HORIBA MIRA

Thermal Energy Management

Optimise thermal efficiency from concept to full vehicle validation.

At HORIBA MIRA, we offer a fully independent, end-to-end Thermal Energy Management service tailored to accelerate your route to market while enhancing vehicle efficiency, comfort, and compliance.

Whether you're exploring advanced battery cooling, HVAC optimisation, or heat pump strategy, our thermal team brings decades of experience and leading-edge tools to every stage of development.

Your End-to-End Thermal Partner

Attribute Benchmarking

- Competitive, customer-focused assessments of thermal system architecture and control performance.
- Evaluate HVAC, comfort, and charging performance
- Gain insights via teardown analysis and environmental testing
- Benchmark against real-world BEV and ICE platforms

Model-Based Design

Develop virtual prototypes with digital twins and control logic models.

- Enable fast, iterative design
- Simulate thermal architecture interactions
- Validate software using HiL integration
- PVAS assessment of new A/C refrigerants

Thermal System Development

Create and refine physical systems in a modular, sensor-rich bench environment.

- Full VTMS assembly, instrumentation, and control
- HiL-based control validation and calibration
- Warranty readiness and oil migration analysis

Vehicle Validation & Calibration

Replicate extreme real-world conditions to finalise and validate system behaviour.

- Advanced climatic testing from -40°C to +80°C
- Repeatable, high-power charging, icing, and defrost trials
- WLTP and EPA test compatibility with SC03 solar simulation

Why HORIBA MIRA?

- Independent, consultancy-led approach
- Decades of BEV and ICE programme experience
- In-house climatic wind tunnels and HiL rigs with consistent engineering support, equipment and data processing
- Seamless blend of simulation and physical validation
- Direct insight into global market expectations
- Well renowned in the industry and involved in Thermal Management Refrigerant SAE Cooperative Research Project

HM-F-TEM-GBR-25-V1

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Thermal Energy Management

Benchmarking That Drives Decisions

We combine environmental chambers, cabin sensors, and software analytics to deliver detailed insights into:

- Energy efficiency and thermal load
- Control system response and calibration
- Human comfort and cabin conditioning
- Battery thermal preparation and safety

Model-Based Development

Accelerate your design phase and compare technology with advanced digital twin tools:

- Assess and compare new automotive refrigerants (PFAS) (e.g., R290 vs 1234yf vs other)
- Compare impact of new technology e.g. IR glazing, compressor volume
- Range analysis under hot/cold scenarios
- Thermal runaway modelling and mitigation
- Control algorithm validation using HiL

System Bench Development

Prototype and optimise in a fully instrumented, open-access lab environment:

- Validate pressure, flow, and thermal interactions
- Calibrate control systems before vehicle integration
- Perform refrigerant charge determination and oil tracking
- Confirm warranty compliance with independent metrics

Full Vehicle Validation

Access some of Europe's most capable thermal test environments:

Static Vehicle Climatic Chamber

- -40°C to +80°C ambient range
- Cold start, defrost, and demist trials

Climatic Wind Tunnel 1 (Passenger Vehicles)

- 4WD dyno, 200 kph wind, 400kW DC charger
- WLTP, HVAC, Powertrain development and solar simulations

Climatic Wind Tunnel 2 (Commercial Vehicles)

- 2WD dyno, 120 kph wind, 62 tonne floor load
- UV rain, icing, and hydrogen system validation
- LISTX, DefStan 0035, & STANAG capable

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