No.2003/M(N)/951/22

New Delhi, dated 26.11.12

The Chief Workshop Managers
Jamalpur Workshop & Lilluah Workshop, Eastern Railway
Samastipur Workshop, East Central Railway
Amritsar Workshop & Jagadhari Workshop, Northern Railway
Jhansi Workshop, North Central Railway
Izatnagar Workshop, North Eastern Railway
New Bongaigaon Workshop, Northeast Frontier Railway
Ajmer Workshop, North Western Railway
Golden Rock Workshop & Perambur (C&W) Workshop, Southern Railway
Kharagpur Workshop, South Eastern Railway
Raipur Workshop, Southeast Central Railway
Hubli Workshop, South Western Railway
Dahod Workshop & Pratapnagar Workshop, Western Railway
Bhopal Workshop & Kota Workshop, West Central Railway

Sub: Recommend practices to control cases of hot axle on line

Ref: RDSO’s letter No.MW.RB.Genl dt. 29/31.10.12 (copy enclosed)

RDSO vide above referred letter has circulated important guidelines for maintenance of CTRBs in workshops and ROH depots in view of increase in cases of hot axles. The same are hereby enclosed for your information and necessary action.

(Vinod Kumar)

Encl: As above

Dir. Mech. Enng. (P) I
Government of India
Ministry of Railways
Research Design & Standards Organisation
Manak Nagar, Lucknow - 226 011

No.  MW.RB Genl

Dated 29/10/2012

As per enclosed list

Sub: Recommended practices to control cases of hot axle on line.
Ref: Railway Board’s letter no. 2003/M(N)/951/22 dated 11/10/2012.

In the meeting held at Railway Board on freight matters on 26/09/2012 & 27/09/2012, increase in cases of hot axles on line was deliberated in details. Vide Para 1.5 & Para 1.16 of the minutes of the meeting, circulated vide Railway Board’s letter quoted above, RDSO has been instructed to reiterate important guidelines for maintenance of CTRBs in workshops and ROH depot particularly in view of observations made in recent hot axle cases as well as quality audits.

In this regard, recommended practices for POH workshops, ROH depots & Yard Examination are enclosed.

It is requested that these practices may be implemented on your railway so that cases of hot axle on line can be controlled.

Enclosed: As above.

(Amitabh Sinha)
Executive Director (Wagon)
Circulation:

1. EDME (Freight)
   Railway Board, Rail Bhawan,
   New Delhi – 110 001
   : For kind information please.

2. EDME (W)
   Railway Board, Rail Bhawan,
   New Delhi – 110 001
   : For kind information please.

3. Executive Director, CAMTECH
   Maharajpur, Gwallor (M.P.) – 474 005
   : For kind information please.

4. The Chief Mechanical Engineer:
   1. Central Railway, C.S.T., Mumbai – 400 001
   2. Eastern Railway, Fairlie Place, Kolkata – 700 001
   3. East Central Railway, Hajipur – 844 101
   4. East Coast Railway, Rail Vihar, B – 2, Chandrashekharpur, Bhubaneswar – 751 023
   5. Northern Railway, Baroda House, New Delhi – 110 001
   7. North Eastern Railway, Gorakhpur – 281 001
   8. Northeast Frontier Railway, Maligaon, Guwahati – 781 001
   9. North Western Railway, Near Jawahar Circle, Jaipur – 302 017
   10. Southern Railway, NGO Annexe, Park Town, Chennai – 600 003
   11. South Central Railway, Rail Nilayam, Secunderabad – 500 371
   12. South Eastern Railway, Garden Reach, Kolkata – 700 043
   13. South East Central Railway, RE Office Complex, Bilaspur – 495 004
   14. South Western Railway, Club Road, Keshwapur, Hubli – 560 023
   15. West Central Railway, Opposite Indira Market, Jabalpur – 482 001
   16. Western Railway, Churchgate, Maharishi Karve Marg, Mumbai – 400 020

5. The Chief Works Manager:
   1. Eastern Railway Workshop, Liluah, District: Howrah (West Bengal) – 711 204
   2. Eastern Railway Workshop, Jamalpur, District: Munger (Bihar) – 811 214
   3. Mechanical Workshop, East Central Railway, Samastipur (Bihar) – 848 101
   4. Mechanical Workshop, Northern Railway, Civil Albert Road, Amritsar (Punjab) – 143 001
   5. Mechanical Workshop, Northern Railway, Jagadhari, District: Yamunanagar (Haryana) – 135 002
   6. Wagon Repair Workshop, North Central Railway, Jhansi (U.P.) – 248 003
   7. Loco Workshop, North Western Railway, Lal Phatak, Ajmer (Rajasthan) – 305 001
   8. Carriage & Wagon Workshop, Southern Railway, Perumbur (Tamil Nadu) – 600 023
   9. Central Workshops, Golden Rock (Porimailai), Tiruchirapalli (Tamil Nadu) – 620 004
   10. Wagon Workshop, South Eastern Railway, Kharagpur (West Bengal) – 721 301
   11. Wagon Repair Workshop, South East Central Railway, Raipur (Chhattisgarh) – 490 015
   12. Wagon Repair Workshop, West Central Railway, Kota (Rajasthan) – 324 002
   13. Wagon Repair Workshop, South Central Railway, Guntupalli (A.P.) – 521 241
   14. Western Railway Workshop, Freelandganj, Dahod, District: Panchmahal (Gujarat) – 389 160
   15. Western Railway Workshop, Pratap Nagar, Vadodara (Gujarat) – 390 004
   16. Carriage & Wagon Workshop, North East Frontier Railway, New Bongaigaon (Assam) - 798 381
Recommended practices for POH workshops, ROH depots & Yard Examination as regards inspection, testing and maintenance of CTRBs of Freight Stock

RESEARCH DESIGNS AND STANDARDS ORGANISATION
MANAK NAGAR, LUCKNOW - 226 011

OCTOBER 2012
Background:

There has been a spate of hot axle cases, in recent times, on newly POHed wagons. A detailed investigation was conducted by RDSO to ascertain the possible causes of these failures and to suggest remedial actions for freight maintenance organizations on Indian Railways. In course of this investigation, assistance from Indian Railway workshops like Jhansi, Dahod, Ajmer, ROH Depots at Katni, Mughal Sarai and Khan Alam Pura and the OEMs of CTRB and CTRB components was taken to arrive at these recommended practices.

Recommended Practices for Railway Workshops:

i) Cleaning, inspection and assembly of cup & cones to be done in controlled environment to avoid in-grass of dust particles.

ii) 100 % checking of groove depth of seal wear ring and re-use of only correct wear ring or replace with new one. Use of seal wear rings with vent holes needs to be stopped immediately. Use of proper measuring instrument is required for seal wear ring groove depth.

iii) Bearing mounting machine needs to be periodically calibrated for its proper working at specified force (50 +/- 5 Tons) with ensuring holding for specified time (5 seconds). Use of the proper fixture (tooling) needs be ensured. The pressure – force conversion configuration for the specified machine may be prominently displayed near the mounting area for the benefit of the mounting staff.
iv) Checking of journal diameter at three locations with snap gauges may be enforced for ensuring specified fits to obtain the desired mounting force.

v) Checking of fillet radius after proper cleaning for correct seating/ fitment of backing ring may be ensured. Backing rings with vent holes should not be reused. They should be replaced with plugged backing rings or new backing rings.

vi) Proper tightening of end cap screws with periodically (monthly) calibrated torque wrench at specified torque may be ensured on wheel sets. The specified torque should be maintained to 40 Kg - m (290 foot-pound). The torque wrench must be maintained with an accuracy of +/- 4% (Maximum). Minimum 2 passes and maximum 5 passes to be applied to ensure proper clamping. If any screw movement persists after 5 passes check for any irregularity.
vii) Axle threads to be checked with Go- No Go gauge and Axle thread holes should be cleaned by compressed air.

viii) Inside surface of Adapter is required to checked for wear on thrust shoulder and bearing seating area/adapter machined relief with proper gauges (Sample gauge is depicted below). Gauging as per G 95 may be ensured.

ix) Assembly of bogie using properly checked adopter may be ensured. Railway workshops must manufacture/procure specified gauges for this checking. Cups should be checked for wear patterns seen on the cup outside diameter as it reveals excessive wear of the adapter. The figure below shows normal wear bands present on cup OD generated from a serviceable adapter.

<table>
<thead>
<tr>
<th>Normal wear bands</th>
<th>Deep relief</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Normal wear bands diagram" /></td>
<td><img src="image" alt="Deep relief diagram" /></td>
</tr>
</tbody>
</table>

Wear bands formed due to excessively worn out adapter are illustrated below. In case of fully worn out adapter, the cup starts contacting the adapter at the ends also. Worn out adapters must be scrapped. Displaced adapters also form two distinguished marks on the cup outside diameters. And such cups must be examined for spalls being generated on raceways under the adapter contact areas.

<table>
<thead>
<tr>
<th>Normal wear band width</th>
<th>Contact due to excessive wear of adapter</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Normal wear band width diagram" /></td>
<td><img src="image" alt="Contact due to excessive wear of adapter" /></td>
</tr>
</tbody>
</table>

Abnormal indication of extension of wear band shoulder.

xii)
xii) Checking of the mounted end lateral play may be ensured on each mounted CTRB. This is critical to bearing performance. With correct mounted lateral more roller share the load. As a result, peak load on individual rollers are less. Excessive mounted lateral causes high peak roller loads. As a result of fewer rollers sharing the load. This reduces fatigue life.

xiii) Welding on the wagon after lowering of bogie shall be avoided as far as possible. If any welding work is done after assembly of wagon proper earthing shall be ensured (specifically in odd hours) so that electric current does not pass through the bearings. The earthing should be done very close to welding area and the earthing wire should be tightly secured at both ends. Alternatively the earthing can be done with a earthing wire/strip running parallel to the track instead of earthing with the rails. If wagon is not properly earthed the current passing through the bearings will cause arcing in between the rollers and the raceways leading to failure. All the earthing points may be properly grounded through periodically calibrated earth pits. One of the recommended scheme of earthing is shown below:

![Earthing Diagram]

xiv) Separate investigation of defective CTRBs coming from divisions may be done.
xv) The fitment of cup and cones of same make in overhauled CTRBs may be ensured. To the extent possible they may be maintained with similar age profile.
xvi) The stamping of overhauling date & workshop code may be done on backing ring of CTRB also as per RDSO letter no. MW/WA/Genl dated 26/04/2012.
xvii) Handling of wheel sets with proper lifting tackles shall be ensured. Use of wire slings for lifting of wheel sets may be avoided. Similiarly, securing wire ropes near bearing area while pulling the wagon may also be avoided.
Periodic audits of CTRB fitment/maintenance including wheel handling to be done using check sheets already circulated vide RDSO letter no. MW.CTRB.D dated 23/12/2010 may be done.

**Recommended Practices for ROH Depots:**

1. Area where bearings are opened for UST of axle must have controlled environment.
2. Proper visual examination of bearings to be done. Some important aspects to be checked are as under:

   2.1 Overheating, such as discoloration or parts fused together.

   ![Image 1]

   2.2 Check for loose and/or missing cap screws.

   ![Image 2]

   2.3 Check that all tabs of the locking plate are properly bent up against the flats of the cap screw heads in the loosening direction.

   ![Image 3]
2.4 Inspect for damage or wear to the end cap from a displaced adapter.

2.5 Examine the bearing for welding damage or exposure to extreme heat, such as from a cutting torch. Remove the bearing from service if you find any damage.

2.6 Check for cracked or broken outer rings (also called bearing cups).

2.6 Inspect for a loose backing ring. If you can move or rotate the backing ring by hand, remove the bearing from service.
3. While carrying out wheel turning, the prescribed dummy/protective covers (as mentioned in clause 6.22 & shown in Drawing No. WDIIA-8514/S-1, included in Annexure of G-81) on bearing may be used

4. Proper tightening of end cap screws with periodically (monthly) calibrated torque wrench at specified torque may be ensured on wheel sets. The specified torque should be maintained to 40 Kg – m (290 foot-pound). The torque wrench must be maintained with an accuracy of +/- 4% (Maximum). Minimum 2 passes and maximum 5 passes to be applied to ensure proper clamping. If any screw movement persists after 5 passes check for any irregularity.

5. Handling of wheel sets to be done by using the prescribed lifting tackle and not wire ropes which can damage the grease seals.

6. In case bogie(s) are dismantled for any purpose, the adapter must be thoroughly inspected for soundness and wear. Gauging must be done as specified in G 95.

7. Ensure the Adapter is properly placed on CTRB. Most bearings will "creep" in service, creating two wear bands as pictured below. This is a normal condition that also causes wear to the adapter's seat pads
Wear bands that extend to the end of the outer ring, as shown on the left side of the image below, indicate an excessively worn adapter seat. A shiny edge at the extreme end of the outer ring, as shown on the right side of the image below, is an indication that the thrust shoulder is worn. Replace the adapter if either of these conditions exist.

![Image of adapter with bands and shiny edge](image)

8. Whenever wagons or bogies fitted with CTRBs require welding in ROH Depots/Sicklines, special attention should be paid so that electric current does not pass through the bearings. The earthing should be done very close to welding area and the earthing wire should be tightly secured at both ends. Alternatively the earthing can be done with a earthing wire/strip running parallel to the track instead of earthing with the rails. If wagon is not properly earthed the current passing through the bearings will cause arcing in between the rollers and the raceways leading to failure.

9. The stamping of overhauling date on backing ring of CTRB has been advised to be done by workshops on each overhauled bearing to ensure traceability. In case CTRBs fitted wheel are found to be overdue overhauling in course of ROH/Sick line examination to the wagon, such wheels must be sent to nominated workshop for overhauling.

10. Checking of the mounted end lateral play may be ensured on each mounted CTRB.

**Recommended practices during incoming examinations in yards**

1. Detection of warm bearings on arrival of the train. Check operating temperature of the bearing by touching the adapter or underside of the bearing cup with bare hands immediately after the vehicle is halted. If it is found impossible to hold the hand for a few seconds on the adapter or the cup it means that the bearing is running hot. Cross check the bearing temperature with temperature sensing hand held pyrometers/sensors giving direct reading of the bearing. If bearing temperature is more than 90 degree centigrade the wagon should be detached and bearings should be removed from the service.

2. Check for any abnormal sound and/or grinding noise.

3. Visually inspect the bearing for defects like broken cup, loose or damaged grease seals, broken adapters, missing cap screws, broken /distorted end cap, broken locking plate. Check for loose backing rings, missing side frame key. Any of these conditions are reasons for bearing removal.

4. Checking of displaced adapters [as mentioned in clause 6.1.1(d) of G-81].

5. Availability of adapter retaining nut & bolt in wide jaw bogies.