

Role of CMT (Chemical & Metallurgical) lab

Introduction

The Chemical and Metallurgical Department of Indian Railway is as old as the Indian Railways itself. With the change in technology, Steam locomotives were gradually phased out and the Diesel era became predominant. Electric traction also started in parallel, playing an important role in the Railway mode of transportation. In the changed scenario, the role of Chemical and Metallurgical laboratories became very vital because they have to deal with new technology and large varieties of materials, metals and non-metals being used in manufacturing and maintenance of Electric and Diesel locomotives, coaches, wagons and railway track items.

In all railway workshops, Diesel sheds, and Manufacturing units, the field laboratories are working round the clock where the condition of incoming Rolling stocks in respect of various types of materials, lubricants and coolants are checked for their suitability and maintaining the required Physico- Chemical properties to

assess the health of rolling stocks. In Sheds and POH workshops, the C&M officers and Supervisors are required to examine thousands of critical components by DPT (Dye-Penetrant test), MPT (Magnetic Particle test), UST (Ultrasonic testing) and other NDT techniques to ensure that the components those having surface and sub-surface cracks (developed during production of new components as well as in service) are identified, segregated and withdrawn from service. The process control is also exercised by C&M laboratories on various metal working operations such as cold and hot working, heat treatment, phosphating, electroplating shot blasting, corrosion repair, welding, machining, painting etc., alternative engineering materials like FRPs, plastics and rubbers etc. are also being examined by these labs.

100% axles of goods and passenger trains are subjected for Periodic Ultrasonic examination. The flawed axles, if continued in service would have resulted serious accidents and derailments of trains those may cause huge loss of Railway revenue & property, disruption of traffic and most important life of innocent passengers & crew.

The detailed chemical and metallurgical investigation of components involved in accidents and failures of goods and passenger trains during service suggests not only the cause of failure but the remedial corrective & preventive measures to be taken, in terms of modifying specifications, drawings, manufacturing procedures & maintenance practices. The fact is that C&M cadre is the backbone to the other technical cadres particularly mechanical, electrical and civil and it provides very strong technical support to production, repair and maintenance of coaches, wagons, locos and track items. The metallurgical and chemical technologies in Zonal Railways and production Units are indispensable on quality and reliability of Rail Transport System. The officers and staffs of Chemical and Metallurgical disciplines are huge responsibilities for maintaining safety and reliability of trains.

Organisation and Responsibilities

Research Design and Standards Organization (RDSO) is an ISO 9001 research and development organization under

the Ministry of Railways of India, which functions as a technical adviser and consultant to the Railway Board, the Zonal Railways, the Railway Production Units, RITES and IRCON International in respect of design and standardization of railway equipment and problems related to railway construction, operation and maintenance.

RDSO (Metallurgical & chemical) Directorate

Executive Director (M&C)

Additional Executive Director (M&C)

Dy. Director (M&C)

ARO (Assistant Research officer)

Metallurgical supervisors / Chemical Supervisors

**Metallurgical and Chemical (M&C) Directorate
(RDSO)**

It functions as premier R&D establishment for conducting research, evaluation, testing and standardization on materials (metals, alloys, paints, fuels, lubricants, rubber, plastics composites, welding consumables etc.) with the objective of employing the most efficient, cost effective and reliable material on Indian Railways. It functions as a consultant to Railway

Board, Design establishments, Zonal Railways and Production Units in the areas of materials selection, up gradation, testing, indigenization, welding technology, foundry technology, and investigation into failures of components in service. Besides, it also imparts training to Railway personnel in the field of Non-Destructive Testing, Welding Technology, Corrosion Prevention and failure analysis to equip them with the latest development.

M&C Directorate, is broadly divided into two disciplines i.e. Metallurgical and Chemical and it is equipped with state of art equipments e.g. Scanning Electron Microscope, Vacuum emission spectrometer, fatigue and fracture mechanics test system, ultrasonic equipment, X-Ray machine, Universal Testing Machine complete test set up for evaluation of almost all the Rly materials. Major laboratories of M&C Directorate are Metallurgical Investigation, Non-Destructive Testing, Paint & Corrosion Engineering, Rubber & Polymer, Welding, Tribology, Fuels & Lubricants, Composite Development Center, Metallurgical Technology Development, Fatigue and Fracture Mechanics.

Role & main activities of M&C directorate:

- The Directorate renders advisory services on Metallurgical & Chemical aspects in Standardization & R&D activities to the design directorates of RDSO.
- Undertakes R&D Projects in the field of Metallurgy, Non-destructive testing, Corrosion Engineering, Welding research, Polymer technology, Oil Lubricants and Tribology.
- Metallurgical investigation of failed components, received from Zonal railways.
- Imparting regular & refresher training on Ultrasonic testing of rolling stock axles and rails for PWIs & M&C Supervisors of Zonal Railways.
- Testing & Evaluation of Materials, related to R&D Projects, received from Design directorates.
- Framing & review of specifications on Paints, Welding consumables, Rubber & other polymeric materials, USFDs including code of procedures on UST.

- Vendor registration/renewal on Paints, Welding consumables, USFDs (ultrasonic flaw detection) & Lubricants for M&Ps.

In Zonal railways the organisation structure and responsibilities are as follows-

Organisation structure

Dy. CCMT (Deputy chief Chemist and Metallurgist)

CMS (Chief Quality Manager)

Dy. Quality Manager

Technical Manager (CMS & CMA)

Lab Assistant / Technical Assistant

Dy. CCMT (Head Quality Manager):

- He is responsible and authorized to set the Quality Policy and Objectives for the Laboratory.
- He is authorized and responsible for Laboratory administration and heading the Lab As top Management.
- Providing laboratory resources.
- Approving all documents related to Laboratory Quality Management System.
- Overall responsibility to run the laboratory activities.

- Approving and improving Laboratory Infrastructure and Laboratory.
- Reviewing Purchase proposal and signing purchase indent.
- Responsible for purchasing laboratory equipment's.

CMS (I/C) CUM Quality Manager:

- Overall responsibility for Implementing, Controlling and Monitoring of the Quality Management system.
- Controlling the documents.
- Issue of Quality Manual and its Amendment.
- Organizing internal audit and review of Management system.
- Organizing Management Review
- Communication with accreditation body (NABL).
- Maintaining training records.
- Identification of training need.
- Authorized to sign in Test Report.
- Solving Customer's complaint.

Dy. QUALITY MANAGER (CMS):

- Assisting Quality Manager and also Technical Manager.
- Play the Role of Quality Manager in the absence of Quality Manager and play the Role of Technical Manager in the absence of Technical Manager.

TECHNICAL MANAGER (CMS & CMA):

- The technical operation of the concerned lab.
- Updating of knowledge and professional skill of all technical personnel in own department through appropriate training and periodical evaluation of them.
- Selection and recommending procurement of test machinery and equipment of right kind and quality and other specifications requirements.
- Responsible for maintaining updated technical specification/ literature/ handbooks in His/her sphere of activity.
- Quality of testing.
- Reviewing purchase proposal and approving purchase indent.
- Authorized to sign test reports.
- Responsible for identification of departmental training need.
- Controlling non-conformance in laboratory.
- Corrective action and preventive action planning
- Taking corrective and preventive actions when needed
- Solving Customer's complaint.

LAB ASSISTANT cum Technical Assistant:

- Assisting Technical Manager.
- Assisting in carrying out the testing.
- Recording results.
- Maintaining the records.

- Typing the Test report.
- Maintaining proper House-keeping of the laboratory.
- Ensuring timely calibration of the equipment and maintaining related records.
- Preservation of all Samples (To be tested/already tested) with proper Identification
- Maintaining consumable stock records in the laboratory.
- Ensuring proper handling and preservation of materials during storage.
- To maintain environmental conditions to comply with the specific requirements for accurate testing to get correct observations.
- Preparation and release of final reports, maintenance of Test records and final test reports, handling of customer complaints and addressing it to the satisfaction of the customer.

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