Core R&D Areas

Noise, Vibration, Harshness (NVH) & Computer Aided Engineering (CAE)

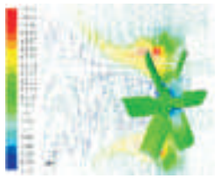
The NVH and CAE divisions, with advanced experimental and computational test facilities, provide end-to-end solutions to the automotive industry. The facilities are also widely used by the non-automotive sectors. Customer-oriented, time-bound solutions are provided to meet the evolving stringent legislative and competitive requirements in the areas of structural integrity, durability, occupant safety and NVH.

Major Facilities in NVH

- Hemi-anechoic chamber with engine and chassis dynamometers
- Reverberation rooms
- 60 channels data acquisition system with analysis software
- Scanning Laser Vibrometer and Torsional Vibration Measurement System

Major Facilities in CAE

- Altix 3300 - 8 CPU Server
- ANSYS, ABAQUS, NASTRAN, ADAMS, LMS VIRTUAL LAB, LMS SYSNOISE, LSDYNA, MADYMO, FLUENT and SWIFT



Core R&D Areas

Power Train Engineering (PTE)

Power Train Engineering (PTE) is one of the major R&D divisions of ARAI. PTE provides comprehensive engine design, emission control and testing expertise for diesel, gasoline, CNG, LPG, bio-diesel and ethanol engines.
PTE undertakes projects for enhancing the power density & fuel economy and reducing emissions from engines used in 2 and 3 wheelers, cars, LCV and HCV, tractors, off-highway and genset applications.

Services offered

- Concept design and detailed engineering
- Computational simulation based on advanced software
- Combustion optimization, port development & matching
- Emission reduction to meet Euro, EPA and Indian norms
- Mechanical design of components, dynamic analysis of power train and valve train system
- Conversion of diesel and gasoline engines to CNG and LPG fuels
- Feasibility study
- Durability testing
- Localization programs

Major facilities in PTE

- CFD software packages - FIRE, SWIFT, FLUENT
- Design & Analysis software - Excite Designer, Tycon, Glide, Hydsim, GT-Crank, GT-Vtrain, GT-Fuel, GT-Cool
- Performance & emission simulation software - Boost, Cruise, GT-Power, GT-Drive
- Transient engine test beds
- Raw & Dilute emission system with integrated FTIR facility to measure unregulated gaseous species
- Partial flow measurement of diesel particulate
- Full flow dilution tunnel with CVS for heavy duty engine emission and particulate measurement
- Swirl & Flow test rig
- High speed data acquisition for combustion and injection line pressures, injector lift, valve motion, torsional vibration etc.

Special Services To International Clients

- Elaborations of Indian regulations and requirements for certification
- Product design and development to meet Indian Safety and Emission regulations
- Assessment of their vehicles for Indian environmental and road conditions and usage pattern

For Literature & details of any services listed above, please contact:

R & D DIVISION

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ARAI
Progress through Research

The Automotive Research Association of India
(Affiliated to Ministry of Heavy Industries & Public Enterprises, Govt. of India)

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ARAI
Progress through Research

Profile

The Automotive Research Association of India (ARAI) has been playing a crucial role in assuring safe, less polluting and more efficient vehicles. ARAI provides technical expertise in R&D, testing, certification, homologation and framing of vehicular regulations.
ARAI is a co-operative industrial research association by the automotive industry with the Ministry of Industries, Government of India. It works in harmony and complete confidence with its members, customers and the Government of India to offer the finest services which earned for itself ISO 9001, ISO 14001, OHSAS 18001 and NABL accreditations.
ARAI is well-equipped with state-of-the-art infra-structural facilities and highly qualified and trained manpower.

Establishment : 1966
Location : Pune, INDIA (150 km from Mumbai)
Area : 105 hectares
Built-up area : 15000 sq.m.
Manpower : 530+
Engineers : 255 (Includes 64 - Post graduates and doctorates)

Major milestones

1976 - Commencement Of Operations
- Establishment Of Component, Engine and Vehicle Testing Facilities

1985 - First Symposium on International Automotive Technology (SIAT)

1990 - Establishment of laboratories for Structural Dynamics, Emission Certification and Advanced Engine Testing

1993 - Commencement of services for Export Homologation

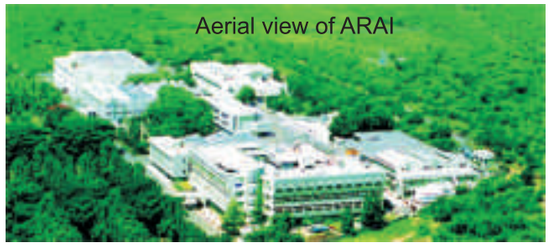
1996 - Establishment of Crash test facility and Calibration Laboratory

2003 - Establishment of NVH, CAE and SLED facility

2005 - Establishment of Post-Graduate Academy

2006 - Establishment of Advanced Emission Laboratory

2008 - Establishment of CISPER


Aerial view of ARAI

Services Offered

Testing, Certification and Homologation

ARAI offers expert services in testing, certification and homologation of complete vehicles, engines, systems and components. It covers the areas of vehicle evaluation, emission, safety, materials, EMI / EMC etc.
Other services of ARAI include technology demonstration projects, turnkey consultancy, calibration and specialized training programs. ARAI also assists the Government of India in formulation of automotive standards and acts as the secretariat for WP 29 activities.
ARAI also conducts a Post-Graduate course in Automotive Engineering along with Vellore Institute of Technology.

Research & Development (R&D)

ARAI offers comprehensive R&D services in the fields of engine development, alternate fuels, NVH - Noise, Vibration & Harshness, computer-aided engineering, structural dynamics, automotive electronics and materials.

Testing, Certification and Homologation

Vehicle Evaluation Laboratory (VEL)

- Test and certification of all types of motor vehicles, as well as Construction Equipment Vehicles as per Indian Standards
- Homologation of vehicles for export as per International Standards, viz. EEC / ECE / ADR etc.
- Validation / Endurance tests under Indian road, load and climatic conditions
- Performance evaluation of all types of vehicles with respect to parameters like brakes / ABS, max. speed, Pass-by-Noise, fuel consumption, gradeability etc.

Emission Certification Laboratary (ECL)

- Emission testing of 2 / 3 wheelers, passenger cars, LCV & HCV
- Export homologation
- Engine Certification for commercial vehicles, tractors, construction equipment and genset
- Particulate size measurement including nano-particles
- After-treatment device evaluation
- Mileage accumulation
- Special projects like ambient air quality, emission inventory, source apportionment etc.
- Evaporative emission measurement in SHED facility

Safety & Homologation Laboratory (SHL)

- Full frontal crash
- Air bag deployment
- Side door intrusion
- Head restraint impact
- Helmet impact
- Safety glass impact
- Steering impact
- Mirrors
- Lighting & signaling devices
- Wind screen / wiper systems
- Automotive bulbs
- Speed limiting devices
- Wheel rims
- Horns
- CNG / LPG components
- Brake hoses

Automotive Materials Laboratory (AML)

- Chemical analysis of materials
- Testing of fuels / oils / fluids / engine coolant
- Vehicle exhaust / air quality analysis
- Physical and mechanical properties
- Metallurgical failure analysis
- Electrical and thermal properties

Calibration Services

- Pressure
- Temperature
- Electrical parameters
- Weight
- Electronic balances

Core R&D Areas

Structural Dynamics Laboratory (SDL)

Structural Dynamics Laboratory (SDL) is engaged in R&D in fatigue, structural integrity, durability and reliability of automotive vehicles, systems and components. Fatigue testing, design optimization and correlation exercise of laboratory & service

ARAI
Progress through Research

conditions are some of the major projects carried out. The facilities include experimental stress analysis, service load data acquisition and analysis, servo-hydraulic actuators of various capacities, multi-axial test set up, four poster and SLED.
SDL has extensive experience in carrying out fatigue evaluation of components such as shock absorbers, chassis frames, brackets, crank shafts, connecting rods, cylinder blocks, axle housing etc., systems such as steering, suspension etc. and complete vehicles.

Guiding principles

- Compressing vehicle development cycle
- Bringing road to the laboratory

Automotive Electronics Department (AED)

- Evaluation of Automotive Electronics Systems & Sub-systems for their performance in terms of EMI-EMC, Temperature, Vibration, Altitude.
- Development of embedded automotive electronics monitoring and control systems such as 2 wheeler fuel injection, Tyre pressure Monitoring system etc.
- Development of automotive test instrumentation such as chassis dynamometer, E-DACS & digital dyno controller, In vehicle high speed data acquisition system etc.
- Certification & evaluation of electric and hybrid vehicles.