

## **ABOUT DIRECTORATE**

**Metallurgical and Chemical (M&C) Directorate** 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 Dtes, Zonal Rlys 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 Rly 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 Ultra-sonic 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 & Lubricants for M&Ps.

**An overview about M&C Directorate**

Metallurgical Investigation & Testing Section	Metallurgical Consultancy Section	NDT Training Centre	NDT Section	Metallurgical Technology Development Section	Welding Research Centre	Lubricant & Fuel Section	Rubber & Plastic Section	Paint & corrosion Lab	Tribology Section
<p>Failure Investigation of</p> <ul style="list-style-type: none"> <li>• Rails</li> <li>• Rail welds</li> <li>• Wheels &amp; axles</li> <li>• CMS crossing</li> <li>• Knuckle &amp; Couplers</li> <li>• Engine Components</li> <li>• OHE Wires</li> <li>• Signalling gear</li> </ul>	<ul style="list-style-type: none"> <li>• Metallurgical inspection of bridge girder.</li> <li>• Welder certification for bridge girder.</li> <li>• Inspection of improved SEJ, Thick web switch.</li> <li>• Inspection of CMS crossing.</li> <li>• Scrutiny of QAP &amp; WPSS for welded bridge.</li> <li>• Scrutiny of QAP for track items ISEJ, Thick web switch CMS crossing etc</li> <li>• Scrutiny of QAP and Prototype Inspection of motive power items such as Engine block, bogie frame, crank shaft etc.</li> <li>• Firm's assessment &amp; quality audit of steel bridge fabricator, ISEJ, CMS crossing manufacturer.</li> </ul>	<ul style="list-style-type: none"> <li>• Imparts training in the field of Ultrasonic Testing of Axles &amp; Wheels to C&amp;M supervisors of IR.</li> <li>• Imparts training in the field of Ultrasonic Testing of Rails &amp; Rail Welds to personnel of Engineering Department over IR.</li> <li>• Imparts training/certification in the field of Ultrasonic Testing of Rails &amp; Rail Welds to personnel from Private Organizations.</li> </ul>	<ul style="list-style-type: none"> <li>• Developments of Ultrasonic Equipments.</li> <li>• Preparation &amp; Revision of Code of Procedure of NDT testing.</li> <li>• Preparation &amp; revision of Specification/STR of Ultrasonic test Equipments for Rail, Rail Welds, Axle, and wheel.</li> <li>• Verification of Ultrasonic rail/Weld testers for Outsourcing Agencies.</li> <li>• NDT comments on detectability of defect in Rails/welds/Axles/Wheels failed during service.</li> <li>• Quality Audit of NDT procedures on IR.</li> <li>• Consultancy on NDT to Rlys/PSU/Rites etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Certification of New-Welders for AT Welding.</li> <li>• Re-Certification of Welders.</li> <li>• Lab Evaluation for New AT Welding Technique.</li> <li>• Field Trials of AT Welds.</li> <li>• Standardization of welding parameters for FBW Machine .</li> </ul>	<ul style="list-style-type: none"> <li>• Consultancy to different Zonal Railways, Design Directorate and Production units for selection of welding consumables &amp; parameters.</li> <li>• Up gradation of IRS specification for welding Technology and Consumables.</li> <li>• Project on repair and reclamation of railway components by welding.</li> <li>• Development of Vendor for Welding Consumables.</li> <li>• Dealing with fresh registration case.</li> <li>• Quality Audit of approved firms at regular interval.</li> <li>• Quality Audit of Railway Workshops.</li> </ul>	<ul style="list-style-type: none"> <li>• Testing/trial and R&amp;D of Lubricants, Greases, Fuel &amp; Bio-Fuel.</li> <li>• Sample testing for Approval of Vendors.</li> <li>• Quality Audit of Vendors.</li> </ul>	<ul style="list-style-type: none"> <li>• Testing &amp; evaluation of Rubber &amp; Plastics, Treated Fabrics Laminated products, Thermoset laminates , Compreg &amp; Plywood.</li> <li>• Inspection of                             <ul style="list-style-type: none"> <li>• 10 mm CGRSP</li> <li>• GFN 66 liner</li> <li>• Elastomeric Pad</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Testing of paints &amp; allied chemicals.</li> <li>• Framing of generic specification of paints for coaching, wagons, Bridges, TI &amp; other rolling Stocks.</li> <li>• Revision, upgradation and Amdt of paint Specification.</li> <li>• Quality Audit of Coaching , Wagon Repair Workshop &amp; PUs.</li> <li>• Field Trial of high Performance painting system for coaching, wagons, Bridges etc.</li> <li>• Consultancy and advisory provided to PUs, Zonal Railways, other Dtes of RDSO on paints. Standardization of painting procedures for coaches, wagons etc.</li> <li>• Training to supervisory staffs of Zonal Rlys &amp; PUs on painting practices.</li> </ul>	<ul style="list-style-type: none"> <li>• Performance testing of grease used in bearing of Locomotives, Wagon &amp; Carriages. Performance tests for greases.</li> <li>• Four ball weld load testing for Load carrying, anti-friction and anti-wear property of lubricating oils.</li> <li>• Performance testing of different type of filters such as ALCO/DLW locomotives &amp; EMD locomotives.</li> <li>• Testing of HSD/Bio Diesel Blends.</li> </ul>
3 AROs + 3 Supervisors	2 AROs + 2 Supervisors	1 Principal + 2 Sr. Lecturers	2 AROs + 2 Supervisors	2 AROs + 2 Supervisors	3 AROs + 2 Supervisors	2 AROs + 4 Supervisors	2 AROs + 2 Supervisors	4 AROs + 3 Supervisors	3 AROs + 2 Supervisors
									