

Workshop Organisation & PCO

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INTRODUCTION: RAILWAY ROLLING STOCK

□ *LOCOMOTIVES*

- **Electrical** Locomotives : WAM4, WAP4, WAP5, WAP7, WAG7, WAG9, WAG12
- **Diesel** Locomotives
 - 1) **ALCO** Locos: WDM2, WDM3A, WDM3D
 - 2) **HHP** Locos: WDP4D, WDG4, WDG4D, WDG5, WDS6, YDM4

□ *Coaching* Stock

- 1) **LHB** coaches : AC, non-AC, Power Cars, Parcel Van, Saloons
- 2) **ICF** coaches: AC, non-AC, Brake Van, Inspection Cars, Camp Coaches

□ **Wagons**: BOXN, BOXNHL, BLC, BCN, BCCN, BTPN etc.

□ **Others**: ART/SPART, ARME/SPARME, SPIC, 140T Breakdown Crane, Tower Cars

INTRODUCTION

- ❖ The Mechanical Department deals with every aspect of rolling stock on IR, including its *production, maintenance, operation* plus *design & innovation*
- ❖ Rolling stock is a *specialized technology* requiring care & regular upgrade
- ❖ It is a *high-value asset requiring regular maintenance over a long term* for optimum performance during its codal life of more than 25 or 30 years
- ❖ Maintenance *schedules* of different classes of rolling stock can be broadly classified, by usage *duration*, from *light schedule to major schedule (POH)* (*Rolling Stock Maintenance Schedules*)

ROLLING STOCK CATEGORY	SHOP MAINTENANCE SCHEDULE		
ICF Coach (AC and non-AC)	IOH – 9 months (bogie repair) POH – 18 months (2 years for first POH)		
DEMU/MEMU	IOH – 9 months (bogie repair) POH – 18 months (2 years for first POH)		
OCVs/SPVs (IOH/POH) *RDSO recommended Feb 2021	Observation Car & ART/ARME	12 / 48 months	
	Camp Coach, Tower Car, RE coach	24 / 48 months	
LHB coach (AC and non-AC)	SS-1	SS-2	SS-3
	18 months	36 months	72 months
BG Wagon	POH – 4.5 years (6 years for first POH)		
Locomotives	POH – 8 years		

SIGNIFICANCE OF POH AND IOH SCHEDULES

- **IOH** = Intermediate Overhaul and **POH** = Periodic Overhaul of rolling stock
- These are **major maintenance schedules** of deep maintenance
- **IOH** – attention to **undergear** (bogie frame, wheels, air brake) and **shell**
- In **POH**, each subassembly is separately disassembled and maintained
- POH involves separate, **individual inspection and repair or replacement** of parts and subparts of various components (**unit exchange**)
- In POH, some **design upgrade** or **amenity refurbishment** is also carried out, e.g. retrofitment of ICF coach with CBC, window and exhaust fan in toilet etc

WORKSHOP FUNCTION

- **CARRIAGE WORKSHOPS**

- **WAGON WORKSHOPS**

- **LOCOMOTIVE WORKSHOPS**

- **OTHER WORKSHOPS**

1. Periodic Maintenance (POH) of Railway Rolling Stocks

2. Intermediate Overhaul (IOH) of coach bogies and wheels

3. Manufacture or repair of rolling stocks or components on special order for—

- i. Other Zonal Railways/Production units

- ii. Other Government Department

- iii. Others

4. Overhaul of rolling stock wheelsets

SIGNIFICANCE OF WORKSHOP

- Workshops conduct *major maintenance schedules* (POH of coaches and wagons, IOH of bogies), retrofitment, modifications, refurbishment, etc.
- Thus, workshops are also the site of some advanced **M&P and T&P**
- In addition, Workshops must *procure and hold material and spares* as required and so are generally attached with a **Stores Depot**
- Workshops generally have a *large coach- or wagon- holding* as WIP
- Smaller units are often dependent upon the Workshop for major repairs
- Workshop can act as an *innovation centre* for IR

LIST OF WORKSHOPS

Railway	Name of the Workshop
1. Eastern Railway	(i) Locomotive Workshop, Jamalpur (ii) Railway Workshop, Kanchrapara (iii) Carriage Workshop, Lilluah (iv) Budge Budge Bogie Workshop, Howrah
2. East Central Railway	(i) Mechanical Workshop, Samastipur (ii) Carriage Workshop, Harnaut
3. East Coast Railway	(i) Carriage Workshop, Mancheshwar
4. Northern Railway	(i) Carriage & Wagon workshop, Alambagh (ii) Mechanical Workshop, Amritsar (iii) Locomotive Workshop, Charbagh (iv) Carriage & Wagon Workshop, Jagadhri (v) Carriage & Wagon Workshop, Kalka
5. North Central Railway	(i) Wagon POH Workshop, Jhansi (ii) Rail Spring Karkhana, Gwalior
6. North Eastern Railway	(i) Railway Mechanical Workshop, Gorakhpur (ii) Mechanical Workshop, Izatnagar

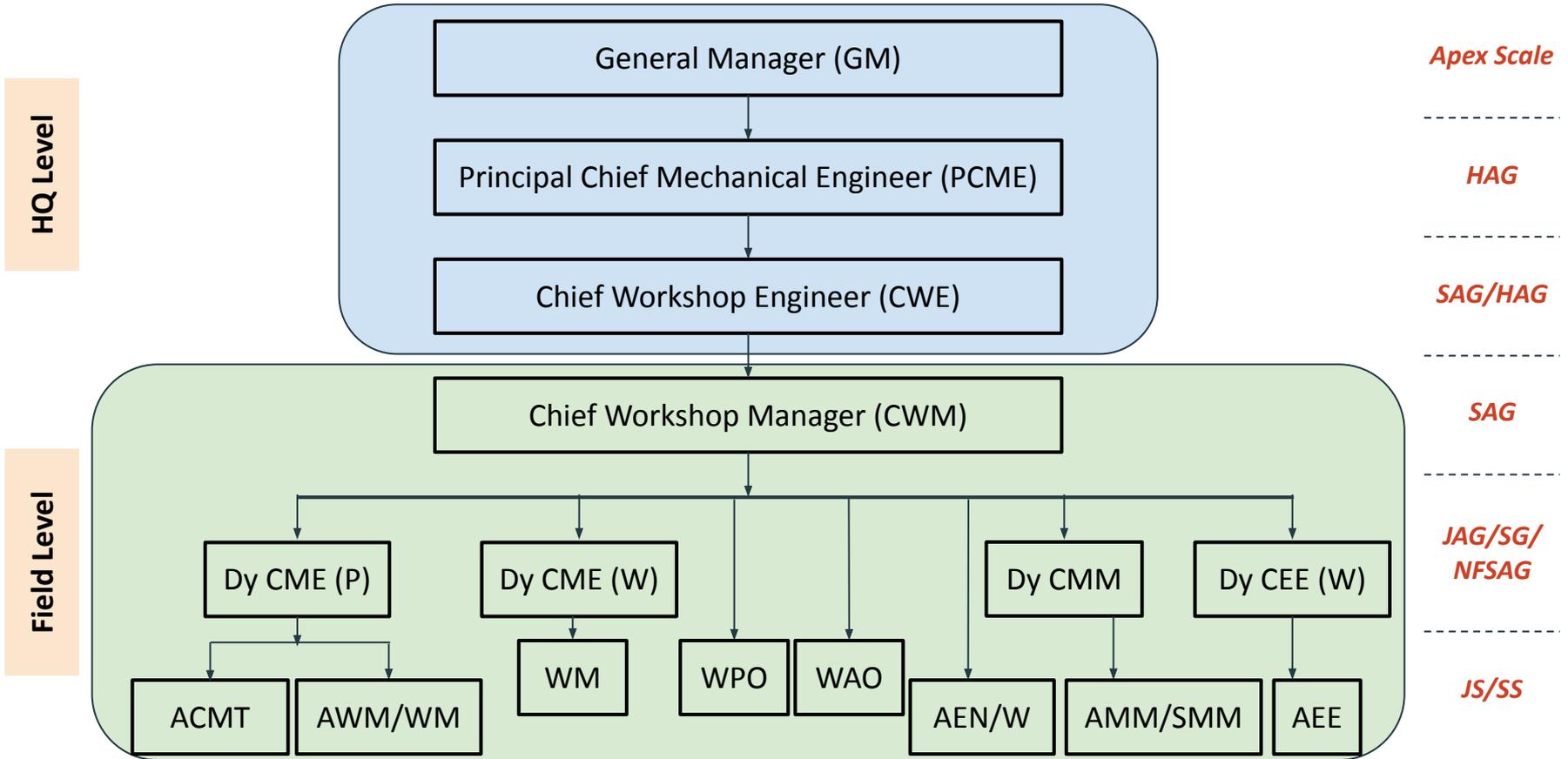
LIST OF WORKSHOPS

Railway	Name of the Workshop
7. Northeast Frontier Railway	(i) Railway Workshop, Dibrugarh (ii) Rly. Workshop, New Bongaigoan (iii) Rly. Workshop, Tindhari
8. North Western Railway	(i) Carriage Workshop, Ajmer (ii) Locomotive Workshop, Ajmer (iii) Railway Workshop, Bikaner (iv) Carriage Workshop, Jodhpur
9. Southern Railway	(i) Locomotive Workshop, Golden Rock (ii) Carriage Workshop, Perambur (iii) Locomotive Workshop, Perambur
10. South Central Railway	(i) Lallaguda Railway Workshop (ii) Carriage Workshop, Tirupati (iii) Wagon Workshop, Guntupalli
11. South Eastern Railway	(i) C&W Workshop, Kharagpur (ii) Diesel Multiple Unit (DMU) Manufacturing Factory, Haldia
7. Northeast Frontier Railway	(i) Railway Workshop, Dibrugarh (ii) Rly. Workshop, New Bongaigoan (iii) Rly. Workshop, Tindhari

LIST OF WORKSHOPS

Railway	Name of the Workshop
12. South East Central Railway	(i) Wagon Repair Workshop, Raipur (ii) Motibagh Railway Workshop, Nagpur
13. South Western Railway	(i) Carriage Repair Workshop, Hubli (ii) Mysore Railway Workshop
14. Western Railway	(i) Bhavnagar Railway Workshop (ii) Loco, Carriage & Wagon Workshop, Dahod (iii) Railway Workshop, Junagarh (iv) Carriage Repair Workshop, Lower Parel (v) Railway Workshop, Mahalaxmi (vi) C&W Workshop, Pratap Nagar, Vadodara
15. West Central Railway	(i) Coach Mid-life Rehabilitation Workshop, Bhopal (ii) Wagon Workshop, Kota
16. Central Railway	(i) Carriage Workshop, Matunga (ii) Locomotive Workshop, Parel (iii) C&W Workshop, Kurduwadi, Solapur

WORKSHOP ORGANISATION



WORKSHOP ORGANISATION: OBSERVATIONS

- One of the Principal Officers (PHoD) of each Railway Administration under the leadership of GM is the ***Principal Chief Mechanical Engineer (PCME)*** who is head of the Mechanical Department
- He is responsible for maintenance and operation of rolling stock and other mechanical equipments of the Railway
- Each Railway has one or more Workshops under the control of its Mechanical Department in which ***Locomotives, Coaches, Wagons and SCVs*** are periodically overhauled in the course of their use

WORKSHOP ORGANISATION: OBSERVATIONS

- Direct control over Workshop affairs at the zonal level is exercised by the **Chief Workshop Engineer (CWE)** as HoD for Workshops
- In consultation with PCME, he issues instructions on **policy matters** and for **technical guidance** to Workshops
- **Budgetary control** of the Workshop rests with the CWE

WORKSHOP ORGANISATION: OBSERVATIONS

- ***Autonomous organizational structure*** with officers & staff of many Departments: ***interdisciplinary*** nature of functioning
- The Chief Workshop Manager (CWM) is an ***interdepartmental head directly responsible to HQ*** and assisted by his own team
- Each departmental head under the CWM handles all matters relating to that department at Workshop level
- The ***CWM*** hence acts as a ***techno-managerial lead and liaison***

WORKSHOP ORGANISATION: OBSERVATIONS

- ***Deputy Chief Material Manager (Dy CMM)***
Responsible for material management to assist Workshop function
- ***Workshop Personnel Officer (WPO)***
Responsible for personnel and industrial relations and assistance
- ***Deputy Chief Accounts Officer (Dy CAO)***
Responsible for assisting CWM in maintenance of Workshop a
- ***Deputy Chief Electrical Engineer (Dy CEE)***
Responsible for different areas of workshop and its functioning
- ***Deputy Chief Mechanical Engineer (Dy CME) / Production Engr (PE)***
Responsible for different areas of workshop and incentive

DEPARTMENTALIZATION OF WORKSHOPS

- Workshops are subdivided into '*Shops*' which are further divided into '*Sections*' for technical, administrative, financial and cost control
- The Shops are headed under supervision of the Shop Incharges (*SSEs*) assisted by Junior Engineers (*JEs*)
- Shops are Process Shops i.e. *Manufacturing* or Job Shops i.e. *Repair*
- Process Shops are *fabrication (welding)* etc others are Job shops
- Each Shop is has a Shop no. for administrative purpose

CLASSIFICATION OF STAFF

- Unskilled; Helper/ Assistant
- Skilled Technician Gr. III
- Skilled Technician Gr. II
- Skilled Technician Gr. I
- Senior Technician

- Direct Worker (DW)
- Essentially Indirect Worker (EIW)
- Excluded/Non-Incentive (NI)
- Production Shop Group
- Support Shop Group
- Support Department

CLW Pattern

GIS Scheme

PRODUCTION CONTROL ORGANIZATION (PCO)

Best use of men, machines and materials for optimum product delivery

➤ *Men*

- Proper allocation & direction for maximum productivity

➤ *Machines*

- Should be optimally utilized with no idle time
- Should be regularly maintained and calibrated

➤ *Material*

- Should be selected as per required specifications
- Should be handled properly and safely

PRODUCTION CONTROL ORGANIZATION (PCO)

Headed by CWM assisted by *Production Engineer (PE)* as three separate sections each under its own SSE, for *interdepartmental coordination & quality*

Progress Office	Planning Office	Inspection Section
<ul style="list-style-type: none">● Assign <i>work order number</i>● Document & form <i>printing</i>● Send documents to Shops● Specify <i>PDC</i> for jobs● <i>Draw materials from Stores</i>● <i>Coordinate the progress of component manufacture</i>● Prepare <i>monthly report</i> of production and delivery● Inter-section and inter-shop <i>movement</i> of components	<ul style="list-style-type: none">● Study of drawings & specs● Prepare Bill of Materials (<i>BoM</i>)● <i>Costing: make or buy?</i>● Prepare Scroll Process Sheet <i>Rate Fixing Section</i>● Fixing of <i>Allowed Time (AT)</i>● Maintain data of time rates● Scrutinize and record <i>piecework cards</i>● Issue of excess time cards and billing time for extra activity	<ul style="list-style-type: none">● <i>Inspect finished work</i> to ensure quality, standards etc.● <i>Reject</i> deviations● Bring <i>workmanship issues</i> to the notice of the authorities● Certify <i>job cards and route cards</i> for quantities and times● Prepare monthly report of <i>local</i> delivery and rejections● <i>Ensure safety standards</i> of the finished product

IMPORTANT FORMS USED IN THE WORKSHOP

1) Scroll Process Card

Maintained and used by PCO for work coordination and costing

2) Route Card

3) Material Requisition

4) Material Tag

Used for fixing and paying incentive

5) Job Card

6) Squad Summary Card

7) Job Card for Squad Work

Important to keep track of Shop floor activities and delays, if any

8) Inspection Form

9) Gate Attendance

PRINCIPLE OF INCENTIVE PAYMENT

- ❑ *Time study* at the work place
- ❑ Not possible to work continuously at the same efficiency
- ❑ Source of *motivation* for worker
- ❑ *Time saved has a money value* associated with it
- ❑ Basic wages are ensured
- ❑ Time saving ceiling limit of 50% of allowed time

ADVANTAGES

FOR THE ADMINISTRATION

- No requirement of additional manpower
- Higher and efficient machine / assets utilization
- More productivity and less pilferage of working hours

FOR THE WORKERS

- It gives satisfaction of “earning more by working more”
- Leading to more purchasing power and satisfaction
- And as an end result the Organization is benefited with better
- Industrial relations and discipline

INCENTIVE SYSTEMS ON INDIAN RAILWAYS

- One is based on time *saving in each activity by each individual employee*, thereby performing the activity in less time than prescribed, giving scope for increased outturn **(Chittaranjan Pattern)**
- The other one is *directly linked to outturn* given by a group. This is Group Based Incentive Scheme **(Also known as Tirupathi Scheme)**.

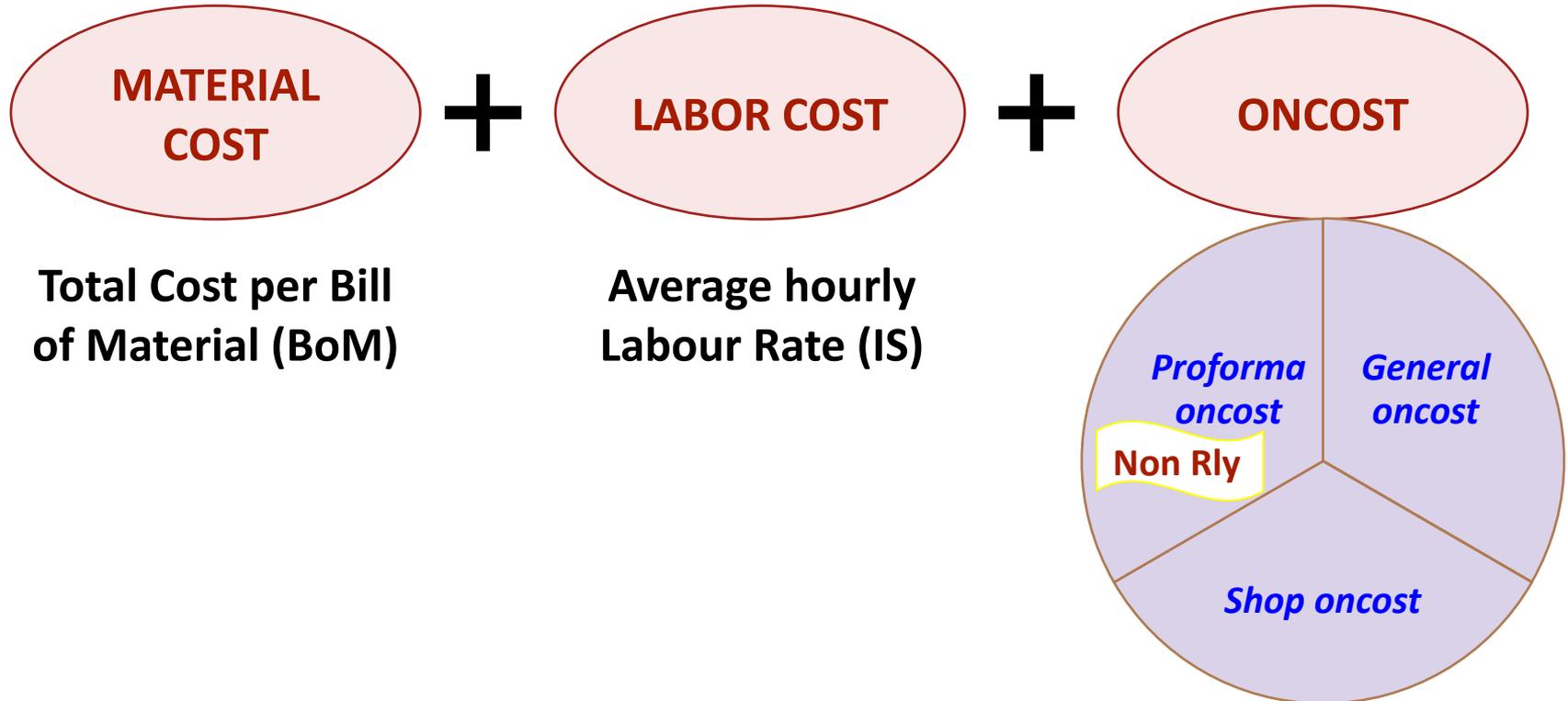
CHITTARANJAN PATTERN (CLW) INCENTIVE

- 1)Chittaranjan Locomotive Works(CLW), Chittaranjan – in **1954**
- 2)Designed so that a worker could reasonably earn 33.33 % incentive
- 3)Maximum limit is 50% of allowed time
- 4)Practiced in ICF, Perambur (**1960**), C&W Workshop, KGP, JMPW, etc.

GROUP INCENTIVE SCHEME (GIS)

- 1) Tirupathi Workshop (SCR) – in **2002**
- 2) Group incentive with group attendance factor for better work
- 3) No overtime/idle time except in case of power failure
- 4) Sick marking/en route detachment etc accounted in incentive
- 5) 70% incentive for individual Shop outturn, 30% for Traffic out
- 6) CRWS, Bhopal (**2004**), RWF Yelahanka, RCF/KXH, Mancheswar W/S

FINANCING: WORKSHOP COSTING



WORK ORDER SYSTEM USED IN WORKSHOP

□ Workshop Expenditure is analyzed with the aid of the Work Order System representing different units for different Heads of Expenditure.

➤ **Revenue Standing Work Orders**

- For repair & maint. or Stores
- Work order No. & Load Chart

→ **Collect Revenue expenditure**

→ **Order book never closes**

➤ **Special Work Orders**

→ **issued on the receipt of requisition**

TYPES OF REVENUE STANDING WORK ORDERS

1. ***Manufacturing Work Orders*** – used in Process Shop producing semi-manufactured materials
2. ***Repair to Rolling Stock*** – Diesel and Electric Locomotives
3. ***Repair to Machinery and Plant (M&P)***
4. Other ***Departmental Work*** (***Divisional***) for own Railway
5. Other Departmental Work (***Non-Divisional***) done for Other Railway

CHANGES IN WORKSHOP MANAGEMENT

- Introduction of Enterprise Resource Planning (WMIS) application to integrate production planning, inventory and dispatches
- Extend it to integrate with MMIS/IPAS & HR (ERP) applications
- Elimination of manual job cards, scroll sheets etc.
- Robust on line costing module
- Establish CENTER OF EXCELLENCE (COE) to showcase niche technologies, e.g. Air Brake (Izzatnagar), Welding (Jamalpur), Roller Bearing (Tirupati) etc.
- Management Certifications like ISO 50001, 3834 etc for standardization

CONCLUSIONS

- The Workshop is a ***significant functional and technical unit***
- Having no running component, it does not have its own field officers for running, but ***relies heavily on the Division*** for this
- However, by leveraging its ***own resources*** under an autonomous hierarchy, it can be a manifold ***asset to Divisional functioning***
- Overall, this ***interaction may be sporadic but it is very important***