L&T Technology Services

ARE YOU READY TO SET THE TRACK FOR THE FUTURE?

RAILWAYS

Liberalization of the transportation industry has raised the global demand for railway infrastructure. With this, there is an increase in the demand for responsive services.

Moreover, the boom in consumerism is promoting an upsurge in manufacturing processes. The new era of manufacturing calls for ever-growing plants and increasing process complexities that create a consistent need for reinvention. The future of manufacturing is unfolding to new technologies that drive innovation, mandating development of plants that perform better and last longer.

Partner with L&T Technology Services

L&T Technology Services partners with global Rail industry leaders, providing them with a wide range of end-to-end highly customized engineering solutions to meet requirements for innovations, reduced time-to-market and cost-effective product development. We achieve this through our technically strong team that ensures viable solutions, delivered to perfection and on schedule.

We deliver holistic solutions to the industry with precision, professionalism and speed.

As we help our customers meet the twin objectives of lowering costs and delivering value-added services, we provide solutions for product, process, manufacturing and facility set-up.

As an engineering partner, we support each phase of our clients' product development, as we 'identify', 'evaluate', 'define', 'execute' and 'operate' with our best practices and the latest and proven technologies.

THE FOCUS OF RAILROAD COMPANIES ON INFORMATION TECHNOLOGY IS EXPECTED TO DRIVE INVESTMENTS IN TELEMATICS, AUTOMATION AND ENERGY EFFICIENCY

Railway Engineering Services

L&T Technology Services provides innovative technical support to global Rail industry leaders through decades of domain expertise. This helps OEMs meet challenges with a focus on developing railway systems that are faster, smarter, safer and more environment-friendly. We offer end-to-end solutions to the Rail sector, in the core domain areas of Rolling Stock, Embedded Systems, Signaling & Telecom, and Aftermarket Services.

Rolling Stock

Car Body | CAB | Interiors | Propulsion System | Bogie | Brake Systems | Electrical Panels | Cable Harness | System Integration & Equipment Installation | Embedded Software | Embedded Hardware

Signaling

Signaling Design | System Engineering | CBTC/PTC

Aftermarket Services

Simulation Services | eLearning (CBT/WBT) | Technical Publications | Embedded System | Integrated Logistic Support

WE HELP YOU STREAMLINE YOUR CURRENT OPERATIONS AND VENTURE INTO NEWER AND DIVERSE MARKETS

Rolling Stock

CAR BODY
» Structural Design - EN 12663
» Equipment Mounting - UIC 566/EN 12663
» Underslung Equipment Mounting - IEC 61133
   Crashworthiness & Impact Design - EN 15227
   Welding Design & Validation - EN 15085
» Development of Car Body Exterior

INTERIORS
» Design Complying to UIC566
» Design & Development of Side Walls,
   Ceiling Panels, Floor, Seating Arrangement,
   Grab Pole, Grab Rail, Door Pillars,
   Stand Back & Draught Screen
» Development HVAC Ducting
» Lighting & Passenger Information Module
» Installation & Integration Design

BOGIE
» Design Adaptation of Bogie
» Detail Design of Bogie Frame Members
» Welding Fixture & Robot Simulations
» Manufacturing-Drawing for Entire Bogie

ELECTRICAL PANELS
» High Voltage, Medium/Auxiliary & Low
   Voltage Electrical Panel Design
» IP 65 & 66 Protection Enclosure Design
» Component Arrangement
» Equipment Mounting UIC 566/EN 12663
» Welding Design EN 15085

CAB
» Driver Desk Design & Development
» Driver's Cabin Structural Design
» CAB Back Wall Development
» Ergonomics of Driver Desk
» Vehicle System Boundary Schematics
» Control Logic Block Diagram

PROPULSION SYSTEM
» Design Adaptation & Development
» Product Localization of Auxiliary Converter
» Manufacturing Drawing Creation
» Propulsion Converters case Design
» Traction System Integration
» Cable Routing Design

BRAKE SYSTEMS
» Brake System Design as per EN 13452-1
   Mounting Brackets for Tubing, Piping
   Testing & Commissioning Support
» Pressure Vessel Design as per EN 286-3
» Brake Unit Enclosures Design
» 3D Piping & Tubing Layouts

CABLE HARNESS
» Schematic Layouts & Wiring Diagrams
» Component & Connector Selection
» Cable Sizing & Routing Calculations
» Cable Duct & Electrical Conduit Design
» Cable List & Bundle Layout Design
» Inter-car Jumper
» Terminal Strips & Connectors Design

SYSTEM INTEGRATION & EQUIPMENT INSTALLATION
» Integration of Car Body & CAB
» Underslung Equipment
» ATP/ATO System
» HV Equipment in the Roof Structure
» Gangway Arrangements

Rolling Stock – Embedded

We offer complete range of design services for both product and manufacturing engineering. We are well versed with EN50128 and IEC 61508, and with critical communication protocols such as Ethernet, MVB and LON, along with CAN and USB device/host for intra-module communication and diagnostics.
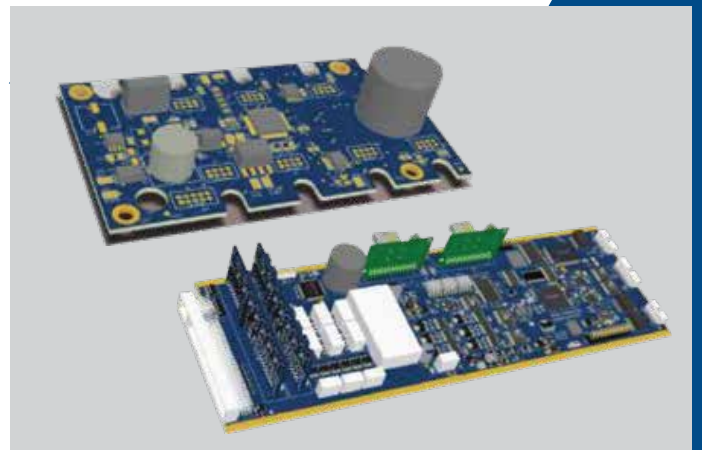
In order to minimize hazards on-field, the applications are well-tested on simulated environments.

Embedded Software Development

// Software architecture to fulfill IEC61508 and EN50128, EN 50159 norms

// Advanced diagnostics for safety critical execution paths

// Proprietary & Industry standard Communication Protocol Stack development

// Device Driver development

// Embedded HMI & GUI development

// Automated Test Environments

// Feature enhancement, performance tuning, maintenance & support

// Static & Dynamic diagnostics in railways through USB & Ethernet

// Boot-loader development, RTOS based system

Embedded Hardware Development

// 2oo2 and 2oo3 architecture for SIL2 and SIL3 requirements

// Hardware boards based on Processor, DSP, VLSI and Analog

// Memory interface for DDR2, FLASH, serial devices and FRAM

// RoHS compliance

// EMI/EMC solutions — In-house EMI test facility, tie- up with established test houses

// Modeling/Simulation — CAD-based control system, design, signal integrity

// Reverse Engineering of hardware schematics

Signaling

L&T Technology Services provides its leading global Rail industry clientele with a wide-range of end-to-end, highly customized, innovative and cost-effective Rail engineering solutions. We have expertise in interlocking systems, wayside equipment, control systems, train-borne equipment, CBTC, ERTMS/ETCS, simulators and level-crossing protection. We focus on timely and high-quality outputs to deliver value to our clients.

Signaling Design Technology

- Communication Based Train Control (CBTC)
- Positive Train Control (PTC)
- European Rail Transportation Management System (ERTMS)
- Train Control and Monitoring System (TCMS)
- Conventional Signaling

Functional Expertise

Signaling

- Requirement Definition and Mapping
- System Engineering
- System Integration
- Application/Data Design
- Interface/Book Wiring
- Aspect/Route Control/CCP
- Verification & Validation
- Integrated Lab Setup
- Configuration Management
- Simulator Development
- Project Management & Documentation

Reliability, Availability, Maintainability & Safety (RAMS)

- RAMS Plan
- Subsystem RAMS Apportionment
- RBD Analysis
- Preliminary RAMS Analysis (FTA, FMECA etc.)
- Reliability Critical Item List (RCIL)
- FRACAS Reports
- RAM Demonstration Report
- Safety case
- Other RAMS Deliverable
- Compliance to EN and IEC Standards

Aftermarket Services

As the learning culture continues to evolve, technical publication with eLearning and simulation has become the demand of the industry. L&T Technology Services, with its experienced programmers, technical writers, domain experts and graphic designers, has relevant experience in providing user-centric information on a global engineering framework that assures customers with accurate, up-to-date, and fully compliant information.

Simulation Services

- Desktop Simulation
- Simulation Control Software
- Instructor Control Software
- Vehicle Systems Logic Development
- Malfunction Integration
- MMI Unit Simulation
- OTW — Geo-specific & Geo-typical 3D Visual Database Creation

Technical Publications

- System Description Manuals
- Maintenance Manuals
- Component Manuals
- Service Manuals & Bulletins
- Operators Manuals
- Trouble-shooting Guides
- Illustrated Parts Catalogues
- 3D PDF
- Document Management System

eLearning — CBT/WBT (SCORM 1.2 Compliant)

- Knowledge Base Courses
- Maintenance Courses
- Procedure-Based Exercises
- Situation-Based Exercises
- 3D Animation
- Evaluation and Exercises
- Learning Management System

Embedded System

- Legacy Code Maintenance
- Obsolescence Management
- Reverse Engineering (H/W and S/W) - support to handle field reported issues
  - » RCA
  - » Impact Analysis
- Enhancements to existing code base as per upcoming contracts
- Analysis of field data (Big Data) and reporting the dashboard for engineering team

Integrated Logistic Support

- Logistics Engineering
- Technical Help Desk
- Suppliers Management
- Maintenance Support Planning

Lab Infrastructure

Technology evaluation has helped to have an in-depth look at the product to understand engineering and technology requirements better. Our product design & development background has helped us develop expertise in the field of EMI/EMC and safety to meet most stringent standards. Our team of experts are leaders in technology segments like Augmented Reality, Video Analytics, Data Analytics, Enterprise Engineering Solution and IoT.

L&T Technology Services has in-house test facilities like Radiated/Conducted Emission tests, Radiated Susceptibility tests, Electrostatic Discharge tests, Electrical Fast-transient tests, Surge tests, Shock & Vibration tests, Voltage dips & Interruptions test, Phantom loads, Gauss meter and Environmental chambers that help us take care of compliance with applicable standards during the design cycle.

Besides the above test facilities, we have alliances with other independent labs like SAMEER and ERTL.

Equipment & Hardware Set-up

Our dedicated Rolling Stock—Embedded Lab has the following capability:

// Design compliance to IPC standards

// IPC certified CID professional team

// PCB Layer count up to 12

// Fabrication and Assembly support

// ItemSoft tool kit for reliability

// Soldering station (HAKKO-702B)

Tools supported: Altium, Mentor Graphics PADS suite, ORCAD CIS, ALLEGRO Eagle Layout Editor, Expedition (Mentor Graphics)

Software supported: MPLABX, CodeWarrior, and MQX-RTOS

Accreditations

Time and again, L&T Technology Services has displayed continuous focus on innovative skills, creativity, design and development. This has led industry bodies, research organizations and our clients to recognize and certify us.

Recognitions:

Leadership Excellence:

Our multi-vertical leadership prowess was once again recognized by Zinnov in 2014.

Engineering Services Excellence:

We received the "2014 Excellence in Engineering Services Award" from Frost & Sullivan.

Quality Excellence:

We won the "Quality Excellence Award for Planning, Processes & Systems" at the World Quality Congress, 2014.

The Best Companies with Software Testers:

We were voted as the 2nd Best Company with Software Testers in the Indian Testing League 2014, conducted by UNICOM.

Among Key Vendors in IoT Embedded Space:

We were identified as one of the key vendors in the "SI and Engineering Service Provider" category, in a study conducted by Gartner in April 2014.

Certifications:

Our Embedded Systems & Software activities are assessed at maturity level 5 of SEI's CMMi® Development plus IPPD (Integrated Process and Product Development) Ver. 1.2.

We have IRSE Licensed Signaling Resources

QUALITY FOCUS

Our comprehensive Quality Management System (QMS) provides a robust framework for global delivery. It factors in the varied nature of our engagements across industries and domains including engineering solutions for CAD/CAM/CAE/PDM and other customization services, plant engineering solutions, design and engineering services, product engineering and application software services, independent testing & test automation services, and test systems development.

Our process improvement initiatives are driven with the help of a measurement framework and the support of our compliance testing labs across various industry verticals. Process performance models govern our key delivery processes, which helps us predict performance and proactively take actions on our projects. An independent and dedicated quality team, supported by senior management, is focused on driving the quality movement throughout the organization. A cross-functional task force focuses on continuously improving the efficacy of our quality systems.

// ISO 9001:2008 certified delivery centres: Only companies that demonstrate its ability to consistently provide product that meets customer and applicable statutory and regulatory requirements get this certification.

// Our Aerospace and Medical Devices practices are AS 9100C and ISO 13485:2003 certified. The certification upholds the quality and system requirements that L&T Technology Services incorporates in its management systems.

// Embedded systems and software activities are assessed at Maturity Level 5 of SEI's CMMi® Development Ver. 1.3. – signifying high standard of consistency in performance and delivery.

// We have bagged the Quality Excellence Award for Planning, Processes & Systems at the World Quality Congress in 2014/15.

INNOVATION CULTURE

Our Culture of Innovation has enabled us to grow and retain our customer relationships and successfully achieve process and productivity improvement for customers.

Deeply passionate and perennially curious, the need to create is a true phenomenon at L&T Technology Services. Innovation as a practice dominates both our value-centric and customer-centric approach to solutions. We continuously innovate to make engineering solutions leaner and less complex.

Our presence across multiple industry segments enables cross-pollination of ideas that lead to product, process, and technology innovations. This innovation culture is further nurtured through investments in a dedicated innovation lab to incubate ideas and transform them into reality. We understand the role of continuous improvement and thus make innovation a practice to deliver distinguished engineering solutions.

We focus on innovation driven technology leadership and have set up research and test laboratories that are specific to industry verticals. Our 31 laboratories replicate our customers' work environment.

We also work closely with international and national scientific institutions to continually source ideas for engineering solutions. Our events such as Tech Panorama, which is an initiative by the Technology Solutions and Innovation Centre within our company, serve as a platform for our employees to showcase their skill and demonstrate ideas.

Own Patents	37
Co-Authored Patents	137

L&T Technology Services - Railways Industry Vertical

The L&T Technology Services' Railways Industry vertical provides Engineering, Research & Development Services for leading global Railroad companies. The vertical works across the Railroad value chain from material to maintenance.

L&T TECHNOLOGY SERVICES

The important thing is not to stop questioning. Curiosity has its own reason for existing," said Albert Einstein. We couldn't agree more...

That's what we do:
IMAGINE: Possibilities for enriched products, services and life...
EXPLORE: Ingenious and innovative ways for a sustainable future
DELIVER: Top quality solutions leveraging the 75-year old rich legacy and engineering heritage of our parent company Larsen & Toubro

We offer design and development solutions throughout the entire product development chain across various industries such as Industrial Products, Medical Devices, Transportation, Telecom, Consumer Electronics and Semiconductors and Process Engineering, besides Mechanical Engineering Services, Embedded System Services, Product Life Cycle Management (PLM), Engineering Analytics and Power Electronics and Machine-to-Machine (M2M) and the Internet of Things (IoT).

Today, 37 own and 137 co-authored patents later, our 8000+ engineering specialists continue to solve business problems for 170+ customers, including 50+ Fortune 500 companies. With presence in 16 countries, 12 Global Delivery Centers and 27 Sales Offices, we continue to dominate the Engineering, Research and Development (ER&D) space, globally.

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