

Types of Rolling stock

Production/Repair/Maintenance practices of same

STC/NBQ/NFR

Following are the main categories of Rolling Stock

1. Locomotive
2. Coaches
3. Wagons
4. DEMU
5. EMU/MEMU

The following are main components repair and maintenance by Rolling Stock Department-

1. **Under Frame** : Made out of steel members of channel, Angle or required section. These members are joined together by riveting or welding, capable to accommodate all other components and to withstand the load and other forces acting on it while on the run.
2. **Running Gear** : Consists of pair of wheels connected firmly by an axle with a provision for a bearing at both ends and its housing and guide arrangements. Cartridge bearings are used of late which are more reliable and require no lubrication.
3. **Spring Gear** : Cushioning arrangements between the Wheel (Axle) and the body of the Rolling Stock to absorb the vertical shocks coming to the wheel while on the run due to unevenness in the track and also to transmit the load vertically from body to Axle. There are laminated bearing springs (Self damping) and coil spring with separate damping arrangements (Shock absorbers) used in rolling stock. The spring arrangement in a Rolling stock is generally called as suspension system. In case of Goods stock only one suspension is provided – Primary or Secondary. In case of coaching stock both primary and secondary suspensions are provided to give more comfortable ride.
4. **Draw Gear** : An arrangement provided in the Rolling Stock at its both ends at the centre to couple several rolling stock together and to make a string of such Rolling Stock in a formation and to haul the formation as one unit by the Train Engine draw gear arrangement is provided. A drawbar hook with a set of screw coupling and straight “U” shackles and coupling screw rod, two drawbar with springs and cotter are assembled at both ends of the rolling stock at its centre. The “U” shackle of the screw coupling is put on to the hook of the adjacent wagon or coach and tightened with the screw rod thereby transmitting the draft force to the rear through the under frame members. To haul heavy loads we have developed high capacity draw gear – Centre Buffer Coupler (CBC) It is important that the draw gear arrangement permits gradual increase of draft force to the locomotive while starting the train from the stabled position and transmitting the draft at the time of acceleration of the locomotive to attain higher speeds.
5. **Buffing Gear** : To absorb the linear forces coming into the Rolling Stock while on run and during shunting, buffers are provided at the end body at both sides. This consists of two buffer casing fitted at headstock at sides and a plunger with a coil spring or hard rubber pads inside is assembled into this casings and secured. The buffer plunger projecting at the ends will come in contact with the adjacent rolling stock and will absorb the linear shocks coming to the headstock while on run and during shunting thereby protecting the under frame and body from heavy shock. In the advanced Rolling stock the draw gear and buffing gear are combined together and made as one unit which is called as Centre Buffer Coupler (CBC) which is provided at the headstock at

its centre. It serves both the purpose of draw gear and buffing gear. In case of MG a Centre Buffer Coupler with hook and yoke end known as ABC (Automatic Buffer Coupler) is used.

6. Brake gear : Brake gear is an arrangement to retard the momentum of a Rolling Stock. Brake gear applies a force on the rotating wheel thereby retarding the motion of a rolling stock. It comprises of pull rod, levers and links, brake beam and brake block. The force developed for brake application maybe manual, vacuum system or by compressed air depending upon the type and design of brake system in the Rolling Stock.

7. Body and other Fittings: Over the under frame body is built according to the nature of utilization of the Rolling stock utilization – goods or passenger carrying etc. Floor, side body, end body and doors, securing arrangements for goods stock, and other items like seats, berths and amenity items like fan, lights, toilets, Air Conditioning and others are provided according to the requirements of rolling stock.

Maintenance Schedule of Rolling Stock:

1. Trip Schedule : After every trip
2. Monthly Schedule: 1 month $\pm$ 3 days
3. Quarterly Schedule: 3 months $\pm$ 7 days
4. Half Yearly Schedule
5. Yearly Schedule
6. I O H – 9 months
7. P O H – 18 months
8. Special Schedule : As prescribed by each railway

Production units: Brief History, Activities

IR has 6 established Production Units manufacturing more than 600 Diesel & Electric locos and more than 3000 coaches per year.

1. CHITTARANJAN LOCOMOTIVE WORKS:

Indian Railway's first Production Unit established on November 1, 1950.

Manufactured steam locomotives till 1972.

Diesel Hydraulic locos were produced till 1993 Electric loco manufacture commenced in 1961.

Transfer of Technology contract signed with M/s Adtranz to turn out the first indigenously manufactured 3 phase 6000 HP locomotive in 1998.

CLW now manufactures 5 types of passenger and freight loco variants ranging from 5000 HP to 6000 HP: WAG7, WAP4, WAP5, WAG9, WAP7.

2. DIESEL LOCOMOTIVE WORKS, Varanasi:

Shri Lal Bahadur Shastri, the Prime Minister, flagged off the first locomotive from DLW on February 3, 1964.

DLW started manufacture of diesel locomotives for main line as well as shunting services in both BG & MG variants, in technical collaboration with American Locomotive Company (ALCO).

First Locomotive of 2600 HP manufactured in 1964. This WDM2 locomotive of DLW had been the main workhorse of Indian Railways till the 1990s. 2600 HP locomotive was upgraded in-house, with minimal inputs, to 3100 HP variant in 1995 and then in-house to 3300 HP in 2003 with Microprocessor based control systems with indigenous effort.

First 4000 HP locomotive turned out in 1999 with Transfer of Technology from General Motors. It has Computer controlled brakes, Microprocessor based control system etc. and are more reliable and efficient than older locomotives.

WDP4 is Fit to run at 160kmph. 4500 HP Locomotive Upgraded in-house from GTO to state-of-the-art IGBT based AC-AC Traction System. This is now the main product of DLW. BHEEM - a 5500 HP prototype freight loco WDG5 - the most powerful indigenously developed diesel loco - with state-of-the-art technology. DLW has exported Locomotives to Angola, Bangladesh, Mali/Senegal, Malaysia, Mozambique, Myanmar, Sri Lanka, Sudan, Vietnam etc.,

3. Integral Coach Factory: Set up at Perambur in 1955 in collaboration with Schlieren, Switzerland. ICF Builds several types of coaches with low alloy corrosion resistant steel as per an integral anti-telescopic design. ICF manufactures Regular Passenger Coaches, Kolkata Metros, EMUs&DEMUs of various capacities. LHB Coach Manufacture commenced in 2014-15. ICF turned out its first complete state-of-the-art LHB coach in September 2014. Complete switch over to Production of Stainless Steel LHB main line coaches planned in the next 5 years. Facility set up to manufacture 300 LHB coaches per annum. ICF exports passenger coaches to various countries like Vietnam, Zambia, Philippines, Taiwan, Angola, Mozambique, Bangladesh, Nigeria. ICF won International “Golden Green Award” 2014 for sustainable green energy initiatives.

4. RAIL COACH FACTORY, Kapurthala: RCF is set up in 1988. The most modern factory of Indian Railways of its time, developing latest designs of coaches. RCF has advanced manufacturing and design facilities and is equipped with robotic welding machines and a cluster of 70 CNC machines. Transfer of Technology with GE-ALSTOM – LHB Germany for manufacture of new LHB type coaches with stainless steel body, superior passenger amenities and higher speed and safety features. RCF is Established to manufacture Indigenously built LHB Coaches fit to run at 160kmph that are upgradable to 200kmph.

5. DIESEL LOCO MODERNISATION WORKS, Patiala: Set up in 1983 with World Bank aid as Diesel Component Works. Manufactures 200 high precision components and sub-assemblies for WDM-2 locomotives. Midlife Rebuilding of Diesel Locomotives after a service life of 18 years started in 1989, is renamed as Diesel Loco Modernisation Works in 2003 to signify the modernisation of Diesel Locomotives being done. After Rebuilding loco is ‘as good as new’ with all latest modifications and incorporation of most recent technology. DMW has also started manufacture of ALCO type locomotives in 2011-12.

6. RAIL WHEEL FACTORY, Bengaluru: RWF is Set up at Yelahanka in 1984. A wheel cast every 2 minutes, an axle forged every 4 minutes. Only unit producing Wheels, Axles and W/Sets under same roof. Adopted the upward pressure pouring cast wheel technology. Precision axle manufacture facility equipped with long forging machines with multiple hammers and high productivity axle machining centres, turning out about one lakh axles per year. RWF Manufactures about 2 lakh wheels per year for locos, coaches and wagons.

7. Central Organisation for Railway Electrification – Allahabad, UP

8. Rail Coach Factory- Raebareli, UP-- New LHB type coaches

9. Rail Wheel Plant – Chhapra, Bihar -- Producing Wheels

10. Diesel Component Factory, Dankuni, West Bengal- Manufactured Diesel Components