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No. SV.Bogie Crack

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१२. मुख्य यांत्रिक अभियंताउत्तर मध्य रेलवे, हार्लिंगरोड, इलाहाबाद- २११ ००१.
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Sub: Bogie Alteration Instruction for Non AC Hybrid Coaches

- Ref:** i. CME, SR Letter No. M/CW/271/III/Coach detachment dated 26.08.2014
ii. CWM, ECR Letter No. MCSW/M/WM/2865 dated 15.10.2015
iii. RCF letter no. MD 21561 dated 11.09.2014

With reference to above, Southern Railway reported the failure of the Hybrid coaches due to cracks developing in bogie frames vide ref.(i). One cracked bogie was jointly inspected by RDSO, RCF KXH and officials of AGC division at Agra. Further, East Coast Railway reported the failure of Hybrid coaches for the similar cracks in bogies.

In the hybrid coaches shell structure is of LHB type and bogies are of conventional type (ICF type) fitted with air suspension arrangement in secondary suspension with BMBC arrangement. There is no change in the basic design of bogies except air suspension. The joint report of RCF, RDSO and Zonal Railways (AGC) has revealed that the recent failure/crack cases of hybrid bogie frames near axle guide arrangement towards inside of bogie frame is due to poor maintenance. M&C analysis was also carried out at RDSO. The findings of investigations on the examined bogie were as follows-

- i. Hitting marks were observed on crown bolt/axle box housing in the culprit bogie at Agra however the other side bogie of this coach had no hitting marks. This end was having Luggage compartment and indicates excessive loading. In this trip, however, the springs were not homed. Therefore, overloading was done in previous trips.
- ii. Heavy wear observed on bracket of brake block hanger and brake block head at Agra. These items have been worn out badly and deep wear steps were formed. This reflected on poor maintenance by Primary End Depot.
- iii. Welding on Safety Lugs were done on all the sides while it is recommended to be done on three sides only. This is likely to cause weld overlap also affecting the fatigue strength adversely.
- iv. M&C directorate concluded that the metallurgy of bogie frame base material conforms to specification for tests conducted. The crack had initiated in a fatigue manner adjacent to the weld interface. The cracking of bogie is attributed to poor quality of welding resulting in lack of side wall penetration. Such deficiency has

caused initiation of crack at weld interface through the heat affected zone. After the initiation of crack the fracture had progressed in fatigue manner resulting in cracking of bogie.


Besides this, the welding of axle box suspension strap was not as per the prescribed procedures. The axle box suspension strap should not be welded from inside (towards Axle Guide) and edge preparation of suspension strap should be ensured for proper penetration of welding. Excessive and poor welding on axle box suspension strap towards axle guide makes the structure soften/annealed and promotes cracks.

FEM analysis has been carried out at RCF KXH and the stresses were found well within permissible limits. However, as an additional safeguard it is suggested that strengthening of bogie frame may be done by providing a channel from inside and a rib from outside (at the center of inner channel) in the area of inner Axle Guide. RCF has issued CAI no. CAI/RCF/MECH/CONV/104 vide ref.(iii) (copy enclosed). Surface preparation and welding procedure as prescribe by RDSO may be followed.

Manufacturers of Bogie are requested to follow the RDSO instructions mentioned in latest revision of RDSO Specification No- C-9202 for manufacturing of bogie. It is pertinent to mention here that the heat treatment is one of the important parameter to manufacture the good quality of product. Therefore, special attention on this may be given during production process.

Further, it is also advised that all brake gear bushes, pins and cotters with standard size should be properly fitted otherwise due to excess lateral and longitudinal play in bogie frame, components fitted in dash pot get broken and complete brake rigging may be shifted. This will cause additional forces on bogie frame and may cause development of cracks in weak spots like welded joints and heat affected zones.

DA: As above

 17-02-16
(Indrajit Singh)

Executive Director Standard Carriage

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