

STRUCTURAL DYNAMICS LABORATORY

Verification, Validation and Value Addition



Bringing the road / track to lab



ABOUT STRUCTURAL DYNAMIC LABORATORY (SDL)

- Test and analysis center with State -Of-The-Art technology, instrumentation and testing facilities
- Leading global brand in Automotive and Non-Automotive world
- Vehicle and component level evaluation over 3 Decades
- Client focused team committed to provide safe, reliable, economical and environment-friendly solutions, has experience of:
 - 1,800 Man-Years
 - 5,00,000 Kms of SLDA
 - 11,00,000 Hours of Component Testing
 - 80,000 Hours of Simulation Testing

KEY SERVICES

Accelerated durability evaluations

- Laboratory and field test
- Component, system and full vehicle
- Single to multiple actuator coupled test
- Vibration Durability in Climatic Chamber

Road Vehicle Interaction analysis

- Road load data collection
- Customer usage correlation
- Customer usage Duty cycle evaluation
- Road / test track scanning –2D and 3D
- Instrumentation –WFT, Gyro, load cell, telemetry

DVP development / testing (EV and ICE)

- Chassis component
- Interior exterior components
- Vehicle level performance, pre-homologation
- Reliability, durability, performance
- Powertrain, HVAC, Cooling system

Seat certification and developmental

- Static & dynamic – performance, reliability

Full vehicle benchmarking

- SBA • EDP • HRP • SBS • DM 

Full vehicle benchmarking

- Static & dynamic – performance, reliability

Vehicle dynamics –Ride and handling

- Subjective and objective evaluation

Non- Automotive: Durability, RLDA

- Railway, Metro – Frame Durability
- Construction equipment
- Trailer components
- Medical
- Agricultural vehicle
- Defence
- Aerospace

Component characterization (Stiffness /damping)

- Elastomer • Damper • Spring

Database/products

- Road profile • Road load

FACILITY

Test lab :

- Hydraulic Power Pack - 2,600 LPM.
- Hydraulics/Pneumatic actuators –@150 nos, 1kN to 500 kN capacity
- Rotary Actuators - Up to 24 kNm.
- Digital controllers – More than 100 channels
- Environmental test chambers – vehicle level



Environmental test chamber
(-40° C to 120° C)

State-Of -The- Art test rigs



Four / Six Poster



ED shaker



Seat robot-ingress, igress



Seat Belt Anchorage



MAST



6 DOF full vehicle simulator

RLDA: Sensors & Systems

- DAQ system (High speed 250 channels, low speed 300 channels) : @ 5 - 6 Nos.
- Wheel Force Transducers (WFT) : PC to HCV.
- Accelerometers DC, MEMS, ICP, Shock types (10g to 5000g): @ 100 Nos.
- Displacement Sensors (25 mm to 500mm)
- Strain gauges (Uniaxial, Rosette, Delta, Miniature)
- Pressure Sensors (25 bar to 1000 bar)
- Slip ring, Telemetry systems for wireless data measurement
- Ride & Handling sensors : Gyro, slip angle, DGPS
- Vehicle tracking & video data logging.
- OBD/CAN data loggers.
- Temperature loggers and sensors: @ 100 channels Anemometers
- Load washers : Engine & cabin mount force measurement
- Fuel, coolant flow rate measurement.



WFT



Telemetry



Strain Gauge



Accelerometers



LVDT



DAQ System

Data Analysis Tools

- Glyphworks • MATLAB • Altair
- RPC • ADAMS - Car

E-MOBILITY

- EV Benchmarking – Database
- Battery and motor sizing
- Powertrain performance optimization
- RWUP Duty cycle evaluation
- Energy and thermal management
- Accelerated durability validation of e-Powertrain.



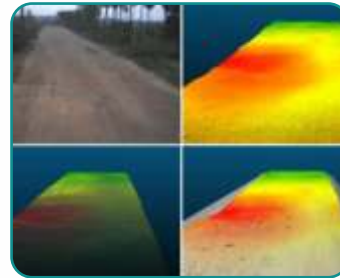
ROAD VEHICLE INTERACTION



Road profile database-
30,000 Kms



Tire model
generation (Ftire)



Test track & public
road mapping



Virtual RLDA

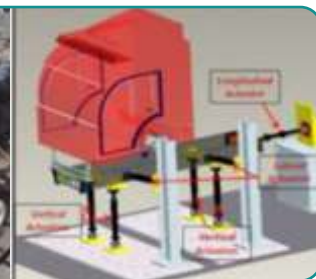
ACCELERATED DURABILITY EVALUATIONS



Component level – Rubber
parts, Knuckle, spring, shafts



System level – Chassis, axle, frame, cabin



Full vehicle level – Six /
Four post, Multi –axis

Flexible test set ups for testing of variety of components

ROAD LOAD DATA MEASUREMENT

- Duty cycle
- Customer Usage Correlation
- Accelerated Test Schedule
- Performance Measurement
Acceleration, Braking



WFT instrumented vehicle . On road test photos ,,, instrumentation , DAQ photos

INTERIOR / EXTERIOR TESTING

Mechanical Strength Tests

- Retention test / Pull out
- Static Load test
- Ease of Assembly disassembly.
- Stiffness measurements.
- Buckling measurements.
- Impact tests.

Durability

- Durability test
- All Life cycle testing for all components with and without environmental conditions
- 6 Degree of Freedom test on complete vehicle
- Continuous Operation Test.
- Full System Rigidity - 4 Poster.
- Vibration test with/without thermal condition

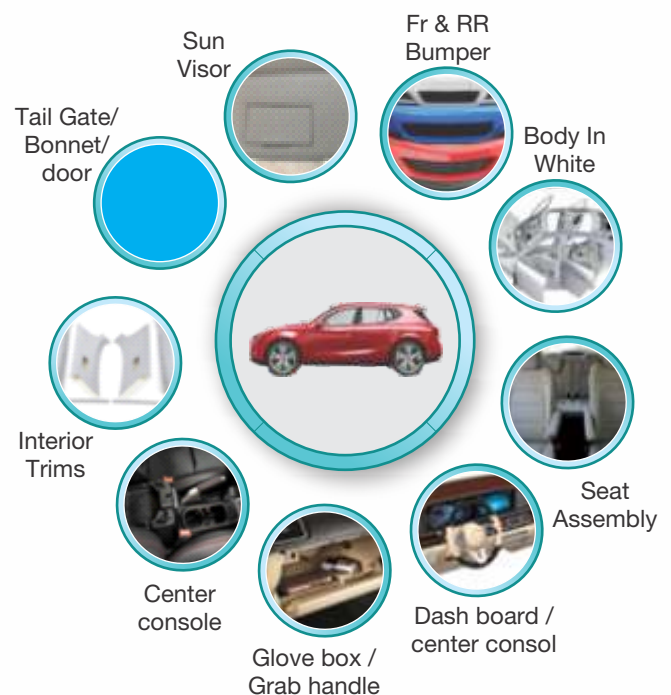
DVP LEVEL TESTING FOR INTERIOR AND EXTERIOR COMPONENTS

Regulatory

- Seat Belt Anchorage, Head Restraint Performance, Energy Dissipation Performance Seat anchorage test.
- Abuse/misuse slam Tests.
- Airbag static deployment tests.
- FMVSS 206,218,210,225
- ECE R17,14
- Interior Fittings - Head Impact.

Environmental

- Climatic cycle test for interior parts
- Thermal aging test.
- Freezing Tests
- Humidity tests
- All life cycles and performance tests in environmental conditions



RAILWAY / METRO

- Bogie Frame testing: EN 13749 / UIC615 / UIC515
- Vibration testing: IEC 61373.
- Performance / Accelerated durability testing: Damper, spring, pivot, axle.



OFF - ROAD

- Farm, construction equipment SLDA and Analysis.
- Accelerated fatigue testing: Machine, assembly, component level.
- Hydraulic lift actuator performance evaluation.



SEAT

Certification test



- Component level: IS15546/ECER17
- Seat Belt Anchorage test: IS15139/ECER14
- Isofix test: ECER145
- Construction equipment: IS6683

Development Test

- Static
- Durability
- Ingress / Egress



OTHERS

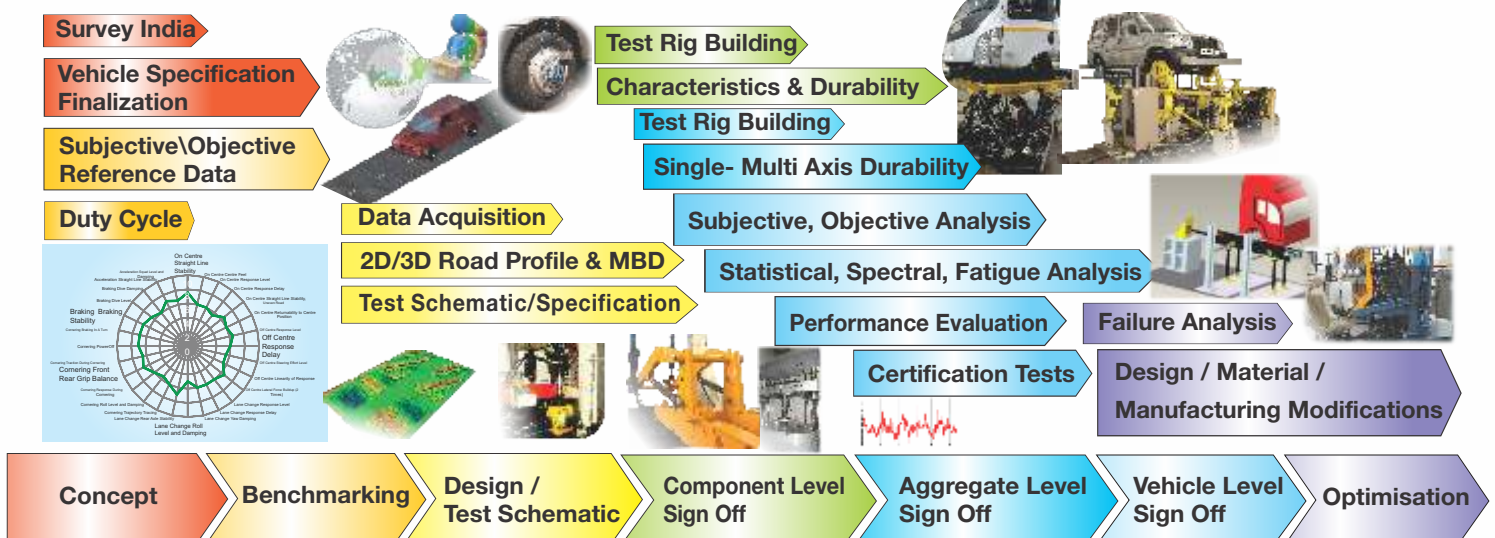
- Defence- On site instrumentation, SLDA.
- Defence- Vibration testing: JSS-55555.
- Defence- Component, Assembly level testing, validation.
- Testing of Reinforcement Rebar Couplers for Mechanical Splices of bars: Is16172.
- Testing of railing system.
- Medical equipment testing as per JIS and MIL.
- Climatic fatigue testing of the components used in hospitals.



PRODUCT / SERVICES

- ARAI's MARG – Indian Public road Database in .rdf and Open CRG format
 - Includes Special events like bump, potholes, railway crossing etc.
- Tire characterization and model Database - FTire and PAC 2002
- Survey India Database
- Indian Public Road Corridor database in OpenDRIVE / OpenSCENARIO Format for ADAS Development
 - It includes typical Indian assets like building, curb, road dividers, signal, road marking etc. along with OpenCRG Road
- Material characterization Database

YOUR PARTNER IN FULL VEHICLE DEVELOPMENT PROGRAM



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ARAI
Progress through Research



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

Regd. Office :
Survey No. 102, Vetal Hill, Off Paud Road,
Kothrud, Pune - 411 038, INDIA
Tel. : +91-20-6762 1510/1511, Fax : +91-20-6762 1104
E-mail : dhande.dts@araiindia.com | shinde.sdl@araiindia.com
Website : www.araiindia.com