

Chapter 2 Production and Maintenance of LHB Coaches in Indian Railways

2.1 Introduction

Indian Railways have been transporting passenger traffic mainly through conventional coaches of ICF design. These coaches are manufactured at Integral Coach Factory, Perambur (ICF) and Rail Coach Factory, Kapurthala (RCF). A limited number of these coaches are being manufactured at BEML (Bharat Earth Movers Limited)/ Bangalore.

The ICF type of coaches have limitations in terms of speed potential, heavy corrosion, poor riding comfort and wearing of parts in the under gear. To overcome these limitations, Indian Railways entered into Transfer of Technology (ToT) contract with M/s ALSTOM LHB/Germany for production of LHB³⁶ design stainless steel coaches. Accordingly, their inception and mass production in Railways was started in 2002. First LHB coach was introduced in Indian Railways network in December 2003.

LHB coaches are far superior with respect to passenger comfort, safety, speed, corrosion, maintenance and aesthetics than ICF coaches. These coaches are also



Figure 2.1: ICF Conventional coach and LHB coach

longer as compared to ICF design resulting into more carrying capacity. The benefits from these types of coaches include:

³⁶Linke Hoffman Busch coaches

- **Better Speed Potential** – Maximum operating speed of LHB coaches is 160 kmph (tested upto 180 kmph) as compared to maximum speed of 140 kmph in ICF coaches. This can increase the availability of path.
- **Higher carrying capacity** – These coaches are about two meters longer than ICF coaches. With this extra length two additional rows of chairs in chair cars or one additional bay in sleeper coaches can be accommodated. An AC III Tier coach of LHB design can accommodate 72 passengers as compared to 64 in ICF type. This increases revenue earning in each run.
- **Better pay to tare ratio³⁷** – The weight of LHB coach is lesser as compared to ICF design coaches, leading to lower hauling cost.
- **Low corrosion** – Stainless Steel shell eliminates corrosion of LHB coaches.
- **Low Maintenance leading to improved availability** – LHB coaches requires less maintenance than that of ICF coaches. Periodical overhauling of LHB coach is done in every 36 months in comparison to 18 months in respect of ICF coach. This reduces the maintenance cost. Disc brakes are provided for efficient braking and lesser maintenance also.
- **Aesthetically superior interiors** – LHB coaches have interiors with FRP panels³⁸ for side wall and roof. They can be removed easily for maintenance, resist water seepage and are wear resistant.

Most importantly, LHB coach offers better passenger safety due to

- use of fire retardant materials for furnishing,
- provision of four emergency openable windows for faster passenger evacuation, and
- vertically interlocked Centre Buffer Couplers with anti-climbing features that prevents the coaches to capsize in case of a derailment.

³⁷**Pay-to-tare ratio** is the total payload divided by dead weight of a rolling stock. Tare weight is the weight of the coach without any passenger or luggage on it, that is, without any 'load'. Payload is the maximum amount of weight it can sustain apart from its own weight. LHB coaches weigh approximately 10 *per cent* less than corresponding conventional coaches resulting in saving in haulage cost.

³⁸**Glass Fiber Reinforced Plastic panels** are used for interiors of LHB coaches.



Figure 2.2: Accident site of Dibrugarh Rajdhani on 25.06.2014 - None of the LHB coaches turned turtle despite a high speed derailment and there was no loss of life (left).
Accident site of Dehradun-Varanasi Janta Express near Bachrawan Railway Station on 20.03.2015 - Derailment of ICF rake claimed lives of 38 people with injury of 150 others (right).

A comparison of the fatalities caused in the accidents between trains with ICF and LHB design coaches during 2014-15 to 2017-18 revealed the following:

| Table 2.1 – Comparison of accidents involving trains with LHB and ICF coaches | | | | | | | | | |
|---|------------------|-----------|-------------------|-------------------------|------------|-------------|-------------------------|----------|------------|
| Year | No. of Accidents | | Type of accidents | Trains with ICF Coaches | | | Trains with LHB Coaches | | |
| | Derailment | Collision | | No. of Trains | Deaths | Injuries | No. of Trains | Deaths | Injuries |
| 2014-15 | 4 | 1 | Derailment | 3 | 90 | 350 | 1 | 4 | 8 |
| | | | Collision | 1 | 25 | 60 | 0 | 0 | 0 |
| 2015-16 | 4 | 0 | Derailment | 3 | 36 | 150 | 1 | 2 | 7 |
| | | | Collision | 0 | 0 | 0 | 0 | 0 | 0 |
| 2016-17 | 6 | 1 | Derailment | 6 | 193 | 430 | 0 | 0 | 0 |
| | | | Collision | 1 | 1 | 22 | 0 | 0 | 0 |
| 2017-18 | 4 | 0 | Derailment | 3 | 26 | 130 | 1 | 0 | 100 |
| | | | Collision | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 18 | 2 | | 17 | 371 | 1142 | 3 | 6 | 115 |

Out of 20 train accidents/derailments during the past four years, ICF coaches were involved in 17 instances and LHB coaches were involved in three instances. The accidents involving ICF coaches claimed 371 lives and 1,142 injuries, while accidents involving LHB coaches claimed six lives and 115 injuries. Even after allowing for a lower proportion of LHB coaches, fewer casualties in accidents involving LHB coaches proved their superiority over ICF coaches. Thus, there is an urgent need to switch over to LHB rakes to ensure safety of the railway passengers, especially in trains with higher speeds.

Audit objectives:

- Whether the production of LHB coaches was adequate to meet the requirement of conversion of ICF conventional rakes.
- Whether the facilities available in coaching depots and workshops of IR were adequate for maintenance of LHB coaches.

Audit findings

2.2 Recommendation of High Level Safety Review Committee for use of LHB coaches

The High Level Safety Review Committee (HLSRC) had analyzed (February 2012) the casualties of passengers in train collisions and derailments, in addition to other issues. They opined that ICF design passenger coaches were not safe at operational speeds of 100-120 kmph with trailing loads of 20-24 coaches. They strongly recommended complete switching over to the manufacture of LHB design coaches and immediate stopping of manufacture of ICF design coaches. For usage of the existing large fleet of ICF design coaches, they recommended to relegate these coaches in trains having composition of lesser than 18 coaches and with lesser speeds. The XIIth Five Year Plan also envisaged complete switch over to new manufacture of only LHB design coaches by the end of 2017.

Audit observed that Indian Railways stopped production of ICF coaches only with effect from April 2018. Over the last five years the pace of production of LHB coaches has increased. However, the share of LHB coaches to the total coaches of Indian Railways produced during 2013-14 to 2017-18 was about 30 *per cent*.

HLSRC had recommended relegating ICF coaches for running trains with less than 18 coaches and with lesser speeds. Audit scrutiny of records of operating department of Zonal Railways revealed that as of March 2018, 903 rakes of ICF conventional coaches were still being run for trains with 18 or more coaches. Further, the trains had a capacity to run at a maximum speed of 100 kmph or more. Only 252 rakes were running with LHB coaches as of March 2018. Details are shown in **Annexure 2.1**.

Running of rakes with 18 or more conventional coaches at high speed exposes the passengers to the risk of unsafe journey.

In reply, Railway Board stated (20 June 2019) that ICF designed coaches are perfectly safe for the operating condition defined for running for them on Indian Railways. They further stated that there is no safety risk involved with ICF coaches within the boundaries of defined operating conditions.

The audit observations were based on the recommendations of HLSRC formed by Ministry of Railways itself. The committee has made its recommendations based on analysis of the casualties of passengers in train collisions and derailments in previous years.

2.3 Production of LHB coaches

Indian Railways have three passenger coach manufacturing units viz., Integral Coach Factory Perambur (ICF), Rail Coach Factory Kapurthala (RCF) and Modern Coach Factory Raebareli (MCF). ICF and RCF are manufacturing both conventional and LHB coaches. MCF was set up in April 2011³⁹ to produce LHB coaches only. As of March 2018, production of conventional coaches in ICF and RCF during last five years was more than three times of production of LHB coaches even after 15 years of introduction of LHB coaches. In addition, Railways also planned to set up new production units of LHB coaches at Kanchrapara and Singur. Proposals for Kanchrapara were sanctioned in the budget of 2009-10 and proposal for Singur was yet to be approved. However, no production plan was programmed from two units (Kanchrapara and Singur) till March 2018.

Audit analyzed the installed capacity of production of ICF and LHB passenger coaches vis-à-vis the production in last five years.

| Table 2.2 Production of passenger coaches during 2013-18 | | | | | | | | |
|--|--|---------------------------------|-----------------------------|-------------|----------------------------------|----------------|--|---------------|
| Production units | Installed capacity per year | | Production Plan for 2013-18 | | Actual production during 2013-18 | | Shortfall in production against plan Excess(+)/Short (-) | |
| | ICF Conventional | LHB | ICF Conventional | LHB | ICF Conventional | LHB | ICF Conventional | LHB |
| <i>ICF</i> | <i>1500 in 2013-14 and 1700 from 2014-15 onwards</i> | <i>300 from 2015-16 onwards</i> | 8215 | 1738 | 8601 | 1510 | 386 | (-)228 |
| | | | | | 5365 (2015-18) | 1420 (2015-18) | | |
| <i>RCF</i> | <i>1500 (combined)</i> | | 5027 | 2626 | 4879 | 2495 | (-)148 | (-)131 |
| <i>MCF</i> | 0 | 1000 | 0 | 2135 | 0 | 1842 | 0 | (-)293 |
| Total | | | 13242 | 6499 | 13480 | 5847 | 238 | (-)652 |

From the above table, the following observations emerge:

³⁹ MCF Raebareli has been declared as a production Unit by Ministry of Railways with effect from 1 July 2014 vide Railway Board's notification dated 30 June 2014.

(a) In ICF, against a total installed capacity of 900 LHB coaches for 2015-18 i.e. three years cumulative, actual production was 1,420 LHB coaches (excess by 58 per cent). Hence, it appears that the installed capacity has not been accurately assessed. Further, against a production plan of 1,738 coaches for 2013-18, it produced 1,510 coaches (shortfall of 13 per cent). Audit noted that with accurate installed capacity assessment, the production plans are also likely to be revised.

(b) In RCF, there is no variant wise separate installed capacity. The combined installed capacity is 1,500 coaches per year. During 2013-18, there was a shortfall of 131 LHB coaches against a production plan of 2,626 LHB coaches (shortfall of 5 per cent).

(c) In MCF, against a combined installed capacity of 5,000 LHB coaches for 2013-18, i.e. five years cumulative, the production plan was for only 2,135 coaches and actual production was 1,842 LHB coaches (shortfall of 63 per cent w.r.t. installed capacity).

Hence, Railways need to accurately assess the installed capacity of manufacturing units and take adequate steps to fully utilize it.

Audit further noticed that out of 19,327 coaches produced by these three production units, 5,847 coaches were of LHB type. Audit noted that

- Indian Railways have planned for manufacturing of 13,242 conventional and 6,499 LHB coaches through the three production units during 2013-14 to 2017-

18. These production units have manufactured 13,480 conventional and 5,847 LHB coaches during these periods. It was seen that conventional coaches were produced more than the targets set. But, 652 less LHB coaches were produced as against the targets of 6,499 coaches.

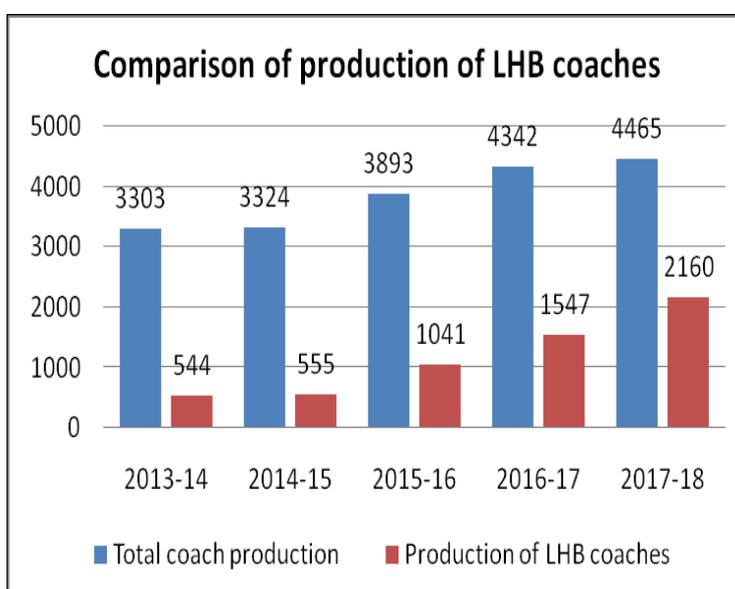


Figure 2.4: Production of LHB coaches vis-à-vis conventional coaches

- Out of 6,499 LHB coaches planned for production during 2013-18, ICF and RCF produced 4,005 LHB coaches. On the other hand, MCF could produce only 1,842 LHB coaches during this period. As such, MCF established for production of only LHB coaches, could produce only 31.5 per cent of total LHB coaches during 2013-18. Details are shown in **Annexure 2.2**.

In reply, Railway Board accepted (20 June 2019) the audit contention and stated that Railways has taken the decision to manufacture only LHB coaches for mainline trains from 1 April 2018. They further stated that Kanchrapara Coach Unit has been kept on hold due to sufficient production by existing coach manufacturing unit. They also stated that production of MCF Raebareli has been enhanced to 1,425 during 2018-19, which would be increased to 1,540 during 2019-20. They clarified that setting up of Singur unit is not yet sanctioned.

Audit is of the view that with stoppage of production of ICF design coaches, requirement of LHB coaches would increase in future. Thus, Railways needs to re-examine the need to enhance the installed capacity of ICF, RCF and MCF for production of LHB coaches, and whether to phase out production of ICF Coaches.

2.3.1 Production of LHB coaches in MCF

Audit observed that MCF could not achieve the production as targeted in the production programme since its inception. The acquisition plan from MCF was 2,800 coaches during the Plan period (2013-14 to 2017-18). But, the production program was set only for 2,135 coaches. However, during 2013-14 to 2017-18, it could actually produce only 1,842 coaches. Audit noticed that

- Important plant and machinery viz, Integrated Shell Assemblies and Assembly Line were yet to be commissioned as of March 2018. These were installed earlier between June and November 2015,
- Other machines⁴⁰, procured in February 2014 and December 2012 were rejected in July 2017 and September 2017 due to non-compliance of the productivity standards.
- In addition, CNC laser cutting and welding machines, CNC laser cutting machines, CNC Plasma Profile Cutting machines remained either on breakdown

⁴⁰ viz., Bogie Fabrication Line, Slitter-cum-cut-to-length combination line machine

or had not worked as per the specifications. These were procured during May 2012 to January 2013.

As such, non-commissioning/rejection/breakdown of machines was one of the main reasons for shortfall in production by MCF.

Thus, seven years after setting up of MCF in 2011, the production unit was yet to attain production as per the planned installed capacity of 1,000 coaches per annum (as of March 2018). The shortfall in production of LHB coaches impacted conversion of conventional rakes into LHB rakes.

During Exit Conference (6 May 2019) and in reply (20 June 2019) to audit para, Railway Board stated that MCF has now enhanced the production from 130 in 2013-14 to 1,425 in 2018-19 and 2,000 coaches are contemplated for manufacturing during 2019-20. They informed that there is also a proposal for augmenting the capacity of MCF to meet future demand of LHB coaches. They further stated that all important machines except Sliter cum CTL line machine has now been made functional and are being used for regular production.

2.3.2 Conversion of ICF rakes into LHB rakes

Railway Board allot new LHB coaches to the Zonal Railways for conversion of ICF rakes into LHB rakes. Audit examined planning and pace of conversion of ICF rakes into LHB rakes. Over Indian Railways, during the last three years

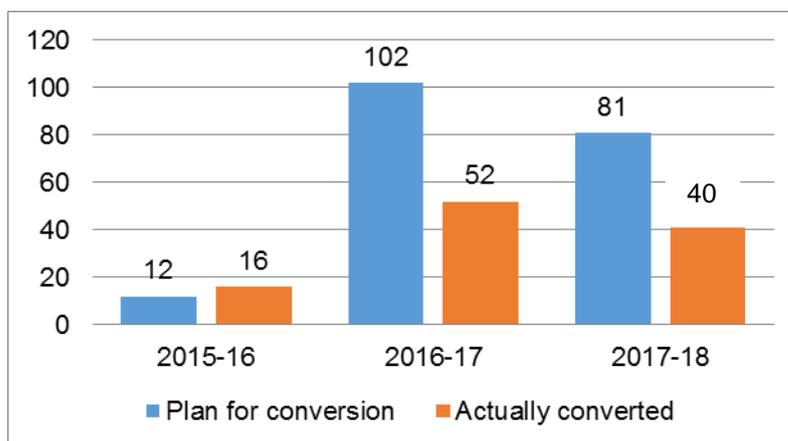


Figure 2.5: Planning and conversion of conventional rakes to LHB rakes from 2015-16 to 2017-18, 195 rakes were planned for conversion into LHB rakes. However, only 108 rakes could be converted into LHB rakes. The target for conversion was reduced from 102 in 2016-17 to 81 in 2017-18, instead of increasing the same. Zonal Railway wise analysis showed that

- 65 rakes were converted to LHB rakes in four⁴¹ Zonal Railways, whereas other 11 Zonal Railways could convert only 44 rakes into LHB rakes during the last three years.
- NWR did not convert any rakes into LHB rake, as they did not plan for any.
- In 2015-16 and 2016-17, SECR, SCR and WCR also did not plan for conversion of conventional rakes to LHB rakes.

Details are shown in **Annexure 2.3**.

Audit also noted that Railway Board did not allot required number of LHB coaches to Zonal Railways. Coaches were allotted in piecemeal due to which coaches received were lying unused till appropriate number of coaches were allotted to form a rake. Audit further noticed that 98 important/prominent Superfast Mail/Express trains are still running with conventional coaches as indicated in **Annexure 2.3 a**.

Thus, it was seen that the number of ICF rakes planned for conversion was not significant. This would have serious safety risk implication as opined by the High Level Safety Review Committee.

During Exit Conference (6 May 2019) Railway Board stated that conversion plans are drawn up every year for all Zonal Railways. First priority is given to long distance trains and trains having pantry cars. They stated that gradually all trains would be converted into LHB rakes. Audit, however, noticed that no time frame has been fixed for conversion of all existing ICF rakes into LHB rakes.

Audit also carried out age analysis of existing ICF conventional coaches over Indian Railways. Audit noticed that there were 56,093 coaches⁴² as on 31 March 2018. Of these, only 7,060 coaches (12.59 per cent) were of LHB type and other 49,033 coaches were of ICF conventional coaches. The age-wise details of these ICF coaches are given in Table 2.3.

⁴¹CR-25, NR-18, ER-11, ECR-11

⁴² Type of coaches – AC I, Composite AC I & ACII, AC II, Composite ACII & AC III, ACIII, IIAC seat, Sleeper, Seating ordinary, Pantry car

| Table 2.3 – Age analysis of ICF conventional coaches as on 31 March 2018 | | | | | | |
|--|-----------------------|--------------------------------|--------------|--------------|--------------|------------|
| Zonal Railway | Number of LHB coaches | Number of conventional coaches | | | | |
| | | Total | <15 years | >15<20 years | >20<25 years | >25 years |
| CR | 605 | 4638 | 2616 | 984 | 868 | 170 |
| ECoR | 371 | 2335 | 1509 | 526 | 295 | 5 |
| ECR | 654 | 3095 | 2099 | 637 | 359 | 0 |
| ER | 687 | 3435 | 2015 | 713 | 614 | 93 |
| NFR | 305 | 1946 | 1251 | 335 | 321 | 39 |
| NR | 1463 | 5547 | 1065 | 4482 | 0 | 0 |
| NWR | 90 | 2765* | 1442 | 251 | 188 | 15 |
| SCR | 300 | 4360 | 2639 | 912 | 809 | 0 |
| SECR | 195 | 1074 | 836 | 64 | 85 | 89 |
| SER | 389 | 2362 | 1510 | 486 | 349 | 17 |
| SR | 499 | 5856 | 3547 | 1059 | 1127 | 123 |
| SWR | 344 | 2455 | 1766 | 374 | 315 | 0 |
| WCR | 57 | 1393 | 1125 | 169 | 99 | 0 |
| WR | 733 | 3933 | 2765 | 713 | 441 | 14 |
| NER | 225 | 2560 | 1829 | 449 | 238 | 44 |
| NCR | 143 | 1279 | 1017 | 111 | 151 | 00 |
| Total | 7060 | 49033* | 29031 | 12265 | 6259 | 609 |

* Age-wise details of 869 conventional coaches is not available with NWR

As can be seen from the above table, 609 conventional coaches have already attained their codal life of 25 years as on 31 March 2018. Further, about 13 per cent (6,259 coaches) were between the age of 20 and 25 years and would need to be replaced in the next five years.

Thus, Indian Railways need to replace at least 6,868 coaches (14 per cent) over a period of next five years. In addition, Indian Railways would also need to manufacture additional new coaches to cater to anticipated increase in passenger traffic. The present production programme is not able to meet the requirement of coach production. As a result, coaches which are very old and about to complete their codal life are being run in the railway system. This leads to an uncomfortable and aesthetically poor travelling experience for the passengers. Further, running 609 over aged coaches in the railway system also has implications on passenger safety.

2.4 Maintenance of LHB coaches

(a) Maintenance facilities at coaching depots

There is need to keep necessary spare items (stock and non-stock) and trained manpower in the coaching depots for maintenance of LHB coaches. Indian Railways have 176 coaching depots. Audit test checked the records of 53 coaching depots to analyse the adequacy of maintenance of LHB coaches. Audit noticed that

- Infrastructure facilities were adequate for maintenance of LHB coaches in 34 coaching depots.
- There were lack of adequate facilities for maintenance of LHB coaches in 19 coaching depots out of which in 14 coaching depots, the required infrastructure facilities have not been proposed.
- Spare items for maintenance of LHB coaches were not being properly maintained in 12 coaching depots. These were made available from other depots/workshops.
- There was lack of trained manpower for maintenance of LHB coaches in seven coaching depots.

Details are shown in **Annexure 2.4**.

During Exit Conference (6 May 2019) Railway Board stated that Railways have identified constraints and problems facing in maintenance of LHB coaches in coaching depots. All efforts were being made to address the constraints for smooth maintenance of LHB coaches.

In reply, Railway Board stated (20 June 2019) that instructions exist regarding adequate planning for maintenance of LHB coaches. They further stated that Zonal Railways were providing maintenance spares, staff training needs etc. at all coaching depots.

Railway Board did not respond specifically to deficiencies noticed in 53 coaching depots reviewed by Audit. Railway Board need to analyse the deficiencies that exist in the coaching depots for maintenance of LHB coaches.

(b) Maintenance facilities of LHB coaches at Workshops

With the induction of LHB coaches in the services, workshops should have also the facility for Periodic Overhaul/ Intermediate Overhaul (POH/IOH)⁴³ of LHB coaches including regular maintenance. The structure and composition of LHB coaches are different from that of conventional coaches. As such, specific infrastructure/facilities/M&P are required for POH/IOH of LHB coaches. Audit reviewed the status of availability of infrastructure in workshops over Indian Railways. Audit analyzed whether the infrastructure was adequate for POH/IOH and other maintenance activities of LHB coaches. Zonal Railway wise Audit findings are discussed below:

Central Railway – The work of creation of facilities for maintenance of LHB coaches in Parel workshop was sanctioned in 2017-18 at a cost of ₹ 88.14 crore. Later, Railway Board gave (October 2017) in-principle approval for the closing of Parel workshop for provision of passenger terminal facility. The facility for POH of LHB coaches was not available in Central Railway. Accordingly, CR proposed (January 2018) the work of setting up of POH workshop for 100 LHB coaches per month in Nagpur Division. Railway Board's sanction for the same was yet to be received. At present, LHB coaches are sent to Lower Parel Workshop of WR.

In reply, Railway Board stated (20 June 2019) that it was decided to create facilities for maintenance of LHB coaches in CR's Matunga Workshop, Mumbai. They also stated that proposal for work of setting up of POH workshops in Nagpur division would be sanctioned after presentation of regular budget of 2019-20. However, till the creation of maintenance facilities at Matunga, LHB coaches continued to be sent to Lower Parel Workshop which would increase the burden of existing Workshop.

Eastern Railway – Liluah Workshop is the only carriage maintenance workshop where POH of LHB coaches are undertaken. Only infrastructure development work

⁴³**Intermediate overhauling (IOH)** is done every nine months in the nominated Coaching Depots and **Periodical Overhauling (POH)** is done every 18 months in Workshops. During IOH & POH, the coaches are critically examined for corrosion, structural damage, stability and ensuring the fitness of the coaches for its safe run. The coaches are being put into service only after ensuring compliance with maintenance standards.

(facilities for overhauling of new generation coaches including 26 m long coaches) was completed in December 2015. Works of modernization of workshop, included creation of infrastructure for 24 m long LHB coaches was sanctioned in 2008-09. Physical progress of these works was only 65 *per cent*. Another work viz., capacity augmentation work for maintenance of 30 LHB coaches per month was sanctioned in 2012-13. The physical progress of this work was only 29 *per cent* as of November 2018. In reply, Railway Board stated (20 June 2019) that modernization and capacity augmentation works at Liluah were being closely monitored. The target of POH of LHB coaches has been enhanced to 562 coaches this year from 372 coaches last year. They further stated that another work for creation of facility for POH of LHB coaches has been sanctioned at ER's Kanchrapara workshop. Railways need to complete the augmentation work of existing workshop and creation of facilities in new workshops within a prescribed time frame to cater to the existing requirement of POH of LHB coaches. This would also ease the burden of existing Liluah Workshop.

East Central Railway - Carriage Repair Workshop/ Harnaut is the only workshop in ECR. The works of developing infrastructure for POH of wheel set for LHB coaches and developing facility for IOH of LHB and ICF bogies were sanctioned in 2017-18 and 2018-19 respectively. However, no significant progress was noted as of September 2018. At present, the Workshop is carrying out POH of only non-AC conventional coaches. This zone has holding of 654 LHB coaches and for POH, LHB coaches were being sent to Liluah Workshop of ER and Gorakhpur Workshop of NER.

In reply, Railway Board stated (20 June 2019) that ECR was being followed to get the execution of augmentation works of Harnaut workshop expedited. Railway Board needs to keep monitoring for early completion of work. This would avoid operating expenditure on empty haulage of LHB coaches for POH to Liluah and Gorakhpur Workshops.

Northeast Frontier Railway –There are two workshops at New Bongaigaon and Dibrugarh Town in NFR. The facilities for POH of LHB coaches did not exist in these workshops. The work related to facilities for POH of LHB coaches was sanctioned in 2013-14 in Dibrugarh workshop. The work was still under progress

as of August 2018. In New Bongaigaon Workshop, the work of improvement of infrastructure for creation of Refurbishing of LHB coaches was sanctioned in 2018-19. The work was at tendering stage. In reply, Railway Board stated (20 June 2019) that the works in Dibrugarh workshop was in advance stage with 95 *per cent* physical progress as of April 2019. They further stated that work for setting up of new Bongaigaon workshop was started in December 2018. Railway needs to expedite completion of these works at the earliest.

Northern Railway – NR has two workshops viz., Jagadhari and Alambagh. The number of holding of LHB Coaches has been increased from 514 in 2012 to 1,463 in 2018. Accordingly, infrastructure of Plant and Machinery has been augmented in Jagadhari workshop to increase the capacity of POH of LHB Coaches from 20 to 35 coaches per month. However, important machines like Shot/Sand Blasting Plant required for Bogie Frame and Components, Bogie load testing machine and Rail-cum-road vehicle for shunting have not been provided. The Alambagh workshop does not have the facility and infrastructure for maintaining LHB coaches.

In reply, Railway Board stated (20 June 2019) that in addition to the existing two workshops, another workshop has been sanctioned at Sonipat for POH and refurbishment of LHB coaches. They further stated that facilities to cater POH of LHB coaches have been developed at Jagadhari Workshop. However, no mention was made about creation of maintenance facilities for LHB coaches at Alambagh Workshop.

North Western Railway – NWR has two workshops viz. Ajmer and Jodhpur. In Ajmer workshop, there was shortage of one hydraulic material carrying and lifting system and one single car testing for air brake system (Fixed). This hampered the maintenance of LHB coaches as per plan. Further, POH facility of LHB coaches is not available in Jodhpur workshop. In reply, Railway Board stated (20 June 2019) that facilities have been developed at Ajmer workshop. In the current year target of POH of 190 coaches has been given in comparison to target of 112 coaches last year. However, they have not responded on the non-availability of facilities in Jodhpur workshop.

South Central Railway - The POH facilities for LHB stock exist only in Lallaguda workshop. All the LHB stock from all the divisions of the zone are being sent to this

workshop for POH. The work for augmentation of Carriage Repair Shop, Tirupathi for POH of LHB coaches was sanctioned in 2017-18. However, the work could be started only in November 2018. In reply, Railway Board stated (20 June 2019) that the augmentation work at Tirupathi was under progress and a target of 55 coaches has been given for the current year. Railways need to expedite this work to enhance the POH of LHB coaches.

South Eastern Railway – There is only one workshop in SER at Kharagpur. No project in connection with augmentation of capacity of the workshop was taken up during last five years. However, a work was proposed in 2017-18 for development of infrastructure, Plant and machineries required for POH/IOH/Maintenance of LHB coaches, However, the same was yet to be sanctioned (November 2018). In reply, Railway Board stated (20 June 2019) that the work has been approved at a cost of ₹ 29.60 crore. A target of POH of 48 coaches has been given for the current year. Railways need to expedite this work to enhance the POH of LHB coaches.

Southern Railway – POH of LHB coaches of SR is being carried out in Carriage Works/Perambur. Further, a work related to shed for POH of 300 to 400 LHB coaches per year was sanctioned in 2016-17. The work was to be executed by Construction Organisation of SWR. This was later assigned to SR in August 2018. The work was still in its initial stage. No infrastructure facility for the same was created at Central Workshop/ Golden Rock (GOC) of SR. A work “GOC workshop – POH facilities for maintenance of LHB coaches” has been recently sanctioned by Railway Board in August 2018. In reply, Railway Board stated (20 June 2019) that the construction activities as well as procurement of M&P were in progress and was closely monitored. Railways need to expedite this work to enhance the POH of LHB coaches.

South Western Railway – No specific infrastructural works were taken up for maintenance of LHB coaches. The facilities existed such as sick lines⁴⁴, which are capable for maintenance of LHB coaches. Further, a work of ‘Augmentation of

⁴⁴**Sick line** is the workshop for the major and periodical maintenance of the coaches. It consists of modern facilities like pit for working under frame and crane for separation of coach & bogie for repair of all type of defects. Sick line is generally provided in the vicinity of the coaching depots and is provided with requisite machinery and plants including facilities for lifting of coaches.”

POH Capacity of Mysore Workshop in Ashokpuram' was sanctioned in 2016 the contract for which could be awarded only in June 2018. The work was in its initial stage. In reply, Railway Board stated (20 June 2019) that works have been undertaken for creation of facilities for POH of LHB coaches in both Mysore and Hubli workshops. However, it was not indicated that by when these works would be completed. Railway needs to expedite these works to cater to the increasing demand of POH of LHB coaches.

Western Railway – The POH facilities of LHB coaches exist in Lower Parel workshop. Further, a work of capacity augmentation of POH of LHB coaches from 15 to 30 coaches per month was sanctioned in 2012-13 for Lower Parel Workshop. The work was to be completed by March 2015. After lapse of six years, civil works like construction of Pit line and service building works could not be completed (31 January 2019). Further, provision of electric fittings and power supply were in tender stage. In reply, Railway Board stated (20 June 2019) that the work was at an advance stage with 77 per cent physical progress and expected to be completed during 2019-20. Railways need to expedite this work to enhance the POH of LHB coaches.

South East Central Railway – None of the Workshops in SECR have the facility for POH of LHB coaches. LHB coaches are sent to workshops of other Zonal Railways⁴⁵ for maintenance. These are located at a distance of 512 to 1403 kms from Bilaspur Coaching Depot. In reply, Railway Board stated (20 June 2019) that coach POH facilities were being developed at Motibagh workshops in Nagpur. Railways need to expedite this work to enhance the POH of LHB coaches.

West Central Railway – None of the Workshops in WCR have the facility for POH of LHB coaches. For this purpose, Ajmer and Jodhpur workshop of NWR have been nominated. These workshops are at a distance of 899 kms and 1,048 kms respectively from Jabalpur Depot. In reply, Railway Board stated (20 June 2019) that a proposal has been received for creating LHB coach POH facilities at the existing Coach Rehabilitation Workshop at Bhopal and it is under consideration.

⁴⁵Perambur Workshop (SR), Kharagpur Workshop (SER) and Mancheswar Workshop (ECoR) - located at 1403 Km, 610 Km and 512 Km respectively from Bilaspur Coaching Depot

Railway needs to expedite this work to avoid empty haulage of LHB coaches to other workshops.

North Central Railway - There is no workshop for maintenance of LHB coaches in NCR. For POH, LHB coaches are sent to Ajmer Workshop of NWR from Allahabad and Kanpur coaching depots. This workshop is at a distance of 627 kms and 823 kms from Allahabad and Kanpur coaching depots respectively. In reply, Railway Board stated (20 June 2019) that coach POH facilities are being developed at Jhansi workshop. Railway needs to expedite this work to avoid empty haulage of LHB coaches to other workshops.

Thus, Indian Railways are in the process of developing adequate facilities in their workshops for POH/IOH of LHB coaches. In some workshops, the POH/IOH of LHB coaches was carried out, but the facilities need to be augmented to handle the increase in number of LHB coaches. Further, the works taken up for augmentation of facilities for maintenance of LHB coaches were either taken up recently or wherever taken up earlier are still in progress. As a result, the LHB coaches were to be sent to other workshops. This resulted in extra time as well as empty haulage of coaches.

In reply, Railway Board stated (20 June 2019) that in order to accommodate increased POH arising, facilities are being created in all major workshops and are closely being monitored for timely completion. They further stated that works to create additional POH capacities of about 2,200 coaches annually are under progress in different workshops.

2.5 Conclusion

Indian Railways has been carrying passenger traffic mainly through conventional coaches of ICF design. These coaches have certain limitations in terms of their speed potential, riding comfort as well as safety in case of accidents. These coaches are also prone to early wear and tear and their under gear corrodes quickly being made of iron. To overcome these limitations, LHB coaches were introduced in Indian Railways in 2003. These coaches made of stainless steel are far superior in respect of the speed at which they can run, provide better riding comfort, safer in case of accidents, easy to maintain and aesthetically better.

Audit observed that share of LHB coaches in total coach fleet of Indian Railways was 12.59 *per cent* (as of March 2018) even after 15 years of introduction of LHB coach. High Level Safety Review Committee recommended (in 2012) to convert ICF rakes to LHB rakes for all the trains having 18 or more coaches and with a capacity to run at a maximum speed of 100 kmph or more. However, 903 such rakes of ICF conventional coaches are still being run. Running of rakes with longer coach formation at high speed exposes the passengers to the risk of unsafe journey. Despite having serious safety risk as assessed by the High Level Safety Review Committee, the pace at which ICF rakes are being converted to LHB rakes, was very slow. The current pace of production was around 2000 LHB coaches per year. As such, it would take Indian Railways at least eight years to convert these 903 rakes (assuming the composition of 18 coaches) to LHB rakes. Audit also noted that Railway Board did not allot required number of LHB coaches to Zonal Railways. Coaches were allotted in piecemeal, as a result rakes could not be formed and coaches were lying unused till appropriate numbers of coaches were allotted.

Audit noticed that out of 49,033 ICF conventional coaches, 609 coaches have already attained their codal life of 25 years as on 31 March 2018. Further, about 13 *per cent* coaches (6,259 coaches) were between the age of 20 and 25 years and would need to be replaced in the next five years. Running of over aged coaches in the railway system has adverse impact on passenger safety.

Audit examined the availability of infrastructure in coaching depots where day to day maintenance of LHB coaches is required to be undertaken. Audit noticed lack of adequate infrastructure in 19 depots while in 12 depots, stock of spare items was not being properly maintained. Audit also examined the availability of infrastructure and facilities required in workshops for Periodical Overhauling (POH)/ Intermediate Overhauling (IOH) of LHB coaches. Audit noted that creation of adequate facilities in the workshops for POH/IOH of LHB coaches in a number of Zonal Railways is work-in-progress. There were also inadequate maintenance facilities in some workshops. As a result, LHB coaches were to be sent to other workshops. This resulted in extra time as well as empty haulage of coaches. In

some workshops, where the POH/IOH of LHB coaches is carried out, the capacity needed to be augmented in view of the increase in numbers of LHB coaches.

Thus, there was lack of adequate pace in production of LHB coaches and non-creation of adequate production facilities in MCF, Kancharapara and Singur units. This impacted the achievement of stated objective of switch over to LHB rakes. Further, inadequate maintenance facilities in depots and workshops also impacted effective and timely maintenance of LHB coaches.

2.6 Recommendations

- 1. Indian Railways need to examine the need to speed up the production of LHB coaches, and ancillary facilities required, if they plan to achieve complete switch over to LHB variant coaches.*
- 2. Availability of adequate infrastructure and other maintenance facilities need to be ensured in the coaching depots and workshops for timely and effective maintenance and POH/IOH of LHB coaches.*



New Delhi

(ROY MATHRANI)

Dated: 14 February 2020

Deputy Comptroller and Auditor General

Countersigned



New Delhi

(RAJIV MEHRISHI)

Dated: 14 February 2020

Comptroller and Auditor General of India