EAST COAST RAILWAY

Office of the
Pr. Chief Safety Officer
Bhubaneswar.

No. ECoR/SFY/ 550 Dt:-17.07.2024

Safety Circular No.:-8/2024

Sub: - HOT AXLE CAUSES AND PREVENTION

Time and again it is reiterated that Hot Axles is a potential threat to safe train operation. Hot Axle in a vehicle occurs when there is an increase in temperature of bearing due to inadequate wheel-bearing lubrication or other mechanical flaws like bearing failure, breakage of ball bearing of wagons or coaches, overloading and faulty condition of the bearing. During Hot Axle, the bearing of the wheel expands and the movement stops due to jamming of bearing. If undetected the bearing temperature can continue to rise until there is a bearing "burn- off" which may lead to a derailment.

Hence, a hot axle in a train is indicative of an impending accident of consequential in nature in terms of derailment involving one or more trains which incurs heavy damage to railway property and huge loss due to interruption of train services. The failures towards early detection of hot axle are corroborated to casual and relax approach by the train passing staff towards early/timely detection. Details are given as under for necessary information and action by concerned staff:

(A) CAUSES OF HOT AXLE :

1. Non-Standard Lubricant
2. Mechanical Defects
3. Irregularities in Loading
4. Miscellaneous Reasons

I. NON-STANDARD LUBRICANT:

1. Bad quality of grease
2. Excessive quantity of grease
3. Non availability/inadequate quantity of grease
4. Contamination of lubricant (foreign particles, moisture, etc.)

II. MECHANICAL DEFECTS :

1. Defects in journal
2. Defective bearing
3. Oozing out of grease due to perished rubber seal
4. Incorrect fitment of bearing
5. Improper mounting during maintenance

III. IRREGULARITIES IN LOADING :

1. Uneven loading
2. Over loading

IV. MISCELLANEOUS REASONS :

1. Derailment
2. Defects in rail track
3. Excessive speed
4. Poor engineman ship.
5. Improper handling
6. Excessive temperature or heating
7. Impact loading

(B) SYMPTOMS OF HOT AXLE / SEIZURE OF CATRIDGE TYPE ROLLER-BEARING:

1. Smell of burning grease /EM pPd
2. Discoloring of Axle Box paint (face plate).
3. Hotness of axle box by feeling, spitting.
4. Splashing / oozing of grease on wheel disc & Discoloring of grease.
5. Red glow of axle box seen better in night.
6. Light smoke from axle box.
7. Axle may be locked and wheel skidding.
8. Metallic noise after grease has worked out and roller have seized.
9. Skidding of wheel at last stage.
10. Tilting of springs in case of primary suspension.
11. Axle box cover cut/missing.
12. Marks of splashing of grease on wheel and axle box visible at low speed or at stationary.
13. Burning out of molten front cover in case of Coaches.

(C) TEMPERATURE ON NON-CONTACT THERMOMETER:

CTRB Axle box / Adopter temperature	State of bearing operating conditions	Action to be taken
Temp. of Axle Box found above 80^0C	Excessively Warm/Hot	Wagon to be detached
Temp. of Axle Box found above 65^0C but below 80^0C	Normal	Wagon allowed with C&W staff accompanied. Temperature to be checked/monitored en-route.

(D) SPECIAL INSTRUCTIONS FOR AXLE BOX TEMPERATURE OF COACHES:

- If temperature is 80^0C or beyond then coach should be detached from the train.
- Difference of temperature in same axle.

Sl. No.	Difference in temperature	Action to be taken
1.	Up to 10^0C	Allowed in same condition
2.	> 10^0C to 14^0C	Inform en-route C&W Examination point up to destination.
3.	> 14^0C to 20^0C	Accompany the coach by C&W staff up to destination
4.	Above 20^0C	Coach to be detached.

(E) PRECAUTIONARY MEASURES / PREVENTIVE ACTION TO BE TAKEN DURING ROH & POH TO AVOID HOT AXLES:

1. Earthling in wagons for welding should be done properly and very close to the welding area so that electric current does not pass through bearing, it will cause arcing between the rollers and raceways leading to failure.
2. Work with clean tools in clean surroundings.
3. Keep bearings wrapped in polythene sheet when not in use.
4. Apply clean grease and keep grease in closed container when not in use.
5. Grease seal and locking plate should be replaced by new.
6. RDSO approved brands of grease should be used.
7. Never mix up the different greases of different grades or even different makes of same grade.
8. Don't reuse locking plate.
9. End cap screws properly tighten with the help of torque wrench at specified torque of 40 kg -meter (290 foot-pounds).
10. Each and every time lateral play of bearing must be checked and UST of all Axles should be done.
11. Load wear Zone area of bearing must be changed during fitment.
12. All tabs of locking plate are properly bent up against the flats of the cap screw heads.
13. Damaged outer cup bearing should not be allowed in service.
14. It must be ensured by stamping particular of grease seal that the CTRB would not complete more than 72 months by the time it becomes due for next POH / ROH.
15. The dismounting of bearing by oxy cutting strictly prohibited, as above such defects are considered very prone to generation of fatigue during service.
16. Overhauling cycle of new CTRB to take place at 72 months interval.
17. Final Mounting force (Value to observe) should be 37-42 tonnes (for Timken make) and 28-32 ton (for SKF make) on bearing installations.
18. Quantity of grease is used 400+30 gm. now-a-days in place of 430 ± 30 gm.
19. AAR approved Lithium base quality of grease must be used.

(F) DUTY OF STAFF:

I. <u>Action to be taken by crew and guard:-</u>

1. On noticing the hot axle on train by themselves or being intimated through station staff or GKs/Patrolman, Engg. Gang/Keyman & Crew/Guard of other trains, LP to stop the train immediately and inform the condition to SM & Section controller & Crew controller.
2. The LP & Guard shall examine and decide the possibility to take the train at restricted speed up to the next block station where siding facility is available for detachment or to the nearest C&W base for necessary examination as per the condition of the vehicle.
3. While negotiating points, walking speed to be maintained.
4. During the journey between stations they shall look back and keep a good look out as per GR 4.41, 4.43 and SR 4.43.02 & 03 to see if any vehicle on the train running hot and in dangerous condition or any signal given by GKs or TM in section and take steps as the situation may warrant vide SR 4.29.02.

II. **Action to be taken by gate keepers, key men/Patrol men:-**

1. On noticing the hot axle or being informed, the Gate man shall at once show stop hand signal to attract the attention of Guard and LP to stop the train. He can also attract attention of LP by shouting, gesticulating and frequent whistling. Walkie-Talkie, if available can also be used to inform the Loco Pilot and Guard. (SR 16.04.01)
2. If guard is not seen outside, stones may be pelted on BV (with care not to injure the guard) and whistles used freely to draw his attention and if the train stops, he shall render such assistance as the Guard may require from him.
3. SM to be intimated immediately over telephone regarding the condition.

III. **Action to be taken by station staff:-**

1. On noticing or being intimated of a hot axle in a train SM has to put back Last Stop Signal & reception signal other than Main Line immediately to stop the train.
2. Wave danger signal in a wide ark left to right across their chest to stop the passed through train.
3. In case a hot axle is detected after the train has already passed the station, the SM will try to attract the attention of Guard and LP by showing hand signal as indicated above, through VHF, by putting back LSS and shall advise the gateman to stop the train.
4. If not possible to stop - inform mid section GKs & SM of advanced station to stop and examine the train as per BWM 2.07(10). Section Controller has to be intimated. **Advantage may be taken by switching off power in consultation with Traction Power Controller in electrified section (SR 4.29.01)**
5. The SM of station in advance has to receive the train preferably on M/Line directly keeping LSS (Last Stop Signal) danger or by Indirect reception on loop line. Pre-intimation to LP & Guard regarding the train is running with Hot axle/Brake binding/Dangerous vehicle is to be given over WT or means of communication available.
6. At stations other than train examining station or attendance of C&W staff not possible within a reasonable period, SM in consultation with driver/guard and section controller, take necessary step for detaching the vehicle vide GR 4.29 (2). Prior to that a memo has to be received from LP that the culprit wagon cannot move and needs to be detached.
7. If the LP considers the wagon is fit to continue journey with/without speed restriction, the mater should be brought to the notice of Officer of Mechanical Dept/C&W controller through the section controller and his orders is to be obtained before the train is allowed to continue journey.
8. If on intimation of a train enters with dangerous vehicle in the block section in the D/L, triple line or parallel single line section, the SM of both stations will stop the train movement on the adjacent line/other line until the said train arrived complete

or caution order to be issued to LP and Guard of the train waiting to proceed to keep a sharp look out. BWM 2.07 (10) (C).

9. Water must not be thrown/applied on a Hot axle box to put down fire/smoke when hot. Sand/earth may be used and station fire extinguisher (DCPT) may also be used for extinguishing the fire.
10. All effort is to be taken to detach & keep the hot axle wagon in siding/other line when it is in hot condition or otherwise advised by LP, Guard and C&W staff.

IV. **Action by Section Controllers:**

1. Train must be stopped at first approaching station, if not possible action shall be taken to stop the train at the next station.
2. In case train allowed proceeding at restricted speed, he shall advise the SM of the concerned station to issue proper caution order besides advising the notice station/Crew changing station on the run of the train for issue of similar caution order.
3. He must coordinate in arranging attendance of C&W department at the spot in seeking advice of an officer of the Mechanical dept. & on receiving proper assurance certifying the safe ability of the culprit wagon to move, should permit the train to resume its run with/without speed restriction as the case may be, otherwise action shall be taken to detach the culprit wagon.

All section DTIs, CLIs, JE/SSE (C&W), JE/SSE (P.Way) & CHCs are advised to counsel the staff and monitor strict adherence of the instructions in letter & Spirit and ensure no short cut to be allowed under any circumstance. This should be discussed in monthly safety meeting.

17.7.24

Pr. Chief Safety Officer(I/c)
Bhubaneswar

Copy to-

1. Secy. to GM for kind information of GM.
2. Secy. to AGM for kind information of AGM.
3. PCE, PCME, PCOM, PCEE, PCCM, PCSTE, PCSC & CAO (Con) for information.
4. Sr.DSO/ KUR, SBP & WAT for information & necessary action.
5. Principal MDTC/VSKP & MDZTI/BBS for information & necessary action.