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MC/CTRB/Defects

Date: 11.03.2019

**Principal Chief Mechanical Engineer,
Central Railway,
Chhatrapati Shivaji Maharaj Terminus,
Mumbai - 400 001**

Sub: En-route detachment of LHB Coach No. CR 14059/C LWACCW from Train No. 12171 due to hot axle at BSL Railway Station of Central Railway on 25.02.2019.

Ref: (i) This office letter no. MC/CTRB/Defects Dated 18.02.2019
(ii) This office letter no. MC/CTRB/Genl. Dated 06.07.2015

Coach number CR 14059/C LWACCW was detached en-route from train number 12171 (LTT-HW AC Superfast Express) at Bhusawal Railway Station of Central Railway on 25.02.19 due to high temperature (84°C) of axle box no. L2 (PP end phonic wheel side) during rolling in examination. The coach was placed at Coach Care Centre / Bhusawal for failure investigation.

RDSO official has visited Coach Care Centre, Bhusawal (BSL), Central Railway on 27.02.2019 to 28.02.2019 for joint inspection of reported bearing. The investigation report alongwith joint inspection note is attached herewith as Annexure-I.

The coach has been detached en-route for hot axle within 25 days from SS II attention given to the coach on 01.02.2019. The coach was put into service on 21.02.2019 after SS II & detached during 2nd trip after earning approx 3985 kms only. Fasteners of other phonic wheels of the coach were also checked. M8 bolts of phonic wheel (L1) of the other wheel of same bogie as of the wheel involved in hot axle were found loose by ¼ pitch (round) to reach specified torque of 21Nm. The coach was moved from platform to Coach Care Centre with the same wheel without any issue. After removing the affected wheel from the coach, the affected bearing was found to be rotating freely by hand rotation with some noise due to grease loss.

It is clear from above that the phonic wheel of the affected axle box L2 wasn't secured properly during SS II, due to which phonic wheel worked out from its location, got broken into pieces and rubbed with other axle box components. The phonic wheel damage led to the bearing seal damage and grease loss, resulting in hot axle.

Vide this office letter under ref (i), following instructions were issued for such failures:-

"Zonal Railways should launch an immediate drive to check condition of phonic wheel & earthing device along with their fasteners to cover all newly manufactured coaches in their holding that have not been given D3 schedule till now, as an immediate measure. The discrepancies brought out in this letter may be specifically checked and attended to where warranted. Compiled exception report may pl. be submitted within 15 days from the date of issue of this letter. While submitting the report, Zonal Railways should verify & also confirm that maintenance of axle box components in LHB coaches at coaching depots is being ensured in terms of instructions issued vide the letter under reference & relevant paras of CAMTECH Maintenance Manual for LHB coaches.

CWEs of Zonal Railways may also conduct audit of maintenance practices for axle box components at the workshops maintaining LHB coaches. Audit reports may pl. be submitted within 15 days from the date of issue of this letter."

In view of above,

It is again requested to ensure that the instructions already issued for maintenance of axle box components of LHB coaches are scrupulously followed in the workshops, to conduct audit of maintenance practices for axle box components at the workshops maintaining LHB coaches & to submit the audit reports.

DA: As above

(Samir Lohani)
Executive Director (Stds.)/Carriage

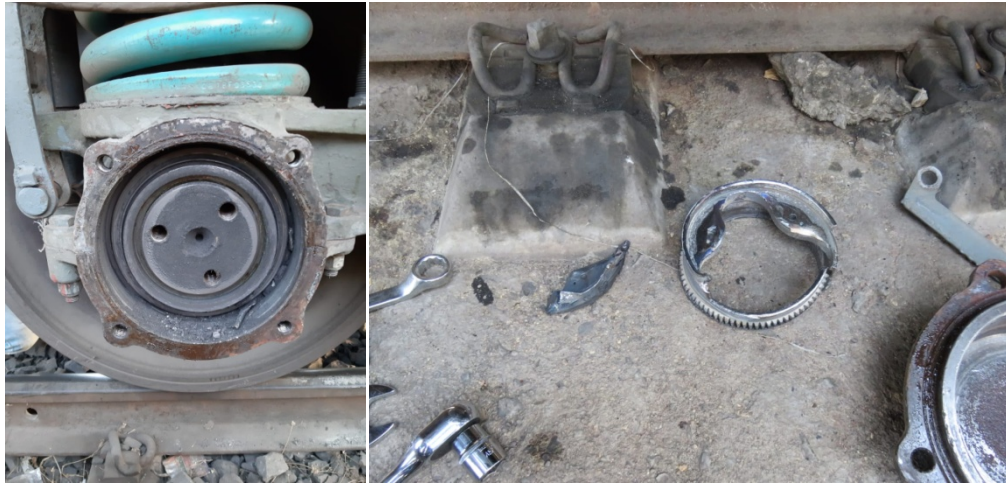
Copy to: EDME/Coaching, Railway Board, Rail Bhawan, New Delhi – 110 001

Principal Chief Mechanical Engineers,

1. Eastern Railway, Fairlie Place, Kolkata - 700 001
2. Northern Railway, Baroda House, New Delhi - 110 001
3. Southern Railway, Park Town, Chennai - 600 003
4. South Central Railway, Rail Nilayam, Secunderabad - 500 071
5. South Eastern Railway, Garden Reach, Kolkata - 700 043
6. North Eastern Railway, Gorakhpur - 273 001
7. Northeast Frontier Railway, Maligaon, Guwahati - 781 011
8. Western Railway, Churchgate, Mumbai - 400 020
9. East Central Railway, Hajipur - 844 101
10. East Coast Railway, Chandrasekharapur, Bhubaneswar - 751 016
11. North Central Railway, Allahabad - 211 001
12. North Western Railway, Jaipur - 302 006
13. South Western Railway, Hubli - 580 023
14. West Central Railway, Jabalpur - 482 008
15. South East Central Railway, Bilaspur - 495 004
16. Konkan Railway Corp. Ltd. Corporate office Belapur Bhawan Nawi Mumbai-400 614

Findings:

1. The end cover of reported axle box no. L2 (phonic wheel end) was opened for inspection. The phonic wheel was found damaged & broken condition.



2. One M8 bolt of phonic wheel was missing. Second M8 bolt was found in unscrewed and rubbed condition inside axle box. Third M8 bolt was found in broken, unscrewed & rubbed condition inside axle box.



3. Heads of M20 screws of axle end (fastened with security disc) had deformed with rubbing marks. Locking plate was found intact with rubbing marks.



4. Rubbing marks & grooving found inside the axle end cover. Metal powder was found inside the control arm.



5. The speed sensor had damaged and melted.
6. WSP fault code noted as 3101 & 3201 / 1101 & 1201. Sheet containing information regarding condition of axle box components of the LHB coach is attached as Annexure-II.
7. The outboard side grease seal of the bearing was found in damaged condition.



8. The coach was lifted and the bogie was rolled out for wheelset change. Casing and rubber lip of outboard side grease seal (front side) of the bearing serial no. 12 14 02716 R38/16-8-18/R1 (SKF) was found damaged and deformed.
9. The inboard side grease seal and backing ring were found ok and intact.



10. Bearing outer cup was found in good condition. No heating mark noticed on the bearing cup OD.
11. The bearing was rotating freely onto the journal but abnormal noise was observed during rotation due to grease loss.
12. Rubbing marks found inside the upper & lower control arm at outboard side only.



13. The other end bearing no. 04 14 30402 R40/16-1-18 R1 (SKF) was found in good condition.
14. All wheels found to be Ok and no wheel shelling mark was observed.

Joint Inspection Note

Dated: 28 February 2019

History:

Train No: 12171 (LTT-HW) AC Superfast
Train Name: Lokmanya Tilak Terminus Haridwar AC Superfast Express
Coach no: 14059/C LWACCW
Coach built: March 2015 RCF
DOC: 21/12/2015 at AQ
Trip Schedule: 25/02/2019 by LTT
Earned kms: 3985 kms from SS-II
Primary Examination: LTT/CR
Date of failure: 25/02/2019
Bearing is within warranty or not: Within Warranty
Bearing no: 12 14 02716 R38/16-8-18/R1 (damaged)
04 14 30402 R40/16-1-18 R1 (Other end)
Tag on Wheel: PR 2429
Wheel Dia: 881mm
Stamping Mark on Axle Journal Face: LHB 0661, ICF PRA 15P 086TCP 0271, K3786

While running in train number 12171(LTT-HW) the coach number 14059/C LWACCW was detached at Bhusawal Railway Station on 25-02-19 due to temperature rise (84°C) of axle box no. L2 (from PP end). During rolling in examination, no temperature rise in axle box reported by Igatpuri, where safe to run examination was done before BSL on 25-02-2019. The coach was placed at Coach Care Centre, Bhusawal for joint inspection of bearing with RDSO, CR & SKF representatives.

The joint inspection was carried out on 27-02-2019 to 28-02-19 and the observations recorded are as follows:

Observations:

1. The end cover of reported axle box no.L2 (phonic wheel end) was opened for inspection.
2. The phonic wheel was found damaged and broken into pieces and the tooth of phonic wheel has partial wear& rubbed.
3. One M8 bolts was missing.
4. Second M8 bolt was unscrewed and has rubbing marks and threads are partially worn.
5. Third M8 bolt was broken, unscrewed and has rubbing marks and threads are fully worn.
6. All M20 screws head were deformed with rubbing marks.
7. Rubbing marks & grooving found inside the axle end cover.
8. The sensor of phonic wheel was completely damaged and melted.
9. The outboard side grease seal of the bearing was found damaged after opening the axle end cover.

DJ
28-02-19.

Radan
28-02-19

Alok Kumar
28/02/2019

GC
28/02/2019

10. WSP system assembly was done at LTT depot after SS-II of coach at Parel workshop. During fitment of WSP sensor and cable, no deficiency was reported from LTT depot regarding phonic wheel assembly. If any deficiency was reported at that time, Parel workshop have inspected. At Parel workshop during SS-II of coach, the specified torque for M8 bolt (phonic wheel assembly) of 21N-m was applied using torque wrench and LOCKTITE 572 was also used as thread lock on M8 bolts as per CAMTECH manual. The bearing after mounting was found to be in good condition.
11. WSP fault code noted as 3101 & 3201 / 1101 & 1201.
12. Location and time of WSP fault code is not available so that any abnormalities in phonic wheel where it happened could be traced.
13. The coach was lifted and bogie rolled out for wheelset change. After bogie rolling out, observed the bearing condition the bearing serial no 12 14 02716 R38/16-8-18/R1 outboard side grease (front side) seal casing found damage and rubber lip was broken and deformed.
14. The inboard side grease seal and backing ring was found ok and intact. No damage found on the inboard side grease seal and backing ring.
15. Bearing OD found in good condition and no heating on the bearing OD.
16. The bearing was rotating freely onto the journal but abnormal noise was observed during rotation.
17. Rubbing marks found inside the upper & lower control arm at outboard side only.
18. The other end bearing 04 14 30402 R40/16-1-18 R1 was found in Ok condition.
19. All wheels found to be Ok and no shelling marks were observed.


Conclusion:


Based on the visual observations it seems that rise in temperature of bearing has occurred due to the bearing outboard side grease seal damage. This seems to be effect of rubbing with phonic wheel and M8 bolts causing temperature rise and grease oozing out from bearing resulting in lubrication starvation condition and metal to metal contact. The phonic wheel damage lead to the bearing seal damage. The bearing was rotating onto the journal freely but abnormal noise during rotation was observed.

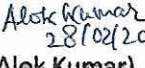
It is concluded that the M8 bolts unscrewed first during service and then phonic wheel freed from its position & rubbed inside the housing with bearing and other components, damaging the bearing seals, leading to loss in grease and consequentially causing temperature rise.


Damaged phonic wheel taken by RDSO representative for the testing at M&C Directorate of RDSO, Lucknow. Phonic wheel material is C40 / C45 as confirmed by Knorr Bremse representative on 27.02.2019.

SKF has requested access to control arm for further investigation & will be collected from LTT/CR. Bearings will be collected by SKF from Parel Workshop/CR.


28.02.19
(Deepak Muraleedharan)
Rep./SKF India Ltd.


28.02.19
(Vinay Kumar Yadav)
JE/D/Carriage/RDSO


28/02/2019
(Alok Kumar)
SSE/PR/CR


28/2
(N. V. Chaudhary)
SSE/C&W/BSL/CR

Condition of Axle Box Components of LHB Coaches in Hot Axle CasesDepot LTTRly CR

- 1) Coach Number: 14059/C LWACCW
- 2) Manufactured by (PU): RCF/March 2015
- 3) Date of Manufacturing: March - 2015
- 4) Date of Commissioning: 21/12/2015 - AB (Agni)
- 5) Last Shop Schedule (date & workshop): PR - SS-II - 01/02/2019
- 6) Date on which, the coach was put in service after SS I/SS II/SS III: 21/02/2019 by LTT
- 7) Approx Kms earned by the coach from last SS I/SS II/SS III: 3985 Kms.
- 8) Last D1/D2/D3 Schedule: Trip Schedule on 25/02/2019
- 9) Sick marking details from last SS I/SS II/SS III: Nil
- 10) Log History of WSP: Fault Code - 31018 3201 / 11018 1201
- 11) Free rotation of bearing at affected end: Rotating but abnormal sound noticed
- 12- Primary Dampers — All dampers found OK.
- 13 - Primary Springs — All Springs found OK.

NOTE: To check whether M8 bolts of phonic wheel & earthing device are properly torqued or not, calibrated torque wrench will be set at 21Nm & applied on M8 bolts. Number of rounds (1/4th, 1/2, 3/4th, 1 & so on) the bolt rotates or tightens before click of torque wrench indicating torque of 21 Nm will represent looseness of the bolt.

12) Phonic Wheel Assembly:Make of air brake system: Knorr Bremse

	WSP sensor gap		Make of bolt	Property class of bolt	Number of rounds it tightens /rotates before reaching 21Nm (represented by click of torque wrench)
Phonic Wheel 1 (R5)	1.45	M8 Bolt 1	TVS	10.9	OK
	—	M8 Bolt 2	TVS	10.9	OK
	—	M8 Bolt 3	TVS	10.9	OK
Phonic Wheel 2 (R6)	1.55	M8 Bolt 1	TVS	10.9	OK
	—	M8 Bolt 2	TVS	10.9	OK
	—	M8 Bolt 3	TVS	10.9	OK

Xadax
27.02.2019

SRM
27/2/19

Alankar
SSE/Wheel Shop / Parcel Workshop
27/02/2019

KBI
27/2/19

Phonic Wheel 3 (L2)	Sensor	M8 Bolt 1	TVS	10.9	Unscrewed & Rubbed
	Burnt	M8 Bolt 2	TVS	10.9	Unscrewed & Rubbed & Broken
		M8 Bolt 3	Not found	Not found	Not found
Phonic Wheel 4 (L1)	1.65	M8 Bolt 1	TVS	10.9	1/4 th Rotation
	—	M8 Bolt 2	TVS	10.9	1/8 th Rotation
	—	M8 Bolt 3	TVS	10.9	1/4 th Rotation

13) Oiler Ring Assembly of Earthing device:

		Make of bolt	Property class of bolt	Number of rounds it tightens / rotates before reaching 21Nm (represented by click of torque wrench)
Oiler ring 1	M8 Bolt 1	TVS	10.9	OK
	M8 Bolt 2	TVS	10.9	OK
	M8 Bolt 3	TVS	10.9	OK
Oiler ring 2	M8 Bolt 1	TVS	10.9	OK
	M8 Bolt 2	TVS	10.9	OK
	M8 Bolt 3	TVS	10.9	OK

14) Condition of other components of earthing device

	Condition of wire connection from earthing device to coach	Condition of carbon bars	Condition of spring mechanism
Earthing device 1 (L4)	OK	OK	OK
Earthing device 2 (R8)	OK	Partial chip off at one end	OK

15) WSP: Working or not working:- *Not working (Cable - 99 not showing)*
Any error code: *310183201 / 110121201.*

Dump valves working or not:-

Dump valve no 1	OK
Dump valve no 2	OK
Dump valve no 3	OK
Dump valve no 4	OK

16) Condition of wheel disc:

Wheel disc no	condition	Wheel disc no	condition
1	No Skelling observed	5	No Skelling observed
2	"	6	"
3	"	7	"
4	"	8	"

Kadav
27.02.2019

Shal
SSE/27/2/19

Ar. K. Kumar
SSE / Wheel Shop / Panel workshop
27/02/19

H. K. K.
KBI
27/2/19

17) Any other remark:

Affected wheelset replaced with another wheelset having wheel dia of

884mm and both bearings are of Timken Make.

1- 03 13 02293 / TIL/023/11/17 W/R R1

2- 04 16 02603 / TIL/006/11/17 W/R R1

Phonic wheel found in broken & rubbed condition. At teeth side fatigue

failure noticed. Phonic wheel taken by RDSO representative for testing
at M&C Dte. RDSO, Lucknow. (Phonic wheel Material - C40/C45)

Bearing outboard side seal damage. All 03 M20 screws head deformed and
rubbed.



27.2.2019

V.K. Yadav

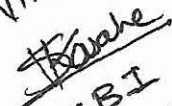
JE/D/Carriage

RDSO/LKO

Adit Kumar
SSE / Wheel Shop / Fare Workshop
27/02/2019 Central Railway




SSE/Carriage
27/2/19

Vinayak.

KBI
27/2/19

ANNEXURE 12.9

PROFORMA TO BE FILLED IN CASE OF CTRB FAILURE OF LHB COACHES

S.N	Details	Observation	S.N.	Details	Observation
1	Occurrence Particulars		5	Bearing particulars	
a	Date of Failure	25.02.19	a	Bearing side (phonic, earthing or plain side)	Phonic
b	Station	BSL	b	Bearing marks	SKF
c	Section	IGP-BSL	c	Bearing No.	12 14 02716 - R1/16/8/18
d	Division	BSL	d	Mfg. Date of bearing	12 14 - R1/16-8-18
e	Railway	CR	e	Within warranty or beyond warranty	Within Warranty
2	Train Particulars		f	Refurbished/New	Refurbished
a	Train no.	12171	g	If refurbished date of refurbishing	16-8-18 - R1
b	Last examination station	IGP	h	Check for any damage to grease seal	Out board side grease Seal damage
c	Last examination date	25.02.19	6	Affected end	
d	Distance traveled since last examination	308 Kms.	i	Phonic wheel side	Yes
3	Failure particulars		a	WSP functional or not	Not
a	Description of failure	Hot axle	b	Phonic wheel present or not	Present
b	How failure detected	During STR	c	Sensor cable present or not	Present
c	Position of affected coach from loco	18 th	d	Physical condition of sensor damage/rubbing mark	damaged & rubbed
4	Coach Particulars		e	Gap between phonic wheel & sensor	Not checked as sensor rubbed
a	Coach Nos.	14059/K	f	Phonic wheel mounting M8 screws/bolts present or not	Two found in rubbed & damaged. One missing
b	Coach Type	LLWACW	g	Make of (WSP, Sensor & phonic wheel)	Knorr Bremse
c	Coach Built by	RCF	h	Make of M8 bolts	LPS
d	Coach Built year	2015	i	Property class of M8 bolts	10.9
e	D1 Schedule date Trip Schedule date	25.02.19	j	Phonic wheel M8 screws/Bolts condition	Rubbed/damaged
f	D2 Schedule date	—	k	Spring washer of M8 bolts present or not	Not found
g	D3 Schedule date	—	l	M8 Screws/bolts Full or half threaded	One found half thread one missing one in broken & fully rubbed
h	IOH date	—	m	Sensor fixing bolts are present/damage or not available	Present
i	POH date /SS-II	PR-01/02/19	n	Phonic wheel OD-wear/damage	Wear & Broken

S.N	Details	Observation	S.N.	Details	Observation
j	Return date	02/22	o	Max temperature	84°C
k	POH shop	PR/CR			
ii	Earthing Side (if failed earthing side)	—	e	Condition or end locking screws	Head deformed
a	Make of earthing device	—	f	Condition of end locking plate	Intact but Rubbing marks found
b	Earthing device functional or not	—	g	End locking plate tab is bent against End cap screw (all 3 screws)	all tabs open
c	Earthing cable present or not	—	h	Heat/burn marks on the Axle end cover/control arm	Heat marks inside axle end cover
d	Physical condition of carbon bushes	—	9	Vertical Damper	
e	Spring of carbon bushes functional or not	—	a	Check the vertical damper functional or not	functional
7	Control arm		b	Leakage of lubricant	No
a	Visual check on all fixings for loosening and/or missing components.	Intact & OK	c	Check the bolts & nuts present or not	Present
b	Check the control arm to see is misaligned or not	OK	10	Wheel	
c	If there is gap between the upper and lower control arm, then measure it.	No gap found	a	Wheel shelling is present or not (depth-1.5 mm Max., & depth of hollow tyre-3mm Max.)	No wheel shelling observed
d	Visually check control arm parts for damages, cracks or corrosion marks.	Rubbed only outside side bore	b	Wheel flat present or not (Max. 50mm)	Not Present
e	Drain holes choked or open	One open one choked	c	Wheel diameter affected side	881 mm
8	Axle end over		d	Wheel diameter Other End (Mate Bearing)	881 mm
a	Axle end cover mounting bolt missing/loose	Found Intact	e	Position/location of affected wheel in coach	L2
b	Inspection bolt present or not at axle end cover	Present	f	Stamping particulars of wheel	VR 15 000 85 7158
c	Axle end cover physical condition at the phonic wheel area any sign of rubbing	Rubbing found	g	UST particular of wheel	—
d	Axle end cover rusted or not	Rubbing & Heating marks		UST Particular of Axle	01/19 VMR