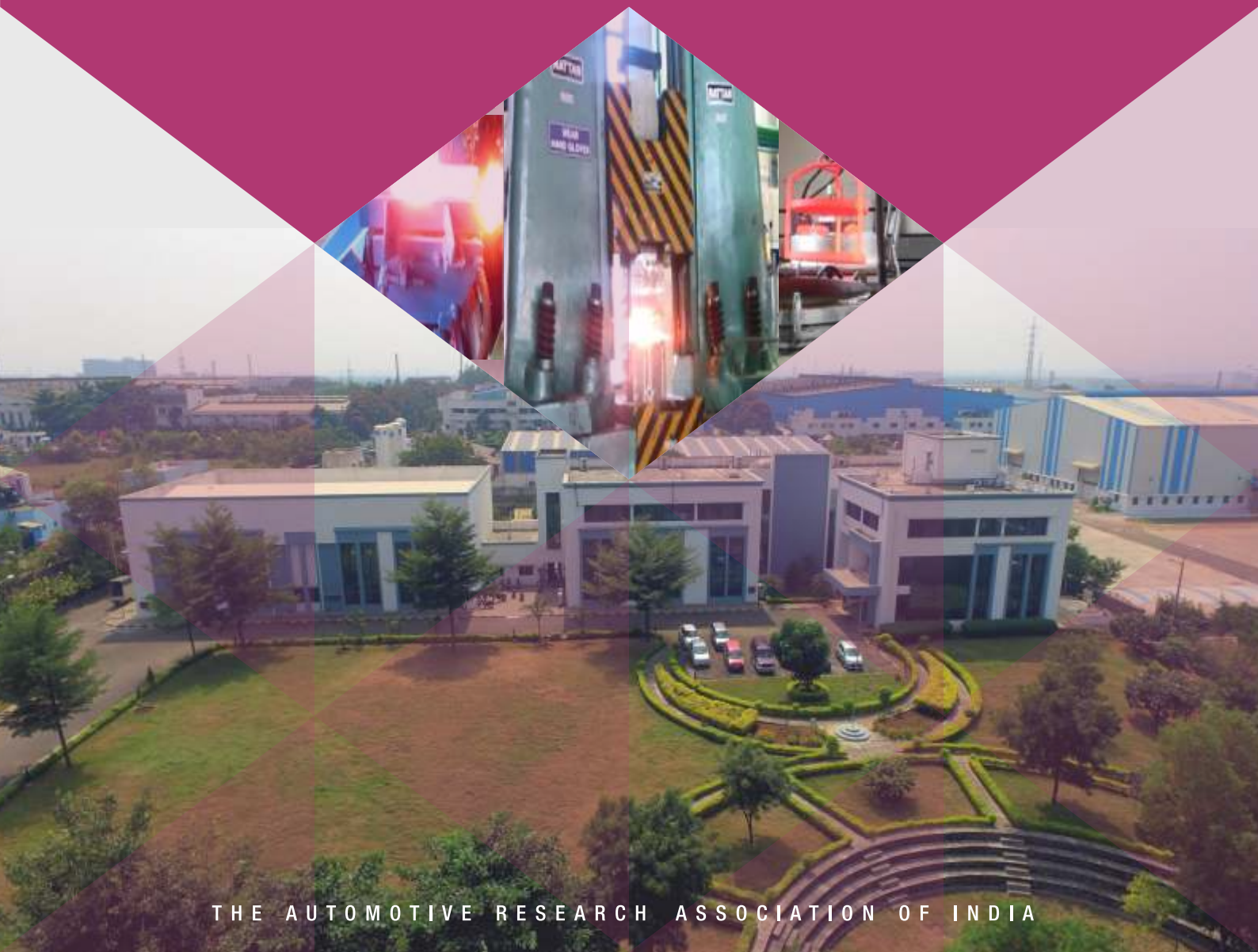
YEARS OF TRUSTED GLOBAL EXCELLENCE
1966-2021

ARAI®
Progress through Research

FORGING INDUSTRY DIVISION



THE AUTOMOTIVE RESEARCH ASSOCIATION OF INDIA

FORGING INDUSTRY DIVISION

Forging Research Lab

Forging Simulation

Material Testing

Fatigue Testing

Failure Analysis

Vision

- To carry out Industrial Research, Design and Development work as per the needs of the industries and to transfer developed technology to industries
- To Incorporate the Concept of value-based R&D / Testing in all sphere of Forging Industry.
- To offer skill up-gradation and training for Forging Industry

Benchmarking, Design and Simulation

- Blue light 3D scanner & point cloud data to 3D conversion
- CAD modelling services.
- Forging die design for new part development
- Die stress prediction and optimization
- Forged component process defect analysis & its elimination
- Advanced metal forming process simulations (E.g. Cross wedge rolling, Orbital forming, Ring rolling, Sheet metal forming, Heat-treatment etc.,)

Prototype Forging and Heat Treatment

- Dilatometry testing for plotting TTT & CCT Curve and new material development
- Corrleation of experimentation with Simulation leading to accurate virtual simulation
- Metal forming lubricant evaluation for frictional parameters
- Non-ferrous metal forging and Heat treatment process design
- Forging process parameter optimization
- Energy saving projects by heat treatment parameter optimization
- Facility available for prototype forging and heat treatment.

Product Testing by Metallurgical Analysis

- Metallurgical failure analysis, investigation and process development
- Material characterization of forged components by various metallurgical testing

Product Validation by Fatigue Testing

- Structural component testing – Static and Fatigue
- Vibration fatigue testing and validation
- Engine component fatigue testing
- Strain measurement and data acquisition

FORGING AND HEAT TREATMENT RESEARCH

Cost of material and energy are the most contributing factors in competitiveness of any forging industry. Therefore any savings made in material used and energy required will benefit the industry. Hence ARAI in its Initial project has taken the initiative to develop capability to generate the material data bank for hot forging materials and establishing forging research facility .

Research at FID is focused on developing lightweight forging process for automotive components and energy saving by heat treatment optimization using three different approaches

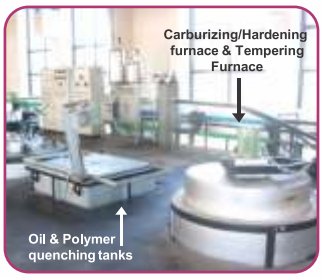
- Material Substitution (Steel to Aluminium)
- Topology and Design Optimization for Light weighting
- Q&T Steel to Microalloyed Steel for Energy Saving

1.5 Ton Drop Hammer

250 ton Mechanical Press

100 Ton Trim Press

50KW Induction Billet Heater

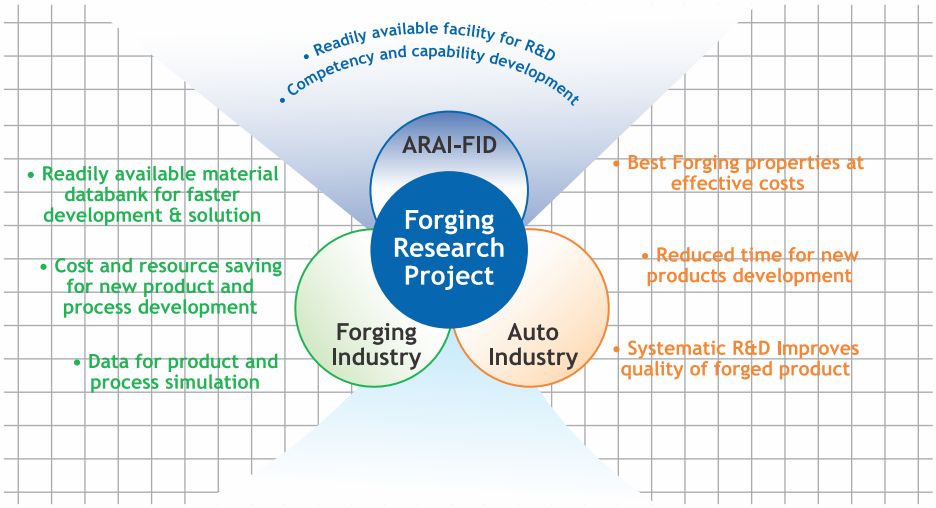


Heat Treatment

Quenching Dilatometer

Forging Research Facility is equipped with prototype forging and heat treatment equipment and also state-of-the-art dilatometer to plot TTT & CCT curve as per ASTM standards

The Data Bank covers as a part of the project contains various properties viz. Monotonic, Metallurgical, Fatigue etc. and carried for various thermo mechanical processes and the properties are also simulated using FORGE metal forming simulation software. This data is useful for both Auto and Forging industry for achieving light weighting and energy saving



We provide consultancy service in forging and heat treatment process optimization & simulation.

FACILITIES

Fatigue Testing Lab

- Rectilinear Actuators
- Dynamic Material Test Machine
- Electro Dynamic Shakers
- High Frequency Pulsating Test
- Data Acquisition System
- Strain Gauging Kit
- Load Frames and Fixtures





Material and Manufacturing Lab

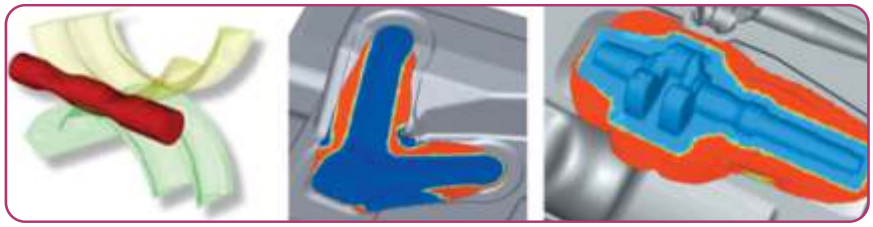
- Residual Stress Analyser
- Optical Emission Spectrometer
- Microscope
- Quenching Dilatometer
- Prototype Forging Facility
- Hardness Testers
- Impact Tester
- Ultrasonic Testing Machine
- Magnetic Particle Testing Machine
- Heat Treatment Facility





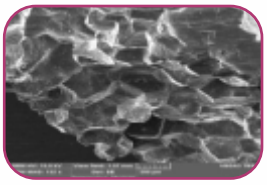
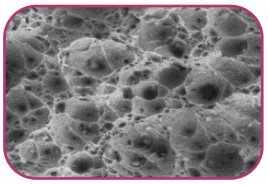
Simulation Lab

- FORGE Software with 16 Core Cluster
- Hyper works
- UGNX- Reverse Engineering
- Geomagic
- Pro/Engineer
- Autodesk Inventor
- Plastic Injection Moulding Software
- Blue light 3D scanner



Metallurgical Failure Analysis and Process Development:

- More than 1000 failure case studies
- Fractography and failure mode analysis
- Residual stress analysis
- Inclusion, corrosion, product, segregation analysis using SEM – EDS

FID SUPPORTED BY :

Fatigue & Materials Centre of Excellence, Chakan

Computer Aided Engineering Laboratory, Pune

Academy, Pune

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

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