



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 & 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 Evaluation

- Laboratory and field test
- Component, system and full vehicle
- Single to multi actuator coupled test
- Vibration Durability in climatic chamber
- 2 / 3 / 4 / 6 Poster testing

Road Vehicle Interaction Analysis

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

DVP Development & Testing (EV and ICE)

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

Seat Developmental & Certification Test

- DVP level – Static, durability & environmental
- Validation as per IS/ FMVSS/ ECE/ ADR regulations

Interior & Exterior Component Test

- Mechanical & strength
- Environmental
- Vibration, life cycle, durability
- Functional
- Regulatory

Vehicle Dynamics – Ride and Handling

- Subjective and objective evaluation
- Full vehicle benchmarking
- Static and dynamic – Performance, Reliability, Characterization

Non-Automotive: Durability, RLDA

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

Database/Products

- Road profile
- Tire model
- Road load

FACILITY

Test Lab

- Hydraulic Power Pack – 2,600 LPM
- Hydraulics/ Pneumatic/ Electric 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



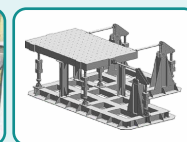
ED shaker



Seat robo
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 1000g): @ 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



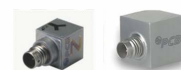
WFT (12" to 22.5")



Telemetry



Strain Gauge



Accelerometers



LVDT



DAQ System

Data Analysis Tools

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

E-MOBILITY – 2W, 3W & 4W

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



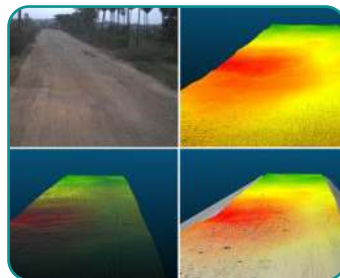
ROAD VEHICLE INTERACTION



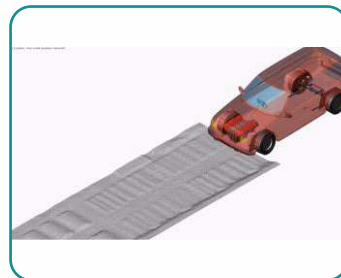
Road profile database
(30,000 Kms)



Tire model
generation (Ftire)



Test track & public
road mapping



Virtual RLDA +
Virtual Proving Ground

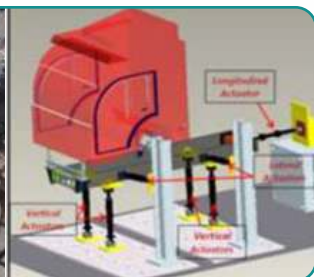
ACCELERATED DURABILITY EVALUATION



Component level – Rubber
parts, Knuckle, spring, shafts



System level – Chassis, axle, frame, cabin



Flexible test set up for testing of variety of components



Full Vehicle level - 6 DOF Multi axis &
4/6 Post test set up

ROAD LOAD DATA MEASUREMENT

- Duty cycle
- Customer usage correlation
- Accelerated test schedule
- Performance measurement acceleration, braking
- Benchmarking



INTERIOR / EXTERIOR TESTING

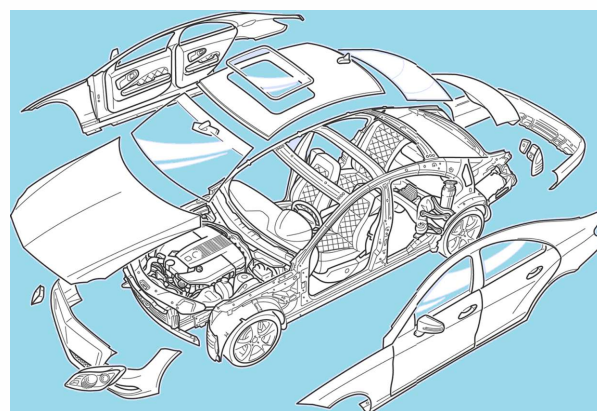
Instrumented test vehicles – 200 + channels

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 test
- FMVSS 206,218,210,225
- ECE R17,14
- Interior fittings - head impact

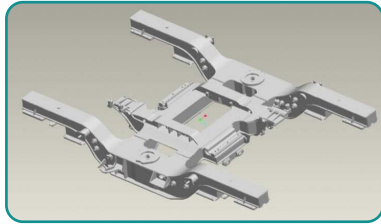
Environmental

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

Doors	Parcel Shelf	Trims
Tailgates	Glove Box	Consoles
Bonnets	Sun visors	Seats
Sunroof	Arm Rests	BIW
Floors	Windows	Bumper
Claddings	Spoiler	Badges

RAILWAY / METRO

- Bogie Frame testing: EN 13749 / UIC615 / UIC515



- Vibration testing: IEC 61373
- Performance / accelerated durability testing: Damper, spring, centre pivot, bellow, axle etc.

OFF-ROAD

- Farm / construction equipment data acquisition, analysis
- Accelerated fatigue testing: Machine, assembly, component level
- Hydraulic lift actuator performance evaluation



OTHER NON-AUTOMOTIVES

- Defence - On site instrumentation, SLDA Vibration testing (JSS-55555) Component, assembly level testing, validation
- Civil - 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

SEAT TESTING

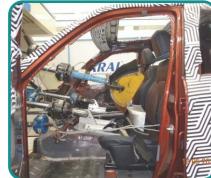
Certification



- Seat Belt Anchorage test (IS15139 / ECER14) Isofix test (ECER145)
- Component level (Is15546 / ECER17)
- Construction equipment (IS6683)

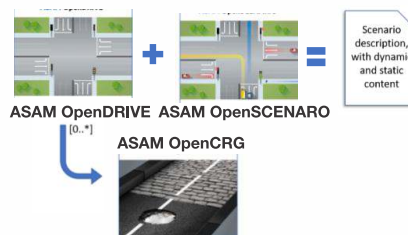
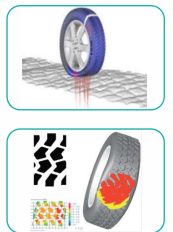
Development

- Static
- Ingress / Egress
- Durability

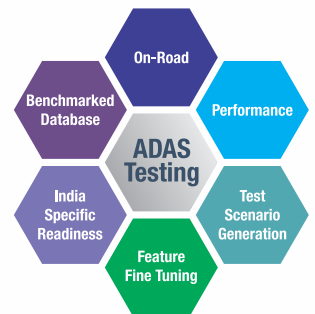


PRODUCT / SERVICES

- ARAI's MARG – Indian public road database in rdf & open CRG format - Includes special events like bump, potholes, railway crossing etc.
- Tire characterization and model Database - FTire and PAC 2002
- Indian public road corridor database in open DRIVE / open SCENARIO format for ADAS development - Includes typical Indian assets like building, curb, road dividers, signal, road marking etc. along with open CRG road

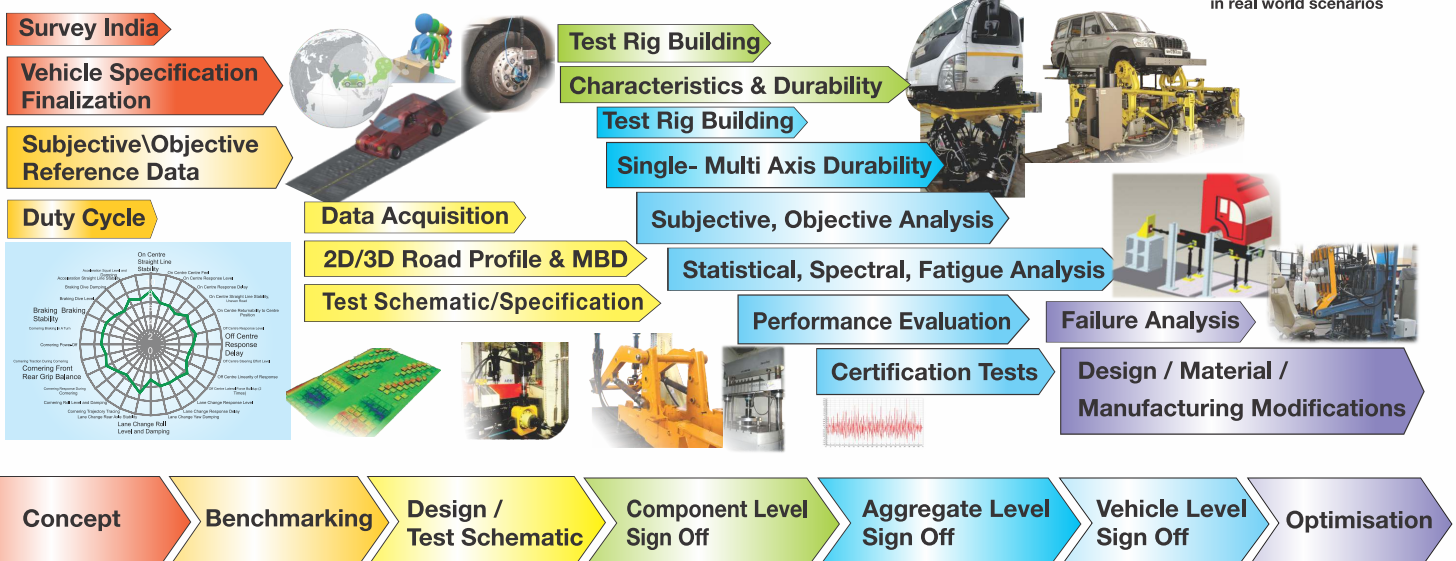


Database : ASAM OpenDRIVE and OpenCRG



ADAS subjective benchmarking in real world scenarios

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)

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