ARAI Update
Progress through Research
Transformation towards Progressive Mobility
Design, Development and Testing Services at ARAI

Apr-Sep 2025

New Capabilities / Development / Awards / Conferences / Seminars

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- Unified Compliance Platform for CSFC and WVSCoP: Advancing CMVR TAS Digital Ecosystem
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- ARAI Strengthens Automotive Testing Capabilities with New Office at NATRAX Indore
- ARAI Signs MoU with ASDC to Offer NSQF Certified Courses in Electric Vehicle Technologies
- ARAI Celebrates World Book and Copyright Day with Book Exhibition cum Sale
- ARAI Journal of Mobility Technology (Volume 5, Issue 4, October-December 2025)
- Symposium on International Automotive Technology, 2026
- ISO 17025 Accredited Calibration Services

❑ Development of India's First Electric / Series Hybrid Electric Fishing Vessel

Mumbai Research Centre of ICAR-Central Institute of Fisheries Technology (ICAR-CIFT) and ARAI successfully launched "Vikalpika" – India's first Electric & Series Hybrid Electric Fishing Vessel – on 26th May 2025 at Gorai Creek, Mumbai.

The diesel engine-powered fishing boat having gross weight of 5 tons is converted into a Battery-Operated Electric Version using Model-based simulation, design and analysis techniques. The supply chain is created for getting the electric drive system and components as per the required specifications and for meeting the present AIS functional and according to safety requirements. Considering the need for redundancy in case of battery depletion due to severe weather conditions at sea, a series hybrid electric version as an alternate / improved version is designed and developed. Controllers for pure electric and hybrid electric versions are developed by making in-house high-fidelity mathematical models of electric drive systems and deployed on real-time micro controllers for efficient and fail-safe operations of the boat. Physical prototype is developed for Electric and Series Hybrid Electric Versions and tested in the sea under full load conditions for maximum velocity, number of operation hours and on-board charging of battery and simultaneous propelling of the fishing vessel at low SoC condition of battery due to available on-board Series Hybrid System. ARAI, Dept. of Fisheries and CIFT tested the prototype fishing vessel at Gorai Creek, Mumbai, for functional performance in the Sea with full gross weight (2-ton fish catch + 3-ton curb weight of vessel).

This groundbreaking innovation represents a major milestone in the national effort to decarbonize India's marine fisheries sector, in alignment with the country's climate-resilient and sustainable development goals. Up to 70% reduction in fuel consumption is possible as compared to conventional vessels.

This project promises brighter future for Maharashtra's fishing industry. By transitioning to renewable energy solutions, we can ensure thriving future for next generations, safeguarding the environment, empowering communities and propelling economic prosperity.

Key Features of Vikalpika:

- Length: 7.92 m (26 feet)
- Propulsion System: Electric / Series Hybrid Configuration
  - 20 HP Diesel Engine
  - 20 HP Continuous Power PMSM
  - 12 kW/h Lithium Battery Pack (Primary Propulsion)
  - 1.65 kW Solar Panel System (Supplementary Source)
- Operational Range: Up to 10 km Offshore
- Endurance: 8–10 hours per full charge
- Fuel Reduction: Up to 70% as compared to that of conventional vessels
- Return on Investment (ROI): Estimated to be 3.5 years

Fig. 1: Electric / Hybrid Electric Boat Developed from Concept

Fig.2: Launch Ceremony - Electric & Hybrid Electric Boat for Fisheries Application

The event was graced by Dr. N. P. Sahu, Director (In-Charge), ICAR-CIFE Mumbai, as the Chief Guest. He emphasized on the vital importance of adopting green technologies in India's pursuit of net-zero emissions and commended the collaborative efforts of ICAR-CIFT and ARAI.

Formal launch and flagging-off of Vikalpika was conducted at Gorai Creek, followed by media interactions. In his remarks, Dr. George Ninan indicated that *Vikalpika* stands as a shining example of cross-sectoral collaboration and technological innovation for sustainable fisheries development.

The vessel is now set to undergo field trials at selected coastal sites in Maharashtra to validate its performance, energy efficiency and economic feasibility in real-world fishing operations.

Officials of Department of Fisheries, Government of Maharashtra, ICAR-Central Institute of Fisheries Education Mumbai, ICAR-CMFRI Mumbai, Fishery Survey of India, Marine Products Export Development Authority (MPEDA) Mumbai, SASMIRA (Synthetic & Art Silk Mills' Research Association) Mumbai, ARAI Pune, Bank of India Mumbai Headquarters, Fibre Tech Gorai, Innovegic India, Bangalore, MP Ensystems Goa, attended the event.

❑ Unified Compliance Platform for CSFC and WVSCoP: Advancing CMVR TAS Digital Ecosystem

Introduction:

Delta System was introduced by ARAI roughly fourteen years back and since then it has been in regular use in serving the auto industry. However, with the technological advancements in the software industry, it started lacking and slowly started becoming a storage and data entry software and this wasn't the visualized aim of the DELTA Portal. ARAI Homologation Management and Regulations Dept (HMR) had initiated technical and digital innovation platform CMVR TAS in 2020 after taking inputs from the Industry and internal stakeholders with an aim to provide enhanced and apparent interface to all the stakeholders. HMR completed User Acceptance Testing and unveiled the portal on 15th July 2021 for the user-industry to have working experience.

India's automotive regulatory ecosystem requires compliance at both Type Approval (TA) and production stages. Conformity of Production (CoP) ensures vehicles manufactured post-approval adhere to the certified specifications. With the evolving standards, digitalization of CoP is essential for reducing cycle times, improving traceability and enhancing stakeholder experience. To ensure that vehicles continue to meet quality, safety and performance standards established at the time of type approval, Conformity of Production (CoP) frameworks are mandated in India. Two critical CoP regimes are CSFC CoP (Constant Speed Fuel Consumption CoP) as per AIS 149 and WVSCoP (Whole Vehicle Safety CoP) as per AIS 017 Part 6. While CMVR Type Approval System (TAS) has matured over nearly five years serving the large stakeholder base with high user interface and acceptance and is widely adopted for TA processes, it did not originally provide specialized capabilities for CoP management requirements that differ from type approval processes. Absence of dedicated CoP platform for first cycle (Dec 2022 to March 2025) resulted in manual processes, fragmented workflows and limited analytics. Integrating CoP module into TAS provides a single-window solution, reducing complexity and cost while improving efficiency. The integration of CSFC CoP and WVSCoP modules into CMVR TAS delivers unified, efficient and compliant digital ecosystem for India's automotive industry. By leveraging TAS's present infrastructure and user familiarity, the solution ensures cost-effectiveness, operational efficiency and readiness for future regulatory evolution.

Regulatory Background:

CSFC CoP (AIS 149): Validates fuel consumption at constant speeds of any model randomly selected from the plant, ensuring benchmarks match as per the regulations.

WVSCoP (AIS 017 Part 6): Confirms the safety critical components fitted on the vehicle and vehicle level test to check that the performance of the vehicle remain compliant post-approval.

CMVR Framework: Governs TA and CoP processes under Government (MORTH) notifications and AIS / IS standards.

Present functional features as introduced in the portal are mentioned hereunder. The document will also summarize the benefits all the stakeholders can have with the new portal, ensuring that the new system always remains relevant and updated with the new technology and user experience design.

Problem Statement:

Current TAS workflow do not support CoP-specific requirements, such as:

- New data fields and validation rules.
- Sampling and batch management tools.
- Audit trails and traceability across VIN batches.
- Integrated **CAPA** (Corrective and Preventive Action) handling.
- Real-time collaboration for non-conformance resolution.

Objectives:

- **Unify** CSFC and WVSCoP workflows under CMVR TAS.
- **Digitize** end-to-end CoP processes: planning, sampling, testing, reporting, approvals, CAPA.
- **Standardize** templates and data models per AIS 149 and AIS 017 Part 6.
- **Enable** audit-grade traceability and compliance dashboards.
- **Leverage** TAS familiarity for rapid adoption and cost efficiency.

Functional Features:

- **CoP Planning**: Tentative month of selection, manufacturing plant details, sampling logic, traceability of person
- **Sampling Management**: VIN capture, statistical sampling.
- **Non-Conformance Handling**: CAPA workflows, evidence tracking.
- **Approval & Certification**: Digital sign-offs, compliance reports.
- **Analytics**: MIS, Real time dashboards and data capture.
- **ISO 9000** audit requirements data analysis is available on line.
- Digitized and secured **Proforma Invoice, Final Invoice, Test Reports and CoP Certificates**
- **EOHS** paper consumption target at ARAI level drastically reduced
- **Alerts and email notifications** have been introduced to notify customers for every significant operation taking place in system and highlighting any actions to be taken by customer.

The System will also help customers to ***identify departments, engineers assigned to their case, person visiting the plant for CoP selection*** and at the same time ***progress of testing at each Department*** in each case by clicking on the “i” button.

A **Real Time Case List** is provided to check latest status of all their applications. Customer is also provided an option to review the case at a glance by clicking “i” button.

Query Module has been introduced, which will be used for communication between customers and Departments at ARAI involved in the respective case.

Audit will enable customer to access audit trail of a particular case. This will contain all the actions taken by customer and ARAI in chronological order. This will be very helpful in maintaining the record for all the cases for future reference.

Repository: Most of the time customer has to submit same test report for various cases. TAS has a unique feature of Repository, which will be used as a storage place for all the data and later can refer in any case that will save time and reduce document clutter for case. Repository will also help all the Departments to find any reports uploaded on CMVR TAS with the help of Report Number.

Conclusion:

CSFC CoP Module and WVSCoP Module was launched on 25th April and 16th July 2025 respectively at the hands of Dr. Reji Mathai, Director-ARAI in the presence of Team-ARAI. Integrating CSFC CoP and WVSCoP modules in CMVR TAS delivers unified, efficient and compliant digital environment for India’s automotive ecosystem. By leveraging TAS’s established user base and infrastructure, the solution minimizes transition friction, reduces operational costs and strengthens end-to-end compliance from type approval to sustained production quality and safety. The proposed architecture, workflows and governance model positions the platform to adapt to evolving standards and industry needs.

Go Live Event of WVSCoP Module

❑ ARAI bags the prestigious Golden Peacock Innovative Product / Service Award, 2025

Director, ARAI *receiving Golden Peacock award* ***on Leadership for Business Excellence and Innovation*** *at* ***UAE Global Convention in*** *Dubai, April 2025*

Institution of Directors (IOD) felicitated ARAI for work on Development of Lightweight Aluminium Superstructure for Indian City applications. This is the result of continual efforts towards innovation for devising safe and sustainable solutions for Indian mobility sector.

About Invention:

Design and Development of Lightweight Aluminium Superstructure sought to addresses issue of making bus superstructure lightweight for improving fuel economy without affecting strength, durability and safety. Unique Aluminium extrusion profiles and its joinery is designed and developed to construct bus superstructure. The invention encompasses novel mechanical joining the method involving Aluminium extruded profiles fastened via unique Aluminium forged / extruded gussets, specifically designed for the extruded profiles to construct bus superstructure.

Conventional vehicle bus construction involves welded steel structure, which is heavy and prone to rusting. To address this issue aluminium superstructure product is developed with the following unique features:

- Aluminium extrusion profiles configured to self-align and securely interlock in profiles of angular and flat gussets to form a rigid joint by maintaining surface to surface frictional contact at the joint for increasing load carrying capacity of joint and ease of assembly and improving accuracy
- Welding is eliminated and hence there is no Heat Affected Zone (HAZ) and that results in no stiffness reduction of parent metal and no durability failure due to crack initiation from HAZ and further propagation resulting in failure. Joining is only through mechanical fastening, angular and flat gussets, resulting in higher structural durability.
- Higher recyclability of Aluminium superstructure up to 95%

Precise Benefits:

- Over 30% weight reduction in bus superstructure compared with the existing steel superstructure, resulting in better fuel economy / range improvement of 10 to 12%
- For city bus application, ~3000 ltr of fuel saving per year per bus considering 180 – 200 km of daily travel and 85% utilization in a year.
- No warpage of bus superstructure due to cold assembly (absence of welding)
- Weld spool reduction by 90% resulting in cleaner work environment
- Easy assembly of superstructure with increased accuracy
- 40% reduction in bus body development cycle time
- Corrosion free increased bus life

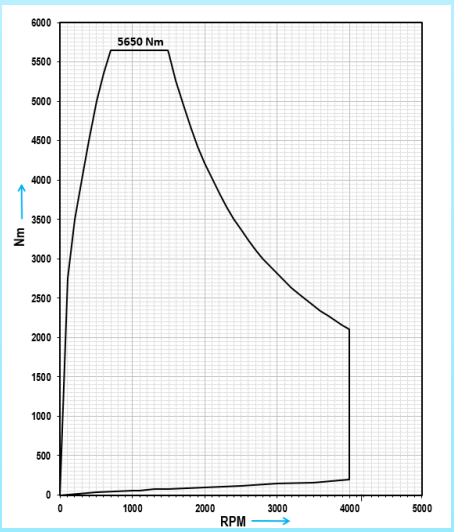
Aluminium lightweight Bus meets all the regulatory requirements, viz. AIS:052 Bus Body Code, AIS:153 and MoUD requirements and structural durability requirements.

The innovation resulted into providing indigenous, cost effective and import substitute solution for light-weighting of bus fleets. Aluminium bus design is Patented (Patent Number # 476062 Date of Grant 1/12/2023) with title “A Joint for Assembling Vehicle Body”. This patent is jointly held by ARAI & Hindalco.

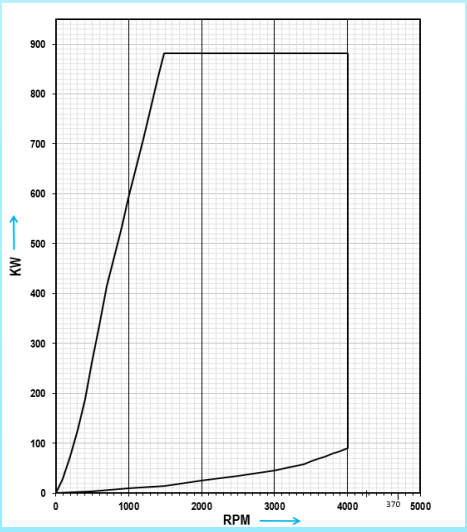
❑ Advanced Engine Steady State Testing Facility for Heavy-Duty IC Engines Up to 800 kW

Engine Development Lab of ARAI has established state-of-the-art engine test facility for **heavy-duty internal combustion (IC) engines**. The facility enables testing of engines up to **800 kW mechanical output, 5650 Nm torque** and operating at speeds up to 4000 rpm.

Dynamometer performance curve for speed and torque vis-à-vis Power output is as below.



Graph 1: Torque curve



Graph 2: Power curve

The facility is equipped with sophisticated instrumentation and control systems that ensure precise data acquisition and analysis across a wide range of operating conditions **along** with emission and particulate measurement system and other fuel, coolant and air conditioning system and thus enabling **comprehensive performance, emission, and endurance evaluations resulting in** meeting both current and future regulatory standards.

The facility is accredited to ISO/IEC 17025:2017 and it will support certification for high power rated **commercial vehicles, construction equipment,** and **Genset engines thus** Strengthens ARAI's position as a technical partner for OEMs and regulators some of the applications.

Applications:

- Advanced combustion development for Power and Emissions conventional and alternate fuels
- Non-automotive (CEV, Tractor, Genset, Earth Moving Vehicles, Material handling equipment and Mining Vehicles) engines
- Retrofit Emission Control Devices (RECD) development and certification for high-power applications
- Fuel efficiency and thermal management optimization

This facility will serve as a platform for validating next-generation heavy duty engine concepts, enabling data-driven insights and technology readiness for future mobility solutions.

❑ Acoustic Vehicle Alerting System (AVAS) Evaluation Capability at ARAI

Now a days, demand for Electrified Vehicles (EVs) is significantly increasing over conventional Internal Combustion Engine (ICE) vehicles. The shift from the familiar sound of internal combustion engines to the quieter hum of Electrified Vehicles has created an unforeseen challenge in vehicle recognition, particularly at lower speeds. Electrified Vehicles are supposed to generate an artificial alert sound for pedestrian ensuring safe usage of roads and fleets. Acknowledging the vital need to safeguard pedestrian safety, Government of India has decided to establish standard for minimum sound emission requirements of Electrified Vehicles and regulate these standards for safer future. In line with this necessity, AIS-173 standard has been developed and draft Notification No. G.S.R. 714(E) has been issued to this effect.

Consequently, electrified vehicles must be fitted with Acoustic Vehicle Alerting Systems (AVAS) as mandated by regulatory authorities. Therefore, sounds generated by AVAS are required to comply with specific regulatory standards. This stipulation necessitates compliance testing for all types of electrified vehicles, including PEVs (Pure Electric Vehicles), HEVs (Hybrid Electric Vehicles), FCEVs (Fuel Cell Electric Vehicles) and Fuel Cell Hybrid Vehicles (FCHVs).

ARAI has developed AVAS testing capabilities and facilities in accordance with AIS 173 Standards to assess minimum sound emission requirements concerning sound pressure level, 1/3rd octave band and frequency shift. NVH Lab of ARAI is equipped to conduct both outdoor and indoor testing as per AIS-173. ARAI offers indoor testing facilities, which include hemi-anechoic chambers at two locations in Pune (Kothrud and Chakan) and offers outdoor testing capabilities at various testing tracks available in the country. All necessary facilities for evaluating electrified vehicles are in compliance with the requirements set forth by AIS-173.

Additionally, NVH Lag offers developmental services, including AVAS development, sound signature creation, AVAS integration into vehicles, component-level assessment and vehicle-level evaluation, among others. This progress allows stakeholders in the electric vehicle sector to easily test their vehicles those are equipped with AVAS.

Overview of different methods of evaluating AVAS installed on vehicles in accordance with AIS 173 :

1. **Test in an Indoor Facility:**

   i. Evaluation of entire vehicle while in motion within an indoor facility utilizing chassis dynamometer (Method C as per AIS-173). This approach is highly recommended for testing as it allows to assess the vehicle under dynamic conditions without interference from environmental noise, resulting in enhanced accuracy and reliability. ARAI's hemi-anechoic chamber facility complies with the standards set forth in ISO 26101:2012.

   ii. Evaluation of entire vehicle while stationary in an indoor environment, simulating vehicle speed to AVAS using external signal generator (Method D as per AIS-173).

2. **Test on an Outdoor Test Track:**

   i. Testing of complete vehicle in motion on an outdoor test track (as per method A).

   ii. Testing of complete vehicle in standstill condition on an outdoor test track with simulation of vehicle speed to AVAS by an external signal generator (as per method B).

Evaluation of AVAS unit in the absence of a vehicle within an indoor environment, utilizing simulation of vehicle speed directed to AVAS via external signal generator (Method E as per to AIS-173 for frequency shift requirement). This approach is applicable solely for developmental testing at the component level.

Figure 1: Vehicle with AVAS unit under test on Chassis Dynamometer

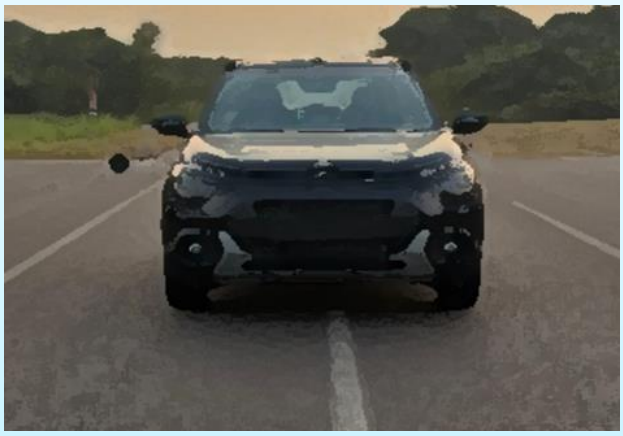


Figure 2: AVAS testing at outdoor test track in Dynamic and Standstill condition

Figure 3: AVAS unit without a vehicle under test

Why ARAI

- Key player in Indian Automotive NVH development
- Database of over 100 powertrains, over 50 vehicles, over 1000 acoustic trims and automotive sub-systems
- Quick turnaround time with proven tests and simulation methods
- Comprehensive test facilities like Hemi-anechoic chamber coupled with chassis and engine dynamometers, reverberation chambers, head and torso simulator, test rig for trim and component evaluation, over 200 channel data acquisition capability

ARAI NVH Capabilities

- Vehicle Benchmarking & Target Setting
- Noise Source Identification using Transfer Path Analysis (TPA)
- Sound package material characterization
- Combustion Noise Analysis
- Engine Calibration Optimization
- Off-road Vehicle and Construction Equipment NVH reduction
- Tire Noise Analysis
- Experimental Transfer Function Evaluation
- Operational Modal and Deflection Shape Analysis
- Exhaust & Intake system Design

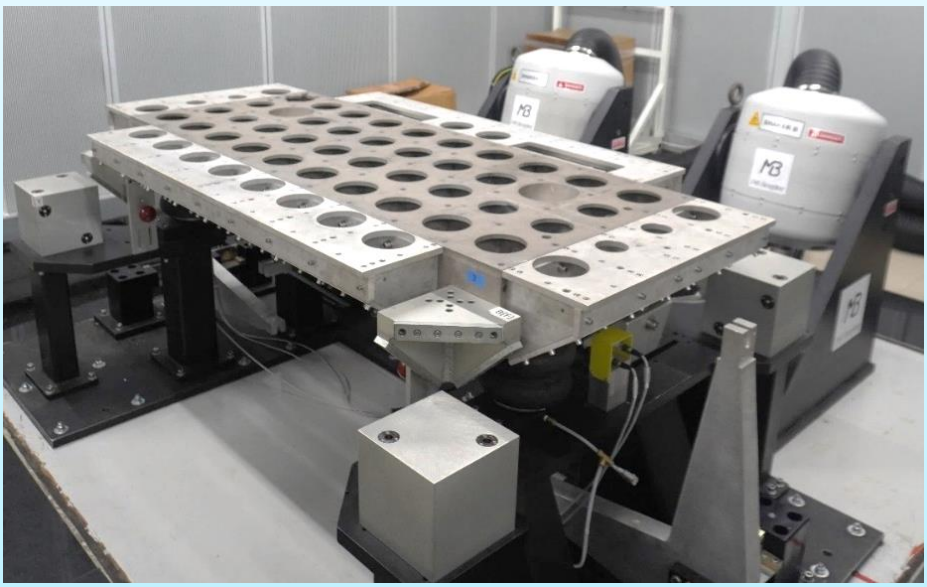
ARAI NVH Major Facilities

- Hemi-anechoic chamber with Engine and Chassis dynamometers
- Reverberation chamber suite with anechoic chamber
- Test Rigs for acoustic material evaluation
- Over 200 channel data acquisition systems
- Head and torso for sound quality analysis

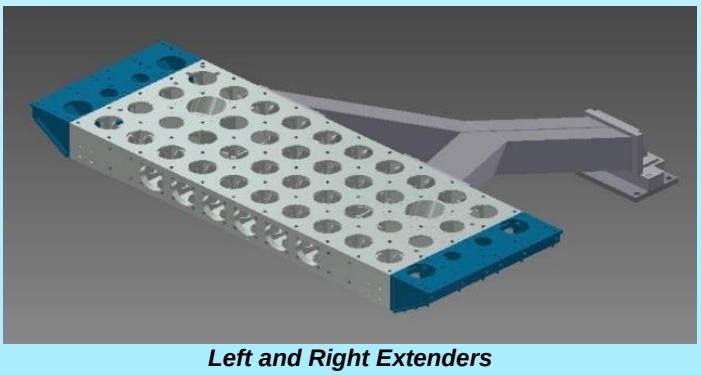
❑ Component and Sub-System Buzz, Squeak, Rattle Test Facility with Table Extenders

Buzz, Squeak and Rattle (BSR) component test facility of MB Dynamics (USA) make is established at ARAI for meeting TIER-I supplier requirements. Current demand of OEMs for BSR assessment for pre and post durability evaluations. To cater to mount large size components, viz. IP panels for LCVs, IP panel with floor consoles, sunroof systems, quarter vehicle bucks, table extenders were installed in the component BSR test rig. Table extenders comprises of front, rear, left and right extenders. With the installation of table extenders, overall table size is now increased to 1921 mm in width 1021 mm against the earlier size of 1500 mm x 600 mm.

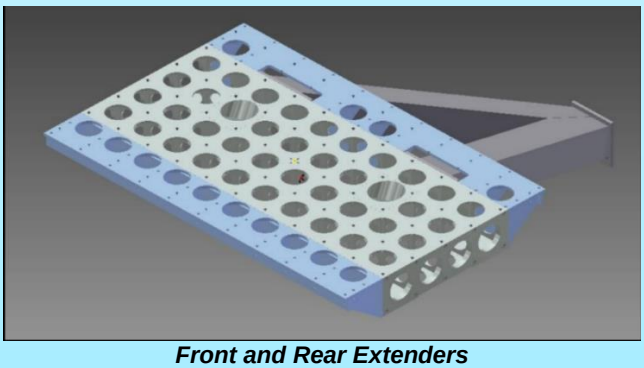
With the expansion of table extenders, technical specifications of the BSR rig, viz. maximum vibration level of 1.5 g rms for normal mode operation, 1.0 g rms for silent mode operation, maximum payload of 315 kg for all modes of operation (VPR, vertical, fore-aft and lateral) are retained. With the table extenders, wider and longer size non-automotive components, viz. electronic components, white goods and industrial equipment can be evaluated for BSR issues. Other advanced applications to include root cause analysis of critical components and vehicle sub-systems, noise and vibration source identification, operational deflection shape / modal analysis and fixture design/validation for different components.



BSR Test Rig with Front, Rear and Side Extenders



Left and Right Extenders



Front and Rear Extenders

❑ Advanced E-Axle Testing and Validation Facility: Accelerating EPT Development

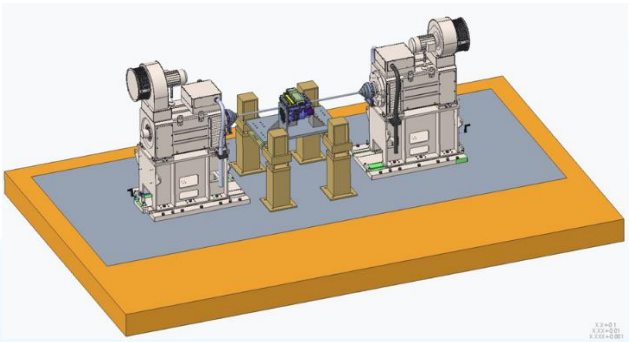


Fig. 1: EV Powertrain connected to 2dynos

Fig. 2: 600kW DCPS

The **state-of-the-art Powertrain Test Rig** is established to support advanced testing and validation of **e-axle systems** and electric vehicle (EV) powertrains. This facility is equipped with **two high-performance dynamometers**, each capable of delivering up to **220 kW of power** and **2200 Nm of torque**, resulting in a **total loading capacity of 4400 Nm and 440 kW**. This test bench has advanced features such as Road Load Simulation (RLS) that can support to replicate on road behaviour of test specimen when subjected to various load conditions.

This facility is also integrated with 600 kW DC Power Supply. This 600 kW powerhouse enables precise testing of EV components including e-motors, e-differentials, e-axles and hybrid drivetrains for both passenger cars and commercial vehicle applications. It is a unique system featuring two independent channels of 300 kW each. Its bidirectional energy flow feature supports for validation of regenerative conditions of powertrain.

This robust infrastructure enables a wide range of testing services tailored to the evolving needs of the EV industry:

- **Performance and Durability Testing**: Comprehensive evaluation of EV powertrain systems under various load and temperature conditions to ensure long-term reliability and efficiency.
- **Hardware-In-Loop (HIL) Testing**: Integration of real-time simulation environments for testing individual powertrain components, enhancing development accuracy and reducing time-to-market.
- **Parklock Evaluation**: Rigorous testing of transmission parklock mechanisms to validate safety and functionality under diverse operating scenarios.
- **Component Validation**: Specialized validation services for **DUJ/CV shafts** and **hybrid Dual Clutch Transmissions (DCTs)**, ensuring compliance with performance standards and durability benchmarks.
- **Function Validation**: critical functions like cornering and software functions, like Torque vectoring of e-differentials can be validated.

With its cutting-edge equipment and versatile testing capabilities, the Powertrain Test Facility stands as a critical enabler for innovation, quality assurance and accelerated development in the electric mobility sector.

This facility is established at Drivetrain Development Centre (DDC), HTC-NVH located at Chakan to offer services to all OEMs and component manufacturers.

❑ ARAI Prepared for AIS 175 WLTP!

ARAI inaugurated India's first Evaporation Emission Measurement System via Canister Aging Bench at its Homologation Technology Centre (HTC), Pune on 9th July 2025. This was a major step towards enhancing ARAI's Emission Certification capabilities well in advance of WLTP regulation implementation in India.

With the release of a draft notification S.O 270 (E) dated 28th April 2025 for implementation of Worldwide Harmonized Light Vehicles Test Procedure as per AIS 175, ARAI demonstrated its preparedness to enable the industry develop and validate as per global standards.

On the occasion, Dr Reji Mathai, Director-ARAI, highlighted India's roadmap for emission control with innovations like E20 and biofuel being explored for India's green mobility mission. He added that the auto industry should come together to work towards innovations aligning with domestic requirements.

The facility is compliant to AIS 175 WLTP and Global Technical Regulation (GTR) 19 with capability for ageing the canister by Gasoline fuel with Ethanol content up to 85% (E85) along with performing the Automatic Test Sequence as per:

1. INDIA - AIS 137 Part 1,2, 3 and AIS 175
2. UNECE GTR-19 (WLTP EVAP)
3. ECE Regulation No. 83 Annex 7 (Type IV Test)
4. Europe Directive 70/220/EEC, 715/2007/EC, 692/2008/EC, 1151/2017/EC, 1154/2017/EC, 168/2013/EC
5. EPA CFR 40 Part 86.153-98
6. EPA CFR 40 Part 1066 (referring to EPA Part 86)
7. CARB CCR 13 Part 1976, LEV 1-3
8. CHINA GB 18352.5-2013, Beijing 6 (Draft)
9. JAPAN JASIC 11-3-49 Part 8f

Applications:

- Canister aging / stabilization as per AIS, ECE, CARB regulations as above
- Canister working capacity evaluation
- Standard canister conditioning
- Puff-Loss Simulation
- Leak check procedure
- Combined-System for flexible use of Butane/N2 or Fuel Vapor/N2 mixture with Real fuel aging (300 Cycles) followed by 5 cycles of Butane/N2 for BWC determination
- BWC validation

Additionally, as a part of preparedness for AIS 175 WLTP, ARAI has enhanced its existing vehicle emission test facilities with upgradation of 4x4 Chassis Dynamometer and Test Automation Systems.

❑ ARAI Strengthens Automotive Testing Capabilities with New Office at NATRAX Indore

ARAI has expanded its footprint by establishing dedicated office at **NATRAX (National Automotive Test Tracks), Indore**, a move set to accelerate India's automotive innovation and compliance ecosystem.

This facility of new workshop provides test area for conducting static evaluation of vehicles such as Tell tales, CMVR checks, etc. also provide ARAI customers a lounge, meeting conference room, etc.

NATRAX, one of Asia's largest and most advanced vehicle testing facilities, offers **14 specialized tracks**, including an **11.3 km high-speed track**, dynamic platforms and ADAS evaluation setups. With ARAI's presence on-site, manufacturers can now validate cutting-edge technologies such as autonomous driving features, lane-keeping systems and collision avoidance under controlled conditions, ensuring safety and reliability. With ARAI's presence on-site, manufacturers can now access **faster homologation and certification services**, reducing turnaround time and enabling quicker product launches.

This strategic location near **Pithampur industrial hub** ensures proximity to major OEMs and component suppliers, cutting logistics costs and improving efficiency. The collaboration also supports testing for **electric vehicles**, **autonomous technologies** and **advanced safety systems**, aligning with India's vision for future mobility.

By leveraging NATRAX's world-class infrastructure and ARAI's technical expertise, the industry gains robust platform for **innovation, compliance and global competitiveness**. This expansion strengthens ARAI's major presence outside Pune, reinforcing its role as a national leader in automotive research and certification.

❑ ARAI Signs MoU with ASDC to Offer NSQF Certified Courses in Electric Vehicle Technologies

ARAI has signed an MoU with Automotive Skills Development Council (ASDC), New Delhi, on 4th April 2025, to collaboratively offer **National Skills Qualification Framework (NSQF)** aligned courses in Electric Vehicle (EV) domain.

Under this partnership, ARAI Academy will conduct two specialized NSQF Level 5.5 NOS courses:

- *Fundamentals of Electric Vehicle Battery Pack Design*
- *Fundamentals of Electric Vehicle Powertrain Design*

Professionals desiring to work in EV domain would either work on powertrain design (motor and related knowledge) or battery design (power source) or both. Because of huge push on electric vehicles, skilled manpower with practical and hands-on exposure becomes imperative. Above two programs are introductory courses of 60 hours duration each, with 70% of time devoted to hands-on and practicals. Such courses become a good appendage for engineers who are acquiring knowledge on other engineering concepts and having more of theory exposure in their regular 4-year degree program. Additionally, for a three-year diploma student, such a practical-rich training module gives an insightful chance to venture into EV domain.

Also, working professionals already in the automotive domain, who are willing to move towards electric mobility would initiate their journey with this first course and then continue further with many such courses, which would be jointly designed by ARAI and certified through ASDC under the NVCET curriculum.

The initiative aligns with India's growing emphasis on EV skill development, complementing national initiatives such as FAME, PM E-DRIVE and PLI schemes. This initiative definitely supports ARAI's long-term vision of expanding its training ecosystem and enhancing employability through accreditation under NCVET.

Course Highlights:

- 60 hours curriculum duration, with 70% hands-on and practical exposure
- NSQF-accredited (ASDC-certified) certification
- Practical and project-based learning modules
- Hands-On, Application-Based Demonstrations
- Delivered by ARAI SMEs who are NSQF-Certified Expert Trainers
- Industry-recognized certification by ASDC

For more details visit: www.araiindia.com/services/knowledge-dissemination

❑ ARAI Celebrates World Book and Copyright Day with Book Exhibition-cum-Sale

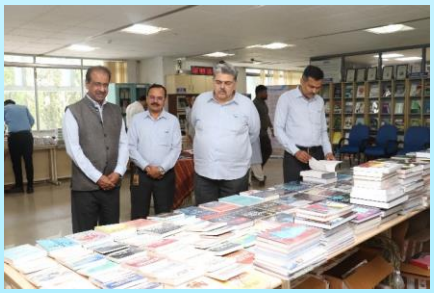
Knowledge Centre (KC) at ARAI organized a lively book exhibition and sale on 23rd and 24th April 2025 to encourage employees, students and visitors to read more and build a reading habit. The event highlighted how books inspire people and share knowledge, while noting that the technology improved access to various sources of information through reading. It aimed to promote reading, raising awareness about copyright issues and creating a space for people to interact, share ideas and enjoy literature.

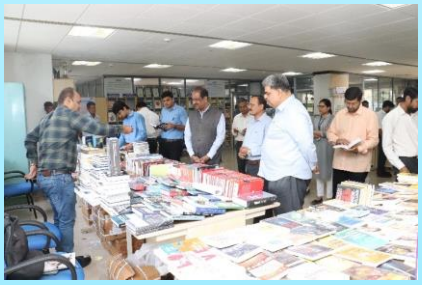

Book Exhibition inaugurated at the hands of Dr. S.S. Thipse, Sr. Dy. Director Head – EDL, ERL & KC and Mr. Anand Deshpande, Sr. Dy. Director, Head – AED Dept.

The exhibition displayed over 1,500 books in genres like fiction, non-fiction, technical literature and children's books, with sessions explaining copyright laws and their importance.

Five publishers, including R K Publications, Allied Publications, BSP Publications, Bombay Book, and Kabadwal Publications from various places, like Pune, Chennai, Hyderabad and Mumbai participated in the Exhibition. Attendees enjoyed discounted purchase of books and many bought titles at lower prices. Feedback was very positive, with 95% rating the event as excellent and 90% wanting similar events in the future. The celebration succeeded the goal, enriching the community's culture and linking literature with technology. KC thanked all the participants, publishers and Director-ARAI for supporting the culture of reading and learning.

Glimpse of exhibition:



❑ ARAI Journal of Mobility Technology (Volume 5, Issue 4, October-December 2025)

ARAI Journal of Mobility Technology is a technical journal that focuses on automotive and related topics. It is available in ONLINE and PRINT version.

This journal was started to help professionals, researchers and students to share their original research in the field of mobility technology. One of its goals is to provide platform for publishing articles on variety of automotive and allied subjects. Papers published in this journal are well-promoted in the automotive and research communities.

The journal welcomes contributions from researchers all over the world as well as that from scholars, academics and professionals in the automotive industry.

The 4th edition of the journal for year 2025 **(Volume 5, Issue 4, Oct-Dec 2025)** is released online. For more details, you can visit the journal's website at https://araijournal.com/index.php/arai

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Publication Started: 2021 (Oct)	**Frequency**: 04 Issues per year (January, April, July, October)
Copyright: ARAI, Pune	ICV 2023: 68.97
Subject: Engineering (Automotive)	Impact Factor: 6.73 (RPRI)

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and more..

Symposium on International Automotive Technology, 2026

COUNTDOWN BEGINS FOR SIAT 2026

The 19th edition of Symposium on International Automotive Technology, 23026, viz. SIAT 2026, is being organised by ARAI, in association with SAE International (USA) and SAE India, from 28th to 30th January 2026 at PIECC, Pune. SIAT 2026 will be centred at the theme "**Innovative Pathways for Safe and Sustainable Mobility**", with growing focus on advancements across various mobility domains, including Electric Mobility, Safety, Emissions, Noise, Fuel Cell, ADAS, Autonomous Vehicles, LCA, Cyber Security, AI, Software Defined Vehicles, etc. SIAT 2026 will witness presentation of over 250 Technical Papers and Keynotes by the eminent experts from 14 countries, over the 3-day Symposium. Plenary Sessions will have Keynotes and Panel Discussions by the renowned experts and distinguished leaders from the automotive industry.

Dr. Reji Mathai
Chairman, SIAT 2026 Advisory Committee
Director, ARAI

The concurrent SIAT EXPO 2026 will have over 380 exhibition stalls, providing an ideal platform to the worldwide automotive and allied industry, to showcase spectrum of their products, technologies, innovations and services.

With the overwhelming response being received for the Symposium and the Exposition, there is significant increase in the size and scale of the activities, including dedicated Micro, Small and Start Ups Pavilion, Special Technology Zone, Advanced Technology Pavilion, Sponsors' Pavilion, etc.

Key Highlights

- Inaugural Function, Technical Presentations, Exposition, Futuristic Technology Pavilion, Cultural Program, Luncheons and Valedictory Function.
- Plenary Sessions and Panel Discussions by distinguished leaders from the Automotive Industry.
- Over 250 Keynotes and Technical Paper presentations by the eminent experts from 14 countries in 8 conference halls.
- 26 topics including E-mobility, Safety, Emission, Alternate Fuels, DAS, LCA, Autonomous Vehicles, Cyber Security, AI, Software-defined Vehicles, etc.
- Excellent opportunity of knowledge dissemination & networking.

Symposium & Expo Schedule

DATE		SIAT 2026	SIAT EXPO 2026
28th January 2026	Wednesday	Inaugural Session & Technical Sessions	Inauguration & Exhibition
29th January 2026	Thursday	Technical Sessions	Exhibition
30th January 2026	Friday	Technical Sessions & Valedictory Session	Exhibition

SIAT EXPO 2026

SIAT Expo 2026 offers ideal platform for automotive OEMs, Tier-I, Tier-II and Tier-Ill Suppliers, Start-ups, Micro and Small Organizations, Equipment Manufacturers, Engineering Service Providers, Test Agencies to showcase their innovations and connect with the industry and explore new business avenues. SIAT Expo 2026 will provide an excellent opportunity for promotion of business, networking and dissemination of information.

SIAT Expo 2026 Layout

SIAT EXPO 2026 Esteem Exhibitors

Main Expo Pavilion

12th Wonder Research India Pvt. Ltd.
3M India Ltd.
A B Process Technology
AaralTech Pvt. Ltd.
Adams Engineering Projects Pvt. Ltd.
Adams Technology Pvt. Ltd.
Advance Catalyst Pvt. Ltd.
A'gain Digitech Pvt. Ltd.
Albonair India Pvt. Ltd.
Angelantoni Test Technologies India Pvt. Ltd.
Apicom SPA
ARAI
Automotive Test System
BEP India Automotive Systems
Bharat Petroleum Corporation Ltd.
Bosch Global Software Technologies Pvt. Ltd.
Business Sweden
Caltest
CAPCP Engineering Services Pvt. Ltd.
Carpenter Engineered Foams India Pvt. Ltd.
Chika Pvt. Ltd.
CM Envirosystems Pvt. Ltd.
CSI S.P.A.
CVMS climate india Pvt. Ltd.
D & M Technologies
D&V Electronics Ltd.
Dewesoft India Pvt. Ltd.
Dewetron Technology India Pvt. Ltd.
DSA Technologies India Pvt. Ltd.
Dspace India Solutions Pvt. Ltd.
Dynamic Test & Measurement Systems
Dynomerk Control
eltek systems
Embedded System Solutions Pvt. Ltd. (ESA Group)
Emitec Technologies India Pvt. Ltd.
Endurance Technologies Ltd.
Enorise India Pvt. Ltd.
Feintool System Parts India Pvt. Ltd.
FEV India Pvt. Ltd.
Gantner Instruments India Pvt. Ltd.
Gaxce Sensors Pvt. Ltd.
Global Automotive Research Centre
Globetek India Pvt. Ltd.
GNS Engineering India Pvt. Ltd
Head Acoustics India Pvt. Ltd.
HEL India Pvt. Ltd.
Henkel Adhesive Technologies
Hi-Lex India Pvt. Ltd.
Hilux Autoelectric Pvt. Ltd.
Hioki India Pvt. Ltd.
Horiba India Pvt. Ltd.
Humanetics Innovative Solutions India Pvt. Ltd.
IASYS Technology Solutions Pvt. Ltd.
I-Design Engineering Solutions Ltd.
Idiada Automotive Technology India Pvt. Ltd.
Igus India Pvt. Ltd.
IMV Corporation
Indeecon Equipments & Instrument Company
Indication Instruments Ltd.
Inspired Control systems Pvt. Ltd.
International Centre For Automotive Technology
Intrepid Control Systems Pvt. Ltd.
Ipetronik India Pvt. Ltd.
IPG automotive
Isotech Technology Pvt. Ltd.
Jemkon
Josts Engineering Company Ltd.
Keysight Technologies
Kristl Seibt India Pvt. Ltd.
Kyowa Electronic Instruments Co. Ltd.
L & L Products India Pvt. Ltd.
Madhura Power Technologies Pvt. Ltd.
Megatech Engineering & Services Pvt. Ltd. - ORME
Megatech Engineering & Services Pvt. Ltd. - BIA
Messring Gmbh
Messung Global Connect Pvt. Ltd.
Mettler-Toledo India Pvt. Ltd.
Mispl Systems Pvt. Ltd.
National Automotive Test Tracks
Nira Dynamics AB
Omni Matrix Pvt. Ltd.
Ono Sokki India Pvt. Ltd.
OPAL.RT Technologies India Pvt. Ltd.
Padmini VNA Mechatronics Ltd.
Panatech Asia Engineering Pvt. Ltd.
Paracoat Products Ltd.
Powertron India Pvt. Ltd.
Procyon TechSolutions Pvt. Ltd.
Reliance Industries Ltd.
Revine Technologies Pvt. Ltd.
Revine Technologies Pvt. Ltd.
Robosafe Systems India
Rohde & Schwarz India Pvt. Ltd.
Rosmerta Safety Systems Pvt. Ltd.
Rotarex India Pvt. Ltd.
Rotex Automation Ltd.
Safex Fire Services Ltd.
Saj Test Plant Pvt. Ltd.
Saleri India Pvt. Ltd.
Sams Advanced Climatic Technologies Pvt. Ltd.
San Instruments
Saraswati Dyanamics Pvt. Ltd.
ScalesDM India Pvt. Ltd.
Sciemetric Technologies India Pvt. Ltd.
Scientific Research Instruments Company Pvt. Ltd

SIAT EXPO 2026 Esteem Exhibitors

Main Expo Pavilion

Sheela Foam Ltd.
Shigan Quantum Technologies Ltd.
Simplinity Solutions Pvt. Ltd.
Smalley
Structural Solutions Pvt. Ltd.
Surelock Pvt. Ltd.
Swastik Synergy Engineering Pvt. Ltd.
Syncious Systems Pvt. Ltd.
T&S Technologies Gmbh
Tarang Kinetics (P) Ltd.
Tasking India Pvt. Ltd.
Technocrat Systems And Measurements
Technokraten
Tenneco Clean Air India Pvt. Ltd.
Tesscorn Systems India Pvt. Ltd.
Testing Expo
Theta Measurement & Control Solutions Pvt. Ltd.
Time Technoplast Ltd.
Transight Systems Pvt. Ltd.
Trinity Tapes Pvt. Ltd.
Trishul Engineers
TUV Rheinland India Pvt. Ltd.
Ubique Packaging Systems Pvt. Ltd.
Uk Pavilion (British Trade Office)
Unico (UK) Ltd.
URS Products and Testing Pvt. Ltd.
Vector Informatik India Pvt. Ltd.
Vibes Technology Pvt. Ltd.
VIT University Vellore
VVDN Technologies Pvt. Ltd.
Weiss Technik India Pvt. Ltd.
Welan Technologies
Wise Vehicle Testing Solutions Pvt. Ltd.
Wissen Baum Engineering Solutions LLP.
World Invent Scientific Technology Pvt. Ltd.
Yokogawa India Ltd.
Zen Microsystems
ZwickRoell Pvt. Ltd.

Special Technology Zone

Acsia Technologies Pvt. Ltd.
Advantek fuel systems Pvt. Ltd.
Aimil Ltd.
AIP GmbH & Co. KG
Aisin Automotive Haryana Pvt. Ltd.
Anritsu India Pvt. Ltd.
Ansys Software Pvt. Ltd.
BlackBerry India Pvt. Ltd.
Comsol Multiphysics Pvt. Ltd.
Convergent Science India LLP.
Eines Vision Systems
Embitel Technologies India Pvt. Ltd.
Envisys Technologies Pvt. Ltd.
ETAS Automotive India Pvt. Ltd.
Furniture Store
Goepel Electronics India Pvt. Ltd.
Hexagon Manufacturing Intelligence India Pvt. Ltd.
ITW India Pvt. Ltd.
KPIT Technologies Ltd.
Madras Engineering Industries Pvt. Ltd.
Mathworks India Pvt. Ltd.
Midtronics Inc.
Monad Electronics
N.R. Enterprises
NTF India Pvt. Ltd.
Qorix India Pvt. Ltd.
Rotary Electronics (P) Ltd.
Saaketh Electrocircuit Pvt. Ltd.
Scale-Tron Co. Ltd.
Schaeffler India Ltd.
SGP Electropnuematics Pvt. Ltd.
Shriram Pistons & Rings Ltd.
Siemens Industry Software(India) Pvt. Ltd.
Simerics Technology India Pvt. Ltd.
Simpro S.P. A.
Sonatus India Pvt. Ltd.
Sushma Industries Pvt. Ltd.
Systec Automotive Gmbh
Tekiknow Technologies India Pvt. Ltd.
Texon Corporation
Tuv Sud
Validate India Pvt. Ltd.
varroc Engineering Ltd.
Vecmocon Technologies Pvt. Ltd.
ZF India Pvt. Ltd.

Micro, Small & Startup Pavilion

Acme Tools
Aerocradle Innovations
Alfa Acoustics
AlfaTech Services Pvt. Ltd.
ANP Engineering Company
Appl Global Infotech Pvt. Ltd.
ARAI-AMTIF
Autocluter Development & Research Institute Ltd.
Belectriq Mobility Pvt. Ltd.
Bharati Fire Engineers
C. Abhaykumar & Co.
C4i4 Lab
Cadtech Engineering Solutions Pvt. Ltd.
Conation Technologies Pvt. Ltd.
Dcontour Litetech Pvt. Ltd.
Drivedge Infosolutions Pvt. Ltd .
Ettiksoft Technologies Pvt. Ltd.
Ferrstron Powertrains Pvt. Ltd.
FSID
Gudlyf Mobility Pvt. Ltd.
Hydrovert Energy Pvt. Ltd.
Innovative Engineering Solutions
Klartech Solutions Pvt. Ltd.
Leap & Scale Pvt. Ltd.
Machine House (India) Pvt. Ltd.
MaxEye Technologies
Micelio
Mindtronic AI India Pvt. Ltd.
NextGen Automotive Technology Pvt. Ltd.
Nk Technologies
Novorbis Itus Pvt. Ltd.
Pacific Dynamics
Precise AVR Technology Pvt. Ltd.
Prosafe Safety Equipments Pvt. Ltd.
Qualitek Labs Ltd.
Reckonix
Revine Technologies Pvt. Ltd.
Revotron Instruments Pvt. Ltd .
RN Embedded System Solutions Pvt. Ltd.
Sequretek
Shivamtech Global Engineering Pvt. Ltd.
Shraddha Infosystems
Shree Balaji Tech Services
Shree Lamipack Pvt. Ltd.
Skillicon Technologies
SR Motor
SYMEO
Syngient Technologies Pvt. Ltd.
Technology Internartional
Technotech Measurement Solutions Pvt. Ltd.
Technovuus
Tii Techno Testing Instruments Pvt. Ltd.
Transvahan Technologies India Pvt. Ltd.
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For more information, please visit SIAT 2026 Website at https://siat.araiindia.com

https://siat.araiindia.com

❑ ISO 17025 Accredited Calibration Services

ARAI's Calibration Lab is one of the leading calibration laboratories in India and has been offering calibration services for various parameters for more than 30 years. With its Motto "Quality Assurance Through Calibration", ARAI's Calibration Lab is equipped with state-of-the-art calibration facilities enabling calibration of various parameters under one roof. Most of the services are accredited as per ISO 17025 through world renowned organizations such as NABL and IAS. Its qualified and experienced staff strengthens the capabilities and also provides turnkey **Calibration services of entire Test cells or facilities**.

❖ Accreditation Certificates


National Accreditation Board for Testing and Calibration Laboratories

CERTIFICATE OF ACCREDITATION

THE AUTOMOTIVE RESEARCH ASSOCIATION OF INDIA (ARAI)

has been assessed and accredited in accordance with the standard

ISO/IEC 17025:2017

"General Requirements for the Competence of Testing & Calibration Laboratories"

for its facilities at

in the field of

CALIBRATION

Signed for and on behalf of NABL

Chief Executive Officer


INTERNATIONAL ACCREDITATION SERVICE

CERTIFICATE OF ACCREDITATION

This is to attest

THE AUTOMOTIVE RESEARCH ASSOCIATION OF INDIA (HTC)

PLOT NO. E-1/1, MIDC CHAKAN INDUSTRIAL AREA, PHASE-III, TALUKA KHED, PUNE, 410 501, INDIA

SATELLITE FACILITY: SURVEY NO. 102, VETAL HILL, OFF PAUD ROAD, KOTHRUD, PUNE, 411 038, INDIA

Calibration Laboratory CL-274

has met the requirements of AC204, *IAS Accreditation Criteria for Calibration Laboratories*, and has demonstrated compliance with ISO/IEC Standard 17025:2017, *General requirements for the competence of testing and calibration laboratories*. This organization is accredited to provide the services specified in the scope of accreditation.

Expiration Date June 1, 2026

Effective Date June 9, 2025

International Accreditation Service

Issued under the authority of IAS management

Visit www.iasonline.org for current accreditation information.

In its quest to continuously update and upgrade itself, the Laboratory has added new services and capabilities.

Load Cell Calibration Facility

CAL Lab of ARAI has newly developed the capability to calibrate instrumented dummy load cells and seat belt load cells along with conventional universal load cells, S-type load cells and special purpose load cells. **The facilities are multi location with presence at ARAI, Kothrud as well as ARAI-HTC, Chakan. Both the facilities are ISO/IEC 17025:2017 accredited by IAS (International Accreditation Service).** This accreditation is a recognition of technical competency, quality management and commitment towards accurate, precise & reliable calibration.

This accredited calibration capabilities includes:

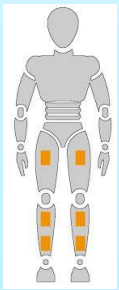
1. Types of Load cells – Universal, Seat Belt, Dummy, S-Type & Special Purpose Load cells, etc.
2. Range from 100 N to 100 kN
3. CMC from ± 0.06% to ± 0.1%

❖ Reference used for Loadcell Calibration

Reference Loadcell

Force Calibration Machine

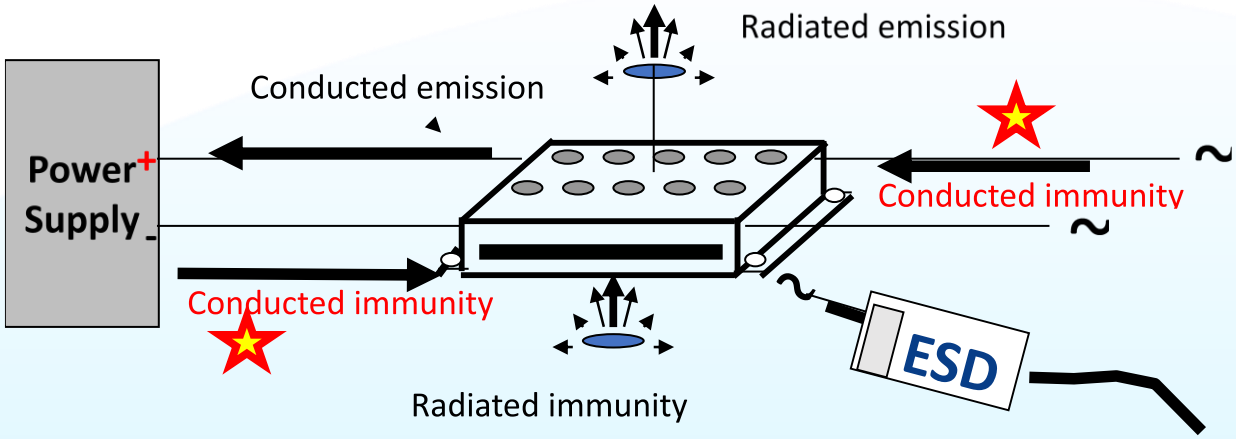
Instron Machine



❖ Device Under Calibration Loadcells- Universal, Seat Belt, Dummy, S-Type, etc.

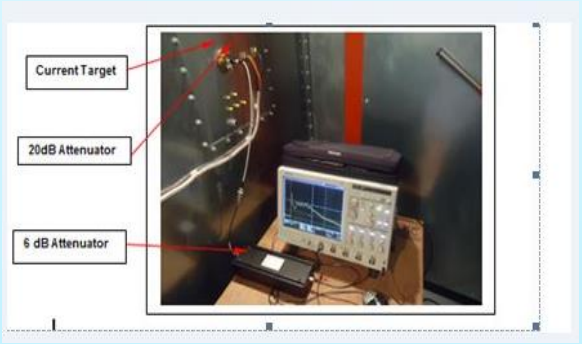
Calibration of Instruments for EMI / EMC Testing

EMI / EMC testing verifies if the devices do not interfere with other electronics equipment / signals and can operate with their intended electromagnetic compatibility and emissions without any errors or malfunctions. The instruments used for EMI / EMC testing need to be critically verified for their accuracy and reliability so that they ensure compliance of the product to the regulatory standards.



EMI/EMC Testing Concepts at a glance

ARAI's CAL Lab has established competency for calibration of such Instruments, which include: Automotive Generators, Non-Automotive Generators, ESD Generators, LISN, Current probe EM clamp, CDN Attenuators etc. Calibration of all EMI / EMC instruments is done as per the procedure prescribed in the latest respective standards (ISO 7637-2, IEC61000 4-4, IEC 610004-5, IEC 610004-11, IEC610004-12, etc.)

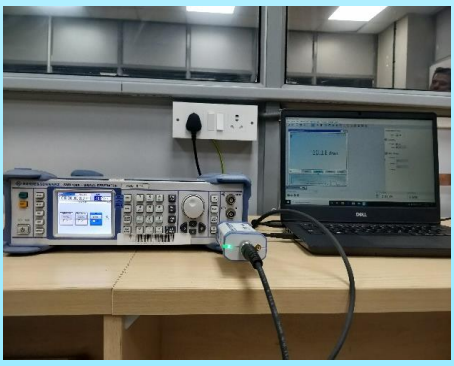


Electro Static Discharge Generator (ESD) & Target Plate Calibration as per ISO10605 and IEC 610004-2

Recently updated for -

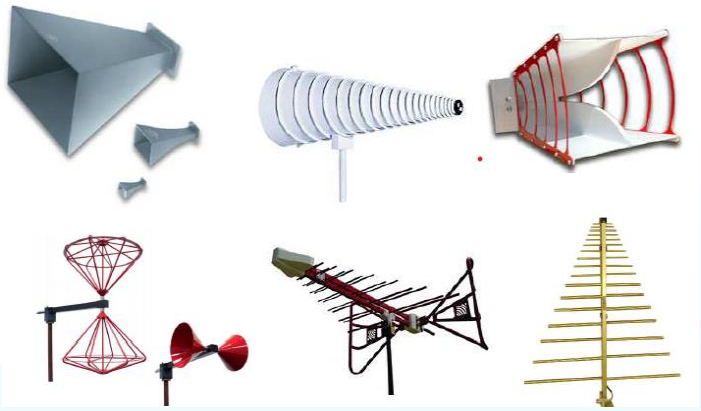
a. Signal generator up to 18 GHz with modulation parameters
b. Power meter & power sensor up to 18 GHz
c. Ring wave generator as per IEC 61000 4-12
d. Antenna Calibration – distance as per SAE ARP958

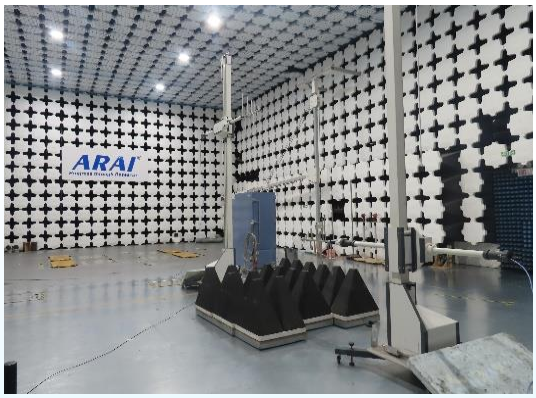
The Lab is accredited by NABL as per ISO/IEC 17025:2017 for calibration of above instruments.



Facility for Signal Generator Calibration

Facility for Antenna Calibration – distance as per SAE ARP958





Enhancement in Electro-Technical & EMI / EMC Scope

CAL Lab of ARAU has wide scope of calibration in Electro-Technical as well as EMI-EMC discipline.

1. Electro-Technical Scope:

Recently, we enhanced our DC current measurement scope up to 500 A and the scope is accredited as per ISO/IEC 17025:2017 by NABL. The accredited CMC is ± 0.4% to 0.6% (from 20 A to 500 A).

This will help to measure charging and discharging current of Battery as well high current source equipment.

Current measurement with shunt

Data Acquisition System /Controller Calibration Facility

Data Acquisition System Calibration

For any further information and Calibration requirement, please reach us on info@araiindia.com; manel.sdl@araiinida.com (+91 020–6762 1521)

Dr. Reji Mathai, Director, ARAI
director@araiindia.com

ए आर ए आई
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Progress through Research

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