEARING RUNNING TEMPERATURE WITH THE HELP OF A TEMPERATURE GUN
BEARING RUNNING TEMPERATURE SHOULD NOT BE MORE THAN 80° C
IF IN EXCESS OF 80° C BEARING SHOULD BE EXAMINED IN MORE DETAIL**

WARNING: DO NOT USE BARE HAND ON HOUSING TO CHECK THE TEMPERATURE

SERVICE INSPECTION – AT MAIN LINE

Lubricant contamination

- Lubricant containing water is destructive for bearings.
- All precautions must be taken to prevent water entering bearing assembly.
- If the bearing is submerged in water remove the bearing for inspection.
- Drain pipes or holes must be located so that drainage will not be directed towards the bearing assemblies.
- During cleaning at stations water jet should not be directed at bearing seals
- During sand blast or shot blast cleaning of the vehicle the bearing assemblies should be properly shielded.
- No additional lubrication is required during the bearing assembly is in service.

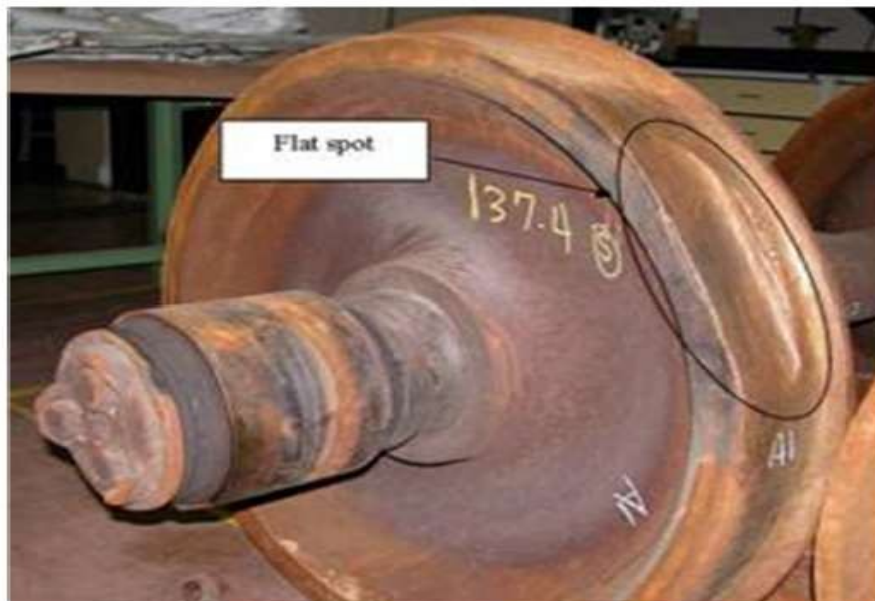
SERVICE INSPECTION – AT MAIN LINE

Displaced housings and external damages

- Housing out of position causes a load concentration on bearing if continued in service may result in serious damages.
- Bearing assemblies under equipment involved in derailment or collision, or subject to damage by fire, floods, or other causes, must be shopped for inspection before being returned to service.

SERVICE INSPECTION – AT MAIN LINE

Flat wheels



SERVICE INSPECTION – AT MAIN LINE

Wheel Shelling

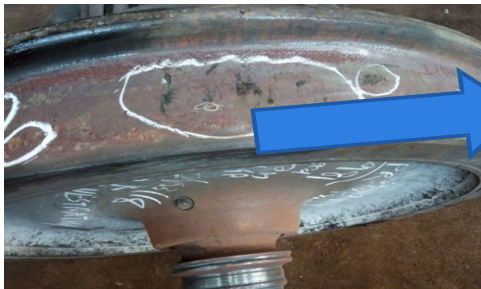


SERVICE INSPECTION – AT MAIN LINE

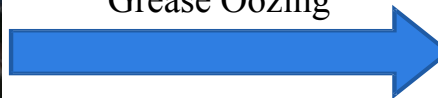
Wheel heat discoloration



WHEEL SHELLING CREATES –GREASE WEEPAGE & CAGE DAMAGE



Grease Oozing



Cage Damage



wheel shelling
length 45 mm x
width 30 mm x
depth 1.5, 20x
20x2, 45x15x2.5,
70x25x2.5,
17x12x2



Components
found OK

SHOP PRACTICE

- Control arm housings should be cleaned and inspected for excessive wear. Housings worn to the extent that proper load distribution on the bearing is affected should be repaired or replaced.
- Rotate the bearing assemblies to detect any abnormal condition and visually check the outside of the bearing assembly for broken, loose, or missing parts.

SHOP PRACTICE

- Whenever the bearing assemblies are removed from the axle, due to excessive end play or roughness, the bearings should be sent for refurbishment.
- During wheel turning the bearing must be protected from steel chips damaging bearing or entering the bearing
- Whenever it is necessary to do any electric welding on cars, or wheel and axle assemblies equipped with Timken bearings, the ground cable must be clamped to or near the part being welded so that **NO CURRENT WILL PASS THROUGH THE BEARINGS.**

Grease weepage

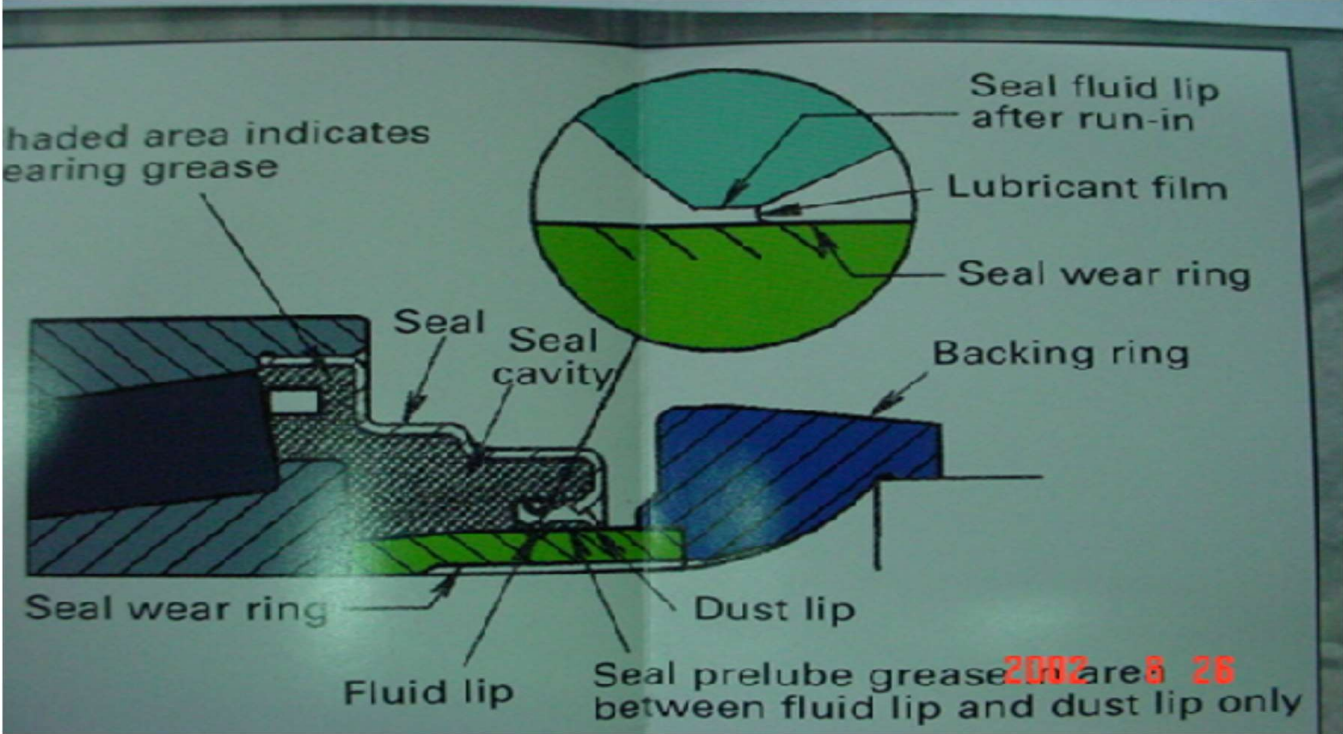
Cause of weepage.

- Temperature.
- Bearing Internal Pressure.
- Dynamic Operating Condition

GREASE WEEPAGE

- Temperature. Grease softens with increasing temperature; the softer or more fluid the grease, the greater the tendency toward weepage. Bearing operating temperature is influenced by ambient temperature, air flow, load, speed and length of operation. Truck and vehicle design also plays a major role in providing adequate air flow to the bearings. These variables all affect the consistency of the grease. (HDL Seals run cooler and tend to reduce softening of grease.)
- Bearing Internal Pressure. The higher the bearing operating temperature, the greater the internal pressure due to air expansion. Non-vented bearing assemblies or assemblies with clogged vent passages have the potential for greater internal pressure, which promotes grease weepage.
- Dynamic Operating Conditions. The dynamic wheel/ rail interaction transmits vibration and shock loads to the bearing that can be great enough to cause the seal lip to momentarily separate from the seal wear ring. This separation provides opportunity for a small amount of grease to pass under the seal fluid lip, especially if the bearing is operating under internal thermally induced pressure. Thus, the bearing vents through the seal lips; inventing, it causes a small amount of grease weepage

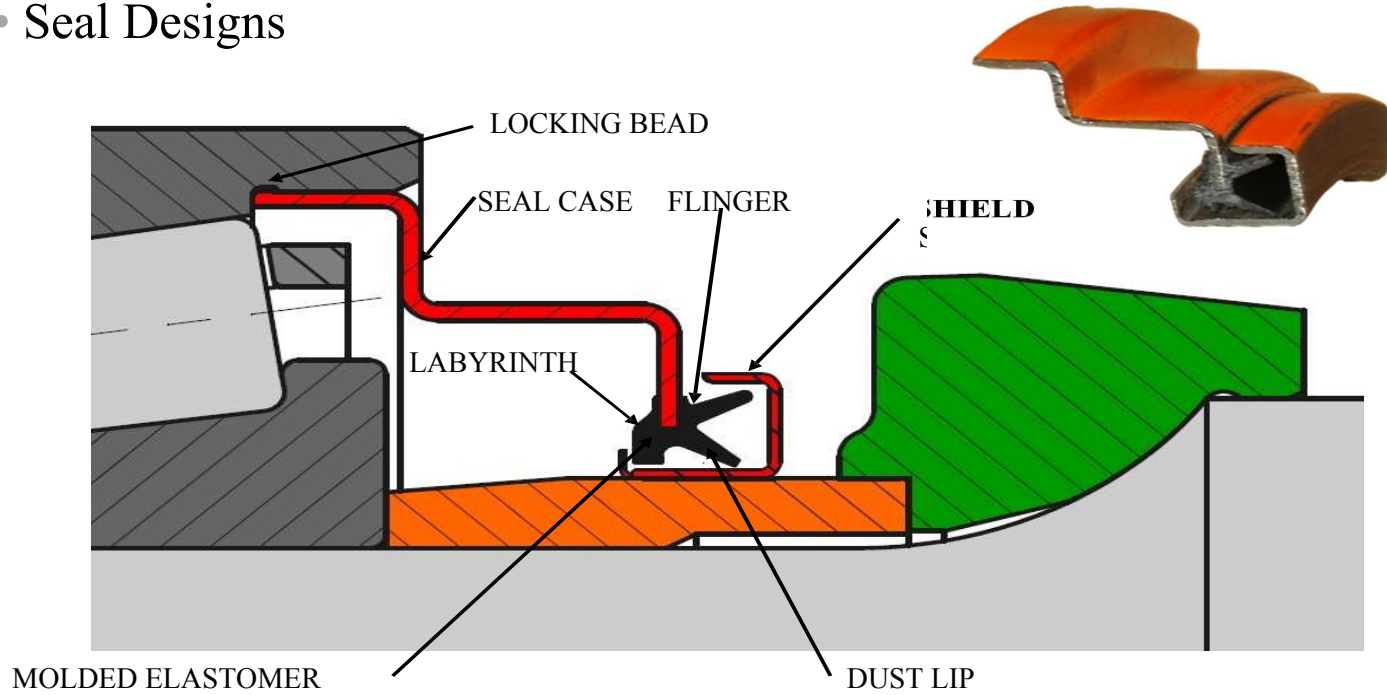
Grease weepage



BEARING DESIGN

HDL Seal – Rubbing Lip – Two Piece Design

- Seal Designs



Grease weepage



Fresh grease weepage

Caution :Do not wipe grease.



Grease weepage



Grease has formed Cake

After the initial run in the grease would get dry.

Grease weepage



How Much Does 10 gms of grease look like.?

Grease weepage



How much 60 gms of grease look like ?

GREASE OOZING STUDY

- For eg: Received complaint on account of grease oozing.



- Inspected the bearing and found grease on the bottom control arm and on the face of the grease seal (may be some other grease). Cleaned the grease properly and allow for another trip and monitored it.
- Re-inspect the bearing at found no grease on the control arm and on the grease seal.



Grease oozing Study

Photographs at SC coaching depot during inspection:



Photographs at LGDS workshop during inspection:



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Photographs before cleaning:



Photographs after cleaning:



Reference from CAMTECH Handbook for LHB coaches bearings:

2.2.3 Slight grease oozing is acceptable and oozed out grease should not be removed if the bearing temperature is within acceptable limit i.e. within 80°C, such bearing should be allowed to continue in service.

(Minutes of meeting held on 13.04.2011 at RDSO,Lucknow.)

9.4 Grease oozing

During service, a small amount of grease leakage could be normal and comes from initial purging of grease and relieving of internal pressures. However, if fresh grease continues to leak, wheel set must be removed from service.

Remarks: All the bearing components like cup, cone assemblies with rollers, cage, seal sleeve, backing spacer and spacer found in good condition and no abnormalities and no damage found on the bearing components. The grease quantity and grease color found in all the bearings are good in condition.

UIC-130 bearing damages references



Damage UIC-130 bearing - Enroute



Affected side wheel

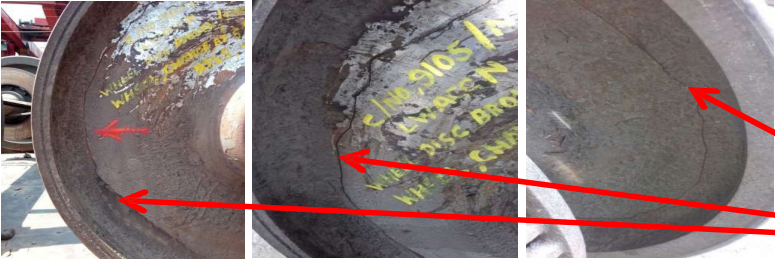


Non Affected side wheel

- Shelling found at many places on the affected and non-affected side wheel. Size measured as (affected side) length 45 mm x width 30 mm x depth 1.5 20x 20x2, 45x15x2.5, 70x25x2.5, 17x12x2. Non affected side 8x13x3, 25x25x3.5

Wheel shelling - found on the wheel which caused excessive vibration and severe impact on the bearing while the train was in running. The excessive vibration due to wheel shelling will affect for the grease oozing from the bearing and regular temperature rise which cause of a premature bearing damage,

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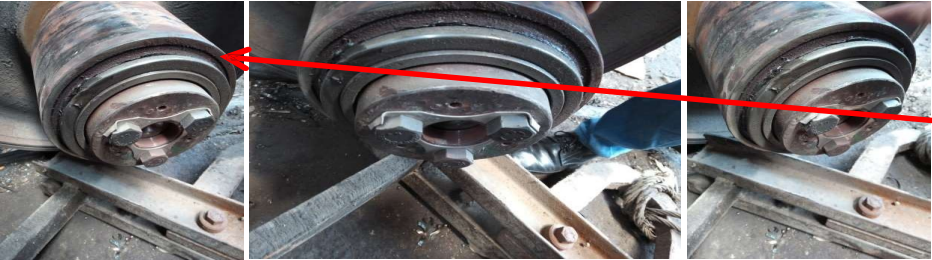


Wheel Disc Crack - found on the wheel which caused excessive vibration and severe impact on the bearing while the train was in running. The excessive vibration due to wheel will create chances of cage breakage which is generally associated with extreme torsional vibration arising from rail – wheel interactions.

Wheel disc Crack



Affected side bearing

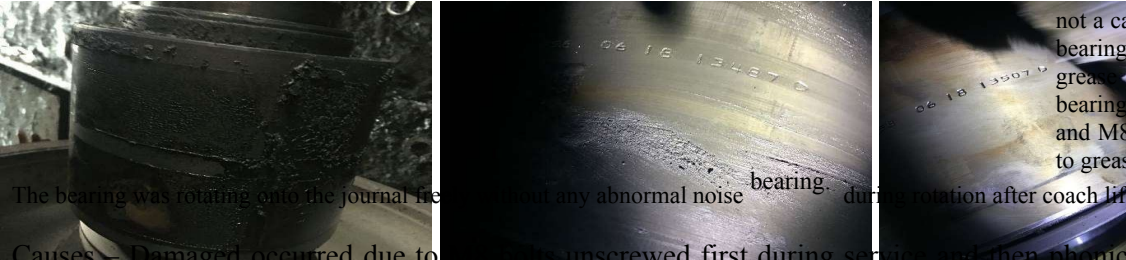


Non Affected side bearing

Damage UIC-130 bearing - Enroute



phonic wheel found damage and broken into pieces and the tooth of phonic wheel was worn out, Rubbing marks & grooving found inside the axle end cover.



The bearing was rotating onto the journal bearing without any abnormal noise during rotation after coach lifting.

not a case of bearing hot axle, the rise in temperature of bearing was occurred due to the bearing outboard side grease seal damage and the outboard grease seal of bearing damaged due to rubbing of the phonic wheel and M8 bolts causing temperature rise and further lead to grease oozing out from

Causes — Damaged occurred due to M8 bolts unscrewed first during service and then phonic wheel free from its position & rubbed inside the housing with bearing and other components consequentially which result temperature rise of the axle box.

Audit benefits - To avoid Bearing
damages

Audit Practices – Benefits

Coach No.163541-LWS on dated.04.1.2018 at Anvt Washing line of Train no, 22420–GZP-ANVT Suhaldev Superfast Exp:-

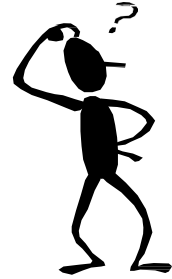


Coach No.173143 –LWACCN On dated 30.7.18 at DLT Washing line of Train no. 122461 –Katra/NDLS



Benefit – To avoid hot axles.

QUESTIONS



Thanks

