Integrated Engineering Solutions (IES), an integral unit of Tech Mahindra, is a leading global product design house with two decades’ experience and over 12,000 engineers serving customers across aerospace, automotive, industrial, transportation, energy, telecom & hi-tech products. Our strong capabilities in electronics, mechatronics and mechanical engineering together with extensive domain capabilities and product expertise enables us to provide product solutions from concept & detailed design through validation, manufacturing and global sourcing support. M matured practices in value engineering, reliability & safety and predictive design methodologies like Design for Six Sigma help us deliver customers accelerated time to market, product innovation, cost savings and global engineering scale.

Recognition

- Ranked in the ‘Winner’s Circle’ in the inaugural Engineering Services Blueprint report by HfS Research on the back of our expertise and industry leading deliveries across verticals such as Automotive, Aerospace and Defense, HiTech & Telecom, Industrial Equipment, Energy & Utilities.
- Ranked in the Leadership Zone for the third time in the Global Service Provider Ratings (GSPR) by Zinnov Management Consulting. Tech Mahindra ranks as a leader in Aerospace, Automotive, Industrial & Telecom verticals and Embedded Systems and Mechanical Engineering capabilities.
- Ranked in the "Winner’s Circle" in the IoT Services Blueprint report by HfS Research for demonstrating excellence in execution and innovation in the IoT space. Tech Mahindra is listed among global leaders for the strength of our digital platforms, proprietary delivery, partnership ecosystem and focus on as-a-service pricing models for many IoT engagements.
- Positioned amongst the Top 3 Product Development services (ISV) providers in Forrester Vendor Landscape based on our extensive innovation and delivery capabilities in IoT and software/product engineering.

IES_Marketing@TechMahindra.com
www.techmahindra.com
Overview

17 years of presence
50+ active customers
3,800+ engineers
10 Global engineering centers
18 Patents
AutoSPICE Level 3 and CMMI Level 5 certified

Investments on future technologies
- Autonomous driving and connectivity technologies
- Personalized mobility platform
- EV/HEV technology
- Future interiors and seating
- Vehicle weight reduction technologies

Investments in future technologies and global footprint for customer proximity

Platform based solutions for Connected Car, Personalized Mobility & Connected Factories

Global Delivery Centres

US / Troy, MI
UK / Norfolk
Italy / Turin

Germany / Munich, Stuttgart, Ingolstadt,
China / Shanghai, Nanjing,
India / Bengaluru, Hyderabad, Pune and Chennai

One stop solution partner offering Styling, Vehicle Engineering, Electronics & Limited Production

Ability to enhance the Brand

Vehicle Engineering: End to End Program Partnership - Styling to SOP
Limited Production: Manufacturing of One of Show cars / Proto Cars / Limited Edition Vehicles


Key Element of Engagements:
- Add significant value to Styling & Design
- Proven & Mature Vehicle Engineering & Electronics capabilities across all vehicle segments

Global Engineering Execution model: Best of both Worlds to optimize the spend by leveraging global competency centres while improving efficiencies.
Spectrum of Automotive Engineering Services

One Stop Shop

360° Customer Experience

- Branding
- Strategic Styling & Creativity
- Engineering (Body, E/E, Autonomous driving)
- Concept & Show Cars
- Niche & Small series manufacturing
- Prototyping
- Virtual and Physical Validation

Traditional “domain”

- Styling
- Vehicle architecture
- Product development (top hat, chassis and pwt. integration)
- Process engineering
- Virtual and Physical Validation
- Prototyping
- Show cars manufacturing

Special Services

- EV – AV strategic design (Electric, Hybrid, Connected & Autonomous Car Solutions)
- HMI and Graphics design
- EV Platform development and integration, FSS management

Brand

- Corporate Identity
- Branding
- Design strategy
- Art Direction
- Lifestyle Design [accessories]
- Graphic Design
- Advertising and communications

Smart solutions

- Connected Car
- Infotainment
- Traffic management
- Safety
- Services
- Content
- Autopilot
- Navigation

Automotive: 360° Customer Experience
A convergence of technologies has opened up new horizons for the automotive industry. There are now opportunities for delivering unique experiences for users and customers across the value chain, all powered by digital technologies such as IoT, cloud and mobility.

Tech Mahindra is a recognized leader in Digital Transformation, providing a compelling suite of platforms, solutions and services. Backed by an extensive ecosystem of partners for technology and global connectivity, and complemented by a 24x7 global footprint for Managed Services, Tech Mahindra can transform your business, from cars to customers.

In the Factories

Tech Mahindra’s solutions for Connected Factories and Industry 4.0 do not just deliver productivity and efficiency improvements, they transform the way we run them. We cannot achieve smart factories without real time data and decision making. Tech Mahindra’s Connected Factories promote interoperability based on industry standards and integrate with a variety of enterprise systems, bringing end-end visibility to your factories and assets. Analytics is an important component of Connected Factories, enabling Predictive Diagnostics and real time asset monitoring and control.

Solutions
- Shop Floor to Top Floor
- Legacy to Smart Factories
- Cognitive Asset Tracking System
- Remote Monitoring & Diagnostics
- Predictive Analytics and Maintenance

Connectivity has fundamentally changed the decisions people make and the way they make them. For the automotive industry, this is a critical transformation, where customers are questioning ‘ownership’. Then, there is the additional disruption of technology – autonomous vehicles, new digital touch points, the need for continuous and collaborative Product Development.

Tech Mahindra’s experience working with the automotive industry is complemented by end-end Design, Engineering, IoT, Big Data, VR/AR, Mobility, System Integration and global Managed Services capabilities to accelerate the disruption.

Solutions
- DIGISENSE
- Advanced Driven Assist Systems (ADAS)
- Telematics
- Virtual Car Showroom
- Autonomous Driving Platform
- Personalized Mobility
- V2X Connectivity
- Pedestrian Detection
<table>
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<tr>
<th>Vehicle Engineering</th>
<th>Virtual (CAE) Validation</th>
<th>Engines</th>
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<tr>
<td>• Concept Definition and Development &lt;br&gt;• Benchmarking, Target Setting and Deployment &lt;br&gt;• Architecture and Feasibility Studies &lt;br&gt;• Product and Process development &lt;br&gt;• Virtual (CAE) and Physical Validation (Testing) &lt;br&gt;• Prototypes Manufacturing &lt;br&gt;• Performance Management &lt;br&gt;• Quality control &lt;br&gt;• Industrial follow up</td>
<td>• Rigidly, strength and misuse loads &lt;br&gt;• Vibration and acoustics &lt;br&gt;• Operational strength and fatigue resistance &lt;br&gt;• Vehicle dynamics &lt;br&gt;• Vehicle safety &lt;br&gt;• Structure design (crashworthiness) &lt;br&gt;• Passenger safety (design of restraint systems) &lt;br&gt;• Pedestrian protection</td>
<td>• Vehicle integration &lt;br&gt;• Auxiliary Systems &lt;br&gt;• Detail design &lt;br&gt;• Analysis: durability, modal &amp; NVH</td>
<td>• Transmission layout &lt;br&gt;• Detail Design &lt;br&gt;• Analysis – durability, thermal &amp; NVH</td>
<td>• Vehicle integration &lt;br&gt;• Design &amp; selection of Chassis components &lt;br&gt;• Simulation of driving dynamics &amp; NVH</td>
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**Vehicle Engineering Success Stories**

**High-end, sport and niche vehicles**
- Multiple programs
- Styling, Vehicle Engineering, Concept Cars
- Limited productions

**18+ years of cooperation with German OEMs**
- Vehicle Engineering for 5 generation of products across crossover cabrio, sedan<br>• Both work package and Turn key working models

**21 variants across 8 Truck platforms & 3 vehicle categories (Class 6, 7, 8) 5 Bus platforms for US market.**

**Asia Facelift program for European OEM – Product Strategy to SOP**

**20 Programs for Ride & Handling Analysis with 90% test to simulation correlation and durability analysis for failure location prediction for 25 vehicle programs**

**Powertrain & Chassis Success Stories**

**New diesel engine adaptation on existing gasoline platform creating a new product range for an Middle East OEM.**

**Multiple programs on Engine Integration & Aux. systems (Air Intake, Exhaust & Fuel) for 2 of the UK based OEMs**

**Engine Integration and emission upgrades for 3 Engine Families to comply with Emission norms. Chassis Integration & design for 8 Truck & 5 Bus platforms**

**Mechanical Design for 3 generations of Occupant Safety, 4 generation Steering and 5 generations of braking systems**
Overall Vehicle Electronics

E/E Architecture
- Electrical architecture Benchmarking, defining requirements, functional Architecture
- ECU development – End-to-End development
- EMI / EMC testing,
- Testing and validating of all E/E systems in static and dynamic laboratory and prototype vehicles

HIL and Fixture Development
- End-to-end Solution including Design, development, testing and deployment of system fault insertion test rig
- Custom built test jig to execute Test scenarios covering System-level Fault insertion for Safety, Diagnostic coverage and Functional testing
- Fully automated test benches for regression testing

System/Feature development & Integration
- Body & Comfort Systems
- Driver Assist and Safety electronics
- Infotainment & Telematics systems
- Connected Car Back-end systems
- EV/HEV – Motor controller, BMS

Success Stories

Vehicle E/E Architecture design & integration for 3 platforms for an Asian OEM

New features & integration for IVI and ADAS systems (Night Vision, LDW, HUD & Driver drowsiness detection)

New Features & Integration - START/STOP, Eco-Mode, Cruise control and EPB

SW for EV control Module, Traction Inverter motor Controller & Power Delivery Module for Electric Vehicle

Infotainment & Connectivity

- SW development for head units and display elements
- App developments for mobility and online services
- Test house for infotainment systems and connectivity

Body, Driver Assistance and Safety

Convenience & Body Electronics
- Develop ECU HW and SW from the draft right down to production ready (AUTOSAR/Non-AUTOSAR)
- Energy Management ECU developments for power classes to 100kW
- Develop and Integrate convenience features into electronic car body systems
- Virtual and physical function validation on the component, system and vehicle level
- Test house for various tests

Success Stories

- HMI Software & Testing for new IVI emerging market platform
- HMI software for split screen IVI system
- HMI software & Testing for HUD

Complete connected car back-end system deployed to handle different types of vehicles provide vehicle health analytics based on vehicle parameters,

Concept design of 48V Mild Hybrid vehicle motor controller, including HW, mechanical design with thermal and EMI/EMC simulations

Actuation platform Concept to Car built actuation platform receives driving instruction signals and converts them into mechanical actuation of steering, break, gear shift and other BCM