ROMD (Role of Mechanical Department)

Corporate Objectives of Indian Railway:

The corporate objectives of Indian Railways are:

a. To provide rail transport for both passenger and goods adequate to meet demand in areas where Railway operation confers optimum benefit to the economy, having due regard to the Government's policy of development of backward areas ;

b. To provide such rail transport at the lowest cost consistent with
   i. requirements of the Railway users and safety operations
   ii. adequate provision for replacement of assets and some provision for development of business and
   iii. the least amount of pollution of the environment;

c. To work in association with or utilize other modes of transportation, such as pipelines and road transport, and to engage in ancillary activities necessary to sub-serve the above two objectives.

d. To establish a corporate image of the Railways as being an up-to-date business Organization With the interest of the public and of the nation as its prime objectives ; and

e. To develop organizationally effective personnel with pride in their work and faith in the management.

Role of Mechanical Department:

Mechanical Department is primarily assigned with the responsibility for Design, Manufacture, deploy and maintain the Rolling Stock of Indian Railways. For certain specific areas of Rolling Stock maintenance, this responsibility is assigned to Electrical Department also. The mission areas for this activity are:

a. Evolving optimal designs for Locomotives, Coaches and freight wagons, choosing the most economical option on a “life cycle basis”

b. Manufacture of the rolling stock Production units or external Manufacturing Units to stringent standards in a cost effective manner

c. Maintaining the moving assets ensuring that they give optimal operational efficiency and safety throughout their full codal life.

d. Planning, procurement and maintenance of Machinery & Plant.

e. Ensuring realization of the full potential of the assets.

f. Adopting and maintaining the best practices in the industry with excellence in all areas of operation.

g. Arranging relief and rescue in any unlikely event of Railway disasters.

While pursuing the above mission, the orientation of Rolling Stock Production/Maintenance Department should remain in complete consonance with Corporate Objectives of Indian Railways.

Organisation of Indian Railway:

The organizational structure of the Rolling Stock production/maintenance Department is driven by the manufacture and maintenance philosophy of rolling assets and is shown in the table below. While the manufacturing practices in the Workshops are shaped by the strategies that characterize the internationally acclaimed World class industries, the maintenance philosophy balances between the two extremes of –

a. Corrective maintenance: running the assets non-stop and attend only when they break down- thus enhancing availability at the cost of reliability.
b. Preventive maintenance: withdrawing from traffic for frequent and prolonged maintenance attention, enhancing reliability at the cost of availability.

Choosing a mid course between the two, Indian Railways contain the ineffective hours within the stipulated targets by restricting frequency and duration of preventive maintenance schedules. Emerging technologies with fit and forget components, enhanced quality conscience and principles of predictive maintenance further help in reducing the quantum of preventive maintenance with higher and higher levels of availability.

	Activities	Function of
a.	**Evolve specifications and designs of the Locos and rolling stock and choosing the most economical option on a "life cycle basis".**	**Railway Board and RDSO**
b.	**Manufacture**	**Production Units, Zonal Railway Workshops and external manufacturers**
c.	**Periodical major overhauls and mid life rebuilds (MLRs)**	**Zonal Railway Workshops and MLR shops**
d.	**Top overhauls and minorschedules, Intermediate androutine overhauls**	**Locomotive sheds and the carriageand Wagon depots**
e.	**Cleaning, topping up supplies, yard or pit line examination attention**	**Locomotive sheds and the carriage and Wagon depots, fuel pads and outstation depots**

Railway Board and RDSO:

Various directorates in Railway Board in charge for specific areas of rolling stock viz., traction, coaching including EMU, Freight, Workshops & Development functions, not only stipulate the philosophy for manufacture and maintenance, but also keep a close watch on the performance of the Railways. The motive power, coaching including EMU, wagon and testing directorates in the RDSO act as the depository of all technical knowledge in their respective domains and issue technical directives to the Production Units and zonal Railways, balancing between maintainability and ease of manufacturing.

Production Units:

Production units are headed by General Managers/Chief Administrative Officers (CAO) assisted by Heads of Departments in Mechanical, Electrical, Accounts, Engineering,Security, Stores and Personnel Departments at appropriate level. Since design and quality are very important, there shall also be Chief Design Engineers.

The General Manager of Zonal Railway is the head of the administration and the organization. In discharge of his duties he is, assisted by a number of Principal Officers who are departmental heads of their respective departments.

Rolling Stock Maintenance Organization in Zonal Railways: The Principal Chief Mechanical Engineer (PCME) is the Principal Head of the Mechanical Department reporting directly to the General Manager. His important function is maintenance of the rolling stock and other mechanical equipment of the Railway in good repair, as on this depends the safety and reliability of railway transportation to a very large extent. To enable him to carry out this duty, Mechanical Department of the Railways have within their control one or more workshops, in which locomotive, carriages & wagons are periodically examined, repaired and overhauled before being placed back on the line. Day to day maintenance of the rolling stock is done in Locomotive Sheds, Coaching Depots, freight depots or other outstation maintenance points, all forming part of the divisional set up. The CMEs assisted by heads of departments as shown below:

Zonal Railways:

a.**Chief Workshop Engineer (CWE):** The direct control on the affairs of the workshops in the Zonal Railway is exercised by the "Chief Workshop Engineer" who is the administrative head of the department for workshops. In all matters relating to policy formulation which concerns workshops in general and the Mechanical Department in particular, the CWE issues instructions in consultation with the CME, who is the Principal Head of the Department. Responsibility for budgetary controls in the workshop rests with the CWE.

b.**Chief Motive Power Engineers (CMPE**) - CMPEs exercises technical control over the maintenance of diesel locomotives in Locomotive sheds and shops and ensure

i. On line performance of the locomotives are above the levels fixed by Board from time to time, especially relating to reliability and availability.
ii. MLR, POH and other preventive maintenance schedules on the Locomotives are carried out in time and to prescribed quality standards.
iii. Supplies (fuel, sand, water, oil etc) and spares are arranged for the Locomotives in sheds and outstation depots
iv. Locomotive and crew links are made to maximize utilization without jeopardizing maintenance and safety.
v. Crew management including timely recruitment and training, running rooms and other operational safety related items
vi. Cadre management for maintenance staff including timely recruitment and training.
vii. Disaster management including readiness and battle worthiness of Breakdown Cranes and other equipment.

c.Chief Rolling Stock Engineers (CRSE) - CRSEs exercises technical control over the coaching depots and freight depots as also C&W activities in yards and outstations. Depending upon the levels of passenger or freight traffic handled by a Railway there may be one or more CRSEs posted exclusively for Coaching or Freight. CRSEs ensure that

i.Availability and reliability of the Rolling stock are above the levels fixed by Board from time to time.
ii.MLR, POH and other preventive maintenance schedules on the Locomotives and breakdown cranes and trains are carried out in time and to the prescribed quality.
iii.Ready availability of spare parts and supplies for Rolling stock in sheds and outstation depots

iv.Rake links are made to maximize utilization without jeopardizing maintenance and safety.
v.Cadre management for maintenance staff including timely recruitment and training.

d.**Chief Planning Engineer** : The CME (Planning) assists the CME in all matters pertaining to Investment Planning i.e. requirements of Rolling Stock, Machinery and Plant and infrastructure creation under Works Program for PUs, Workshops and Sheds). These are planned under Plan Heads 21, 41 and 42 respectively of Demand No 16.

These HODs are assisted by Dy.CMEs, EMEs/SMEs & ADMEs in Headquarters.

Note: In consultation with CME, the activities listed above could be assigned/ shuffled among the various HODs of Mechanical Department.

Electrical Department has a similar set up of Rolling Stock maintenance wings, functioning under Chief Electrical Engineer as the head of the Electrical Department, reporting directly to General Manager. Separate wings headed by HODs of Electrical Department look after maintenance of EMUs and electric locomotives separately with field organizations consisting of maintenance sheds functioning under them. Duties and responsibilities of concerned officers of electrical department are detailed in Indian Railways Manual of AC Traction.

Workshops

Zonal Railway workshops:

The main locomotive workshops of the railway may be either situated at the same station as the main carriage and wagon workshops or at different stations. In addition to the repairs and reconditioning of rolling stock and of plant and machinery, and manufacture of the spare parts for the repair thereof, these workshops may carry out work of the nature shown below: —

a.Construction and assembly of—
i.Locomotives.
ii.Coaching Vehicles,
iii.Goods Vehicles.
b. Manufacture of articles required by other departments of the Railways. c. Manufacture or repair of rolling stock or components for—
i.Other Government Department.
ii.Other zonal Railways/Production units,
iii.Others.

Chief Workshop Manager (CWM)

The Chief Workshop Manager is posted as the officer in charge of the workshop.
All the officers posted in the workshop will be under his direct administrative control analogous to that Divisional Railway Managers.

Chemist and Metallurgist

In one or more of its workshops, each Railway zone shall have a specialized Central Material Technology (CMT) Laboratory with expertise on the following aspects:

a. Testing and quality control (TQC): Testing chemical, physical, and mechanical properties ofmaterials. The TQC should adequateinfrastructure such as metrology, hardness testers organic and inorganic lab, testing of oils and fuels, optical microscope with, imageanalyzer,UTMetc
b. Technical investigations including failure analysis (TIFA): Expertise in fracture metallurgy and tribology; ability to differentiate between service and process failures and suggest preventive measures.
c. Non destructive testing (NDT): To undertake testing and certification- keep abreast of NDT technologies and maintain documentation.
d. New materials technology (NMT): Develop facilities and knowledge to test the new materials such as polymers, composites, ceramics, additives, amorphous metals, insulating materials, etc. and to help the shed or shop exploit their special qualities to upgrade the materials and processes.

The officers (Chemists and Metallurgists) working in these specialized laboratories in Workshops and those working in the running sheds and depots aid in quality control in manufacturing and maintenance, involving special knowledge of modern chemical and metallurgical techniques. They will also help in failure analyses. The Chemist and Metallurgist who is in overall command of the Laboratory will report to the CWM or the officer in charge of the shed or depot, as the case may be.

Workshop Personnel Officer

The open line workshops have an establishment branch under a Personnel Officer (at an appropriate level decided by the Chief Personnel Officer) working under the direct control of Chief Workshop Manager in matters of day to day working, but taking policy directives from Chief Personnel Officer of the Railway. One of his main duties is to attend to all affairs regarding staff and workshop labour. He is responsible to the workshop for all matters relating to establishment such as recruitment, payment of wages and overtime, grant of leave and passes, complaints, discharges, payment of provident fund, gratuity and compensation, maintenance of service registers and other such records. Staff welfare activities like canteen, management of railway quarters, railway schools, supports & cultural activities are also handled by him.

Planning and Production control

The efficiency of a Railway Workshop or a Production Unit is largely dependent on an efficient planning and production control organization. The broad functions of this department comprise of:

a**.Pre-planning**: Study of drawings and specifications, preparation of cost and details Books for each component; drawing up of lists of raw material or component requirements for ensuring its availability; maintenance of datafor installed capacity; booked load; spare capacity, etc. for each machine group etc.

b.**Drawing office**: Scrutiny of drawings received; preparation of part drawings to facilitate manufacturing operations, designing various jigs and fixtures, templates, gauges, etc. for economical manufacture of components; maintenance of drawings for standard cutting tools etc., placing manufacturing orders on Tool Room, when required, etc.
c.**Planning:** This office plans the activities connected with production to ensure fullest use of the plant and other means of production; It makes all arrangements to work as smoothly and efficiently as possible. The functions of this office are broadly divided as under:

I. **Processing:** The functions include preparation of scroll process sheets indicating sequence of operation, quantity of material to be used,the section or load centre where the operation is to be carried out, the requirement of machine groups, jigs, fixture and gauges, etc.

II. **Rate fixing**: The functions include maintenance of synthetic data for fixing rates (time) for individual operation, indicating allowed time in the process sheet for each of the operation involved; to scrutinize all completed piece work cards, issue of excess time cards etc.

III. **Efficiency**: This section deals with matters of general efficiency of the shops. Its activities comprise of review of existing practices, suggest improvement, keeping constant watch on off cuts and rejected materials lying on the shop floor or stores scrap yard in order to suggest suitable usage of that materials etc.

d.**Production control**: Release of work orders for components assemblies etc. well in advance of the schedule of production; preparation of production schedule and distribution thereof in advance to all concerned for their guidance, arranging with stores departments for reservation of required material before actual release of work orders etc.

e.**Progress office**: This office keeps constant watch of Production of components, assemblies, erection etc. as per schedules laid down, preparation of monthly report of production and their deliveries, keeping liaison with shops and stores departments in the drawal of raw material and finished parts. Intersection and inter-shop movement of components; maintenance of records for number of orders received, orders completed for each batch etc.

f.**Inspection**: To inspect components, assemblies etc. on completion of each operation to ensure conformity to drawings and specifications, bringing to the notice of concerned authorities of deviation from drawings; and specifications for rectification and rejection; certification on the job card, and Route cards regarding quantities passed or rejected in respect of each operation etc. Inspectors are also deployed where ever required in checking materials or assemblies received from suppliers, for conformity to drawings and specifications.

Workshop Security Officer (WSO)

Each workshop shall have a security officer from the Railway Protection Force (RPF) at an appropriate level, as decided by the Chief Security Officer of the Railway.

Mid Life Rehabilitation (MLR):

Except for the mainframe and superstructure of a Locomotive or rolling stock, rest of the components gets invariably renewed or repaired during Periodical overhauls (POHs) in workshops. Thus only the physical life of frame and structure has been central to decisions on codal life of the Locomotives or rolling stock, which once inducted, therefore stay for long years in service (25 to 40 years).

But the technology moves on and today's equipments come with many superior and cost effective features than that of yesteryears. Stand alone equipments are renewed piecemeal, whenever the renewal is warranted; however systems such as engine, propulsion or brake circuits, flooring and upholstery, wagon bodies etc are renewed en-block in line with latest technology in the middle of the codal life. Using this opportunity, the locomotive or rolling stock is also modernized, while getting a new lease of life. The Mid Life Rehabilitations are carried out either in exclusive MLR shops or in nominated Railway Workshops as decided by Board.

Role of POH(Periodical Overhauling)

The safety of the train operations is dependent on proper maintenance of the rolling stock and other assets. These are required to be maintained at the constant intervals for smooth and safe running of the trains. For ensuring optimum performance of rolling stock, Periodic Overhauling (POH) is necessary for the following purpose:-

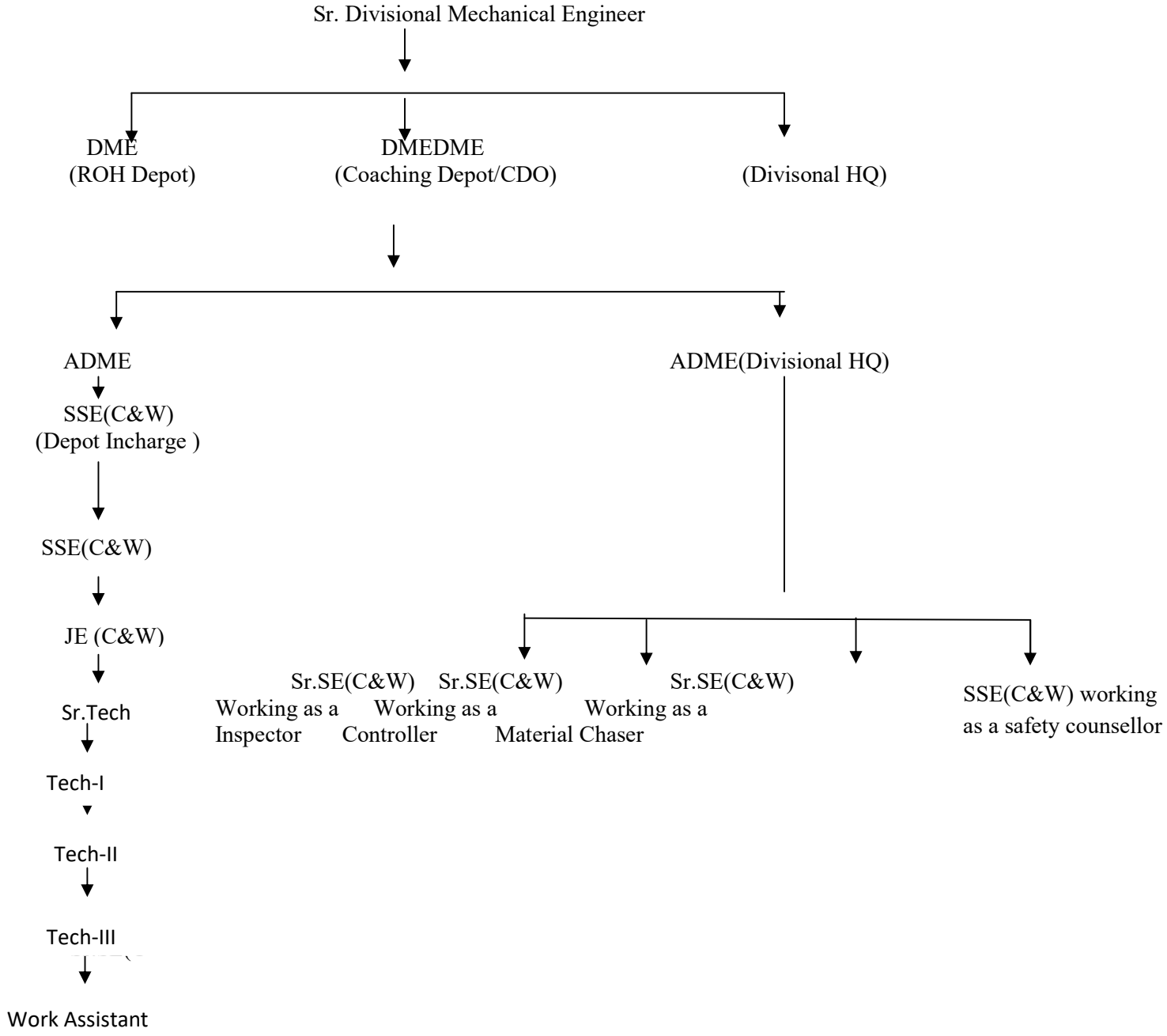
- Preventive maintenance is done timely to avoid occurrence of defects.
- Defects are attended effectively well in time so that the Rolling stock remain fit for traffic use till the next schedule falls due.
- Detention during examination and repairs is kept to minimum.
- Frequent failures of similar nature are studied and necessary modifications/ design changes are effected to eliminate the cause of such failure.

Periodical Overhauling (POH) periodicity of Rolling Stock at various workshops at prescribed intervals as given below:-

Maintenance Schedule of Rolling Stock

Type of rolling stock	**Periodical Overhaul (POH)**	**RoutineOverhaul(ROH) / Intermediate Overhaul(IOH)**
Wagons	4.5 to 6 years	18 or 24 Months
Diesel Locos	8 Years(ALCO),For 18 years for HHP loco	4 Years(ALCO),For 6 years for HHP loco
Electric Locos	6 to 12 Years Or 8 to 18 lakh kms whichever is earlier	3 to 6 years or 4 to 10 lakh kms whichever is earlier
Coaches	18 /24 months	9/12 months

Organisational set up of Mechanical officers and Supervisors of C&W wing in a Division



Duties of Supervisors :

The shop supervisors have a definite function in enforcing/overseeing the under-mentioned aspects:

a. Allocation of work and deployment of Staff.

b. Verification of timely and proper opening and closing of job cards.

c. Enforcing quality through Supervision of work and stage inspections.

d. Ensuring availability of tools and materials.

e. Ensure economy in use of raw materials.

f. Ensure punctuality in attendance, discipline and also presence of workers at the work spot during duty hours.

g. Ensure supply of safety kits to workers and ensure adherence to safety regulations and safe work practices.

h. Ensure timely completion of work as per target set by the management.

i. Ensure proper up-keep and safety of Railway's assets - both immovable and movable.

j. Ensure cleanliness of work premises and ensure good house-keeping by eliminating trash, filth, and foreign matters creating a cleaner workplace.Inculcate cleaning as a form of inspection and establish a clean-up time every day.

k. Ensure correct handling of material so that damage does not occur due to mishandling.

l. Inculcate and maintain proper work culture amongst staff.

m. Design and establish an efficient and neat layout so that one can always get just as much of what is needed and whenever needed.

n. Design of workstations: Design an efficient layout and ensure proper storage of tools, jigs and fixtures, raw materials, spare parts and semi- finished and finished work; and to put things in order (or organize them) according to a specific rule or principle.

o. Ergonomics: To optimise tasks and workstations form the point of view of common place postures and movements such as sitting, standing, lifting, pulling and pushing with least stress on ligaments, joints and muscles of the workmen; and modify them as needed with change of activity or workmen with different anthropometric background.

p. Environment: To create a conducive work environment free from avoidable heat, noise, pollution, vibrations and lack of illumination.

Production Unit of Indian Railways: The Indian Railways network is owned and managed by the Central Govt. All the operations are controlled and directed by the Railway Board under the overall supervision of the Ministry of Railways. The net-work of Railways is divided into eighteen Zonal Railways each under the control of a General Manager. Each Railway zone is organized on the divisional pattern of working.

In addition to above there are Eight Production Units in Indian Railway.They are as follows:

- **Chittaranjan Locomotive Works at Chittaranjan** for manufacture of various types of electric locomotives.
- **Diesel Locomotive Works at Varanasi** for manufacture of various types of Diesel Locomotives, Diesel Engines,Stand by Generating sets and their spares.
- **Integral Coach Factory at Perambur** for manufacturing of coaching stocks of various types and their spares.
- **Rail Coach Factory at Kapurthala** for manufacturing of coaching stocks of various types and their spares.
- **Rail Wheel Factory at Yelahanka** for manufacture of various types of wheels,axles and wheel sets.
- **Modern Coach Factory at Raebareli** for manufacturing of coaching stocks of various types and their spares.
- **Diesel Loco Modernisation Works at Patiala** for Midterm Rehabilitation and Modernization of Diesel Locomotives and manufacture of critical spares.
- **Rail Wheel Plant at Bela** for manufacture of wheel.

There are different types of undertakings in Indian Railway. They are as per follows:

(i) **RAIL INDIA TECHNICAL AND ECONOMIC SERVICES LTD** (RITES): This acts as a consultant and provides services lying of Railways, Pipe lines etc.

(ii) **INDIAN RAILWAY CONSTRUCTION COMPANY LTD** (IRCON): IRCON provides services for the projects related to construction of Electrical, Signal, Telecom system, Buildings, Concrete Sleepers etc.

(iii) **CENTRE FOR RAILWAY INFORMATION SYSTEM(CRIS)**: CRIS provides software services to the Railways;

(iv) **INDIAN RAILWAY CATERING AND TOURISM CORPORATION (IRCTC)**: Provides catering / hotel services for the Rly. Passengers.

(v) **INDIAN RAILWAY CONTAINER CORPORATION LTD (CONCOR)**: Carries raw materials;

(vi) **KONKAN RAILWAY CORPORATION LTD (KRCL)**: Provides Rail service ex-Roha(Maharashtra) to Mangalore(Karnataka).