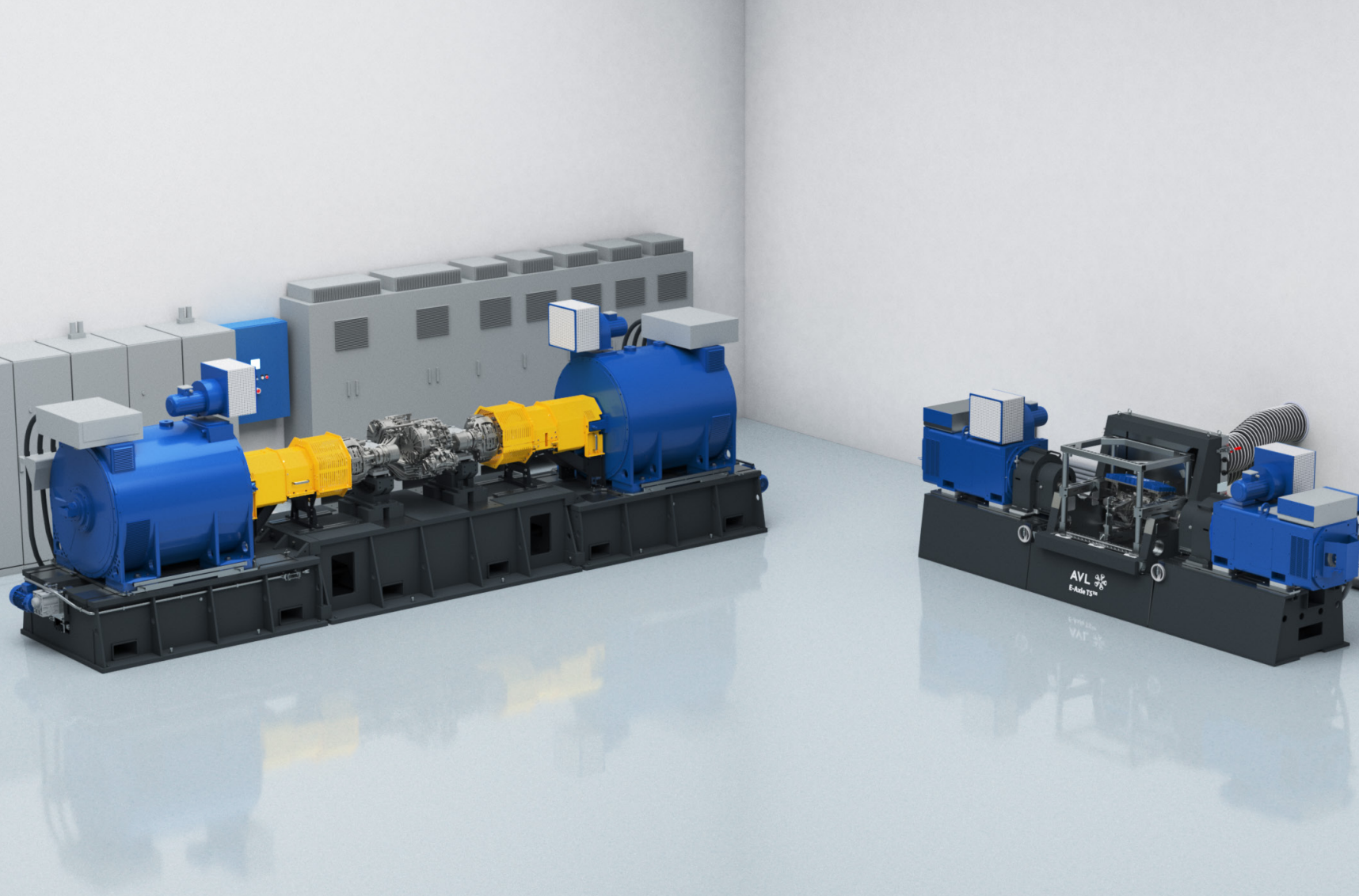




E-Axle Testing Solutions

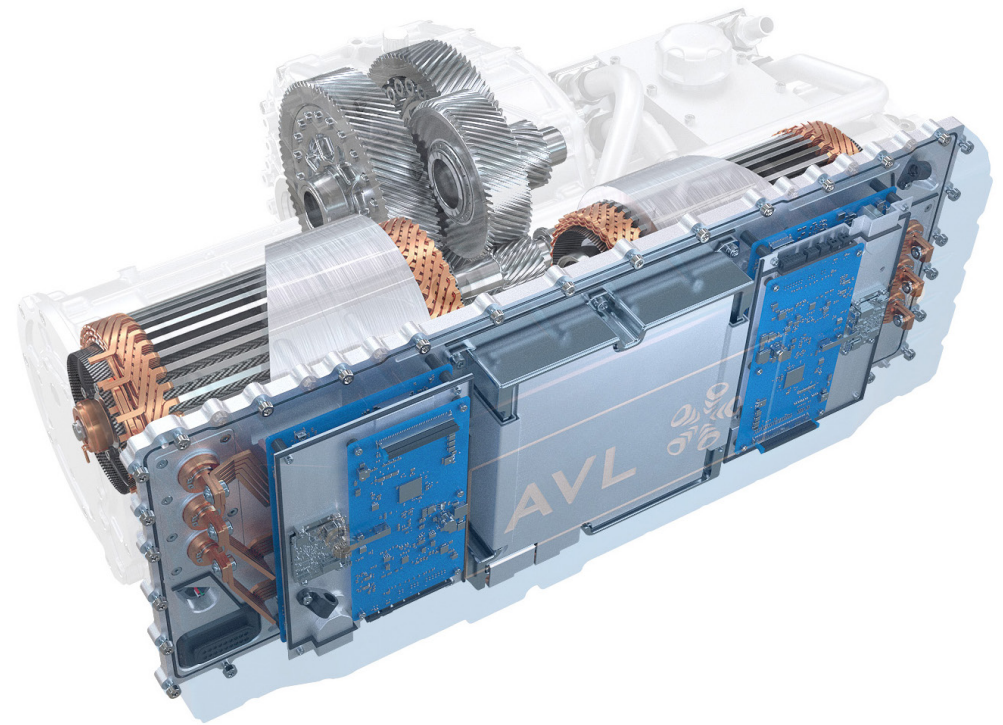
Validating Integrated E-Drive Units with Advanced E-Axle Test Systems.

Testing Requirements for Integrated E-Axle Systems

E-axles are central to the evolution of electric powertrains. By integrating e-motor, inverter, transmission, and differential into one compact unit, they offer significant benefits in terms of packaging, performance and efficiency. However, this level of integration introduces new testing challenges: traditional component-level tests are no longer sufficient due to complex cross-domain interactions – electrical, mechanical and thermal.

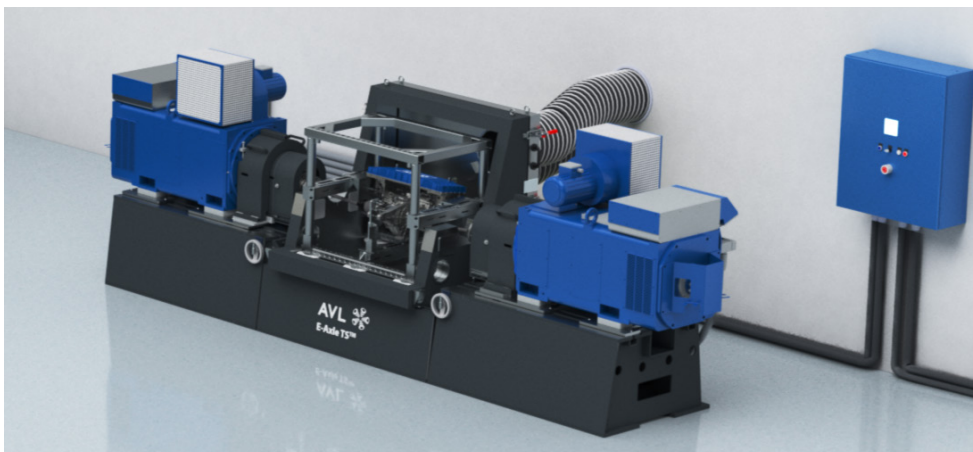
To ensure optimal performance, durability, and efficiency, e-axles must be tested under realistic conditions. At the same time, development timelines are tightening, budgets are under pressure and sustainability goals must be met.

AVL provides modular and scalable e-axle testing solutions tailored to your specific application – from early-stage functional prototypes to near-production validation. Our integrated test systems enable real-world testing with high data fidelity, helping to shorten development cycles and manage the complexity of advanced e-drive systems.



Backed by deep engineering expertise, we continuously translate market dynamics into innovation. Our in-depth application know-how enables us to develop e-axle testing solutions that directly support our customers in meeting performance targets, shortening development cycles and ensuring product reliability.

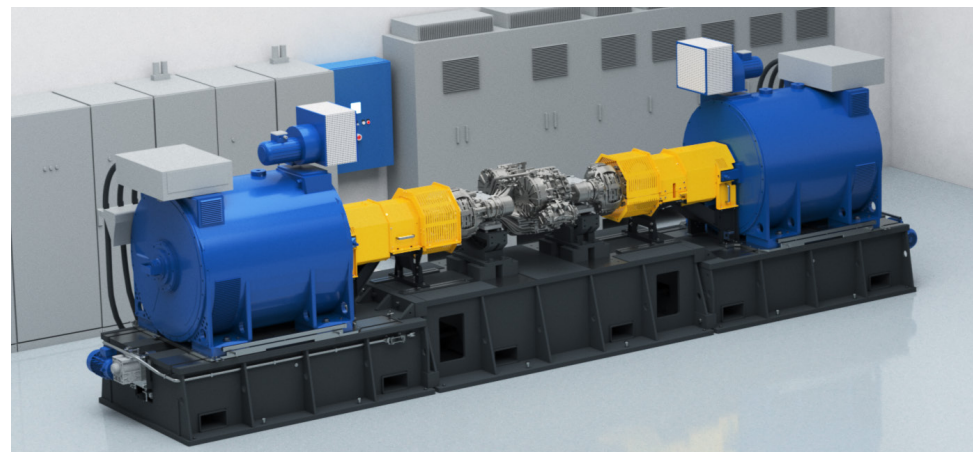
Performance Testing – Scalable Solutions for LD and HD Applications



E-Axle Performance Testing – Light-Duty

The AVL E-Axle TS™ Performance – Light-Duty is a flexible and efficient testing solution for validating light-duty e-axes in both single and twin motor configurations. It enables comprehensive performance testing across electrical, mechanical, and thermal domains, covering everything from service lifetime evaluation to thermal endurance analysis.

The system is built on a compact frame with two dynamometers acting as load units, eliminating the need for a testbed base plate. A modular UUT support frame ensures quick rigging and short changeover times. Optional climatic chambers and fluid conditioning units enable environmental testing under controlled thermal conditions. Thanks to the integrated DC source inside the inverter circuit, grid power consumption is reduced, while the containerized setup allows fast deployment and minimal infrastructure requirements.



E-Axle Performance Testing – Heavy-Duty

The AVL E-Axle TS™ Performance – Heavy-Duty is purpose-built for testing commercial vehicle e-axes under real-world load conditions. At its core are two compact, high-torque motors specifically engineered to meet the speed, torque and power demands of heavy-duty applications without requiring maintenance-intensive reduction gearboxes.

Its robust and compact design allows installation directly on industrial floors without dedicated foundations. A modular rigging system streamlines UUT handling and ensures quick adaptation to various e-axle types. Optional climatic chambers extend the system's capabilities for thermal testing under a wide range of ambient conditions. The combination of torque motor technology, system scalability, and user-friendly operation makes this solution ideal for validating performance, durability, and thermal robustness in demanding commercial vehicle environments.

Further E-Axle Testing Solutions

NVH TESTING

The AVL E-Axle TS™ NVH system enables high-precision acoustic testing of electric axles in 2WD and 4WD configurations. With torque capability up to 10,000 Nm per axle and speeds up to 3,000 rpm, it delivers realistic test conditions. A simulation-optimized driveline and minimal background noise of ≤ 55 dB(A) ensure excellent signal-to-noise ratio for NVH analysis.

Adjustable track width (up to 600 mm per side) and variable wheelbase allow flexible UUT integration. Optional electric track width adaptation reduces mechanical noise and simplifies setup. Combined with modular rigging and fast UUT exchange, the system ensures efficient and repeatable testing – making it ideal for validating NVH behavior across a wide range of e-axle applications.

EMC TESTING

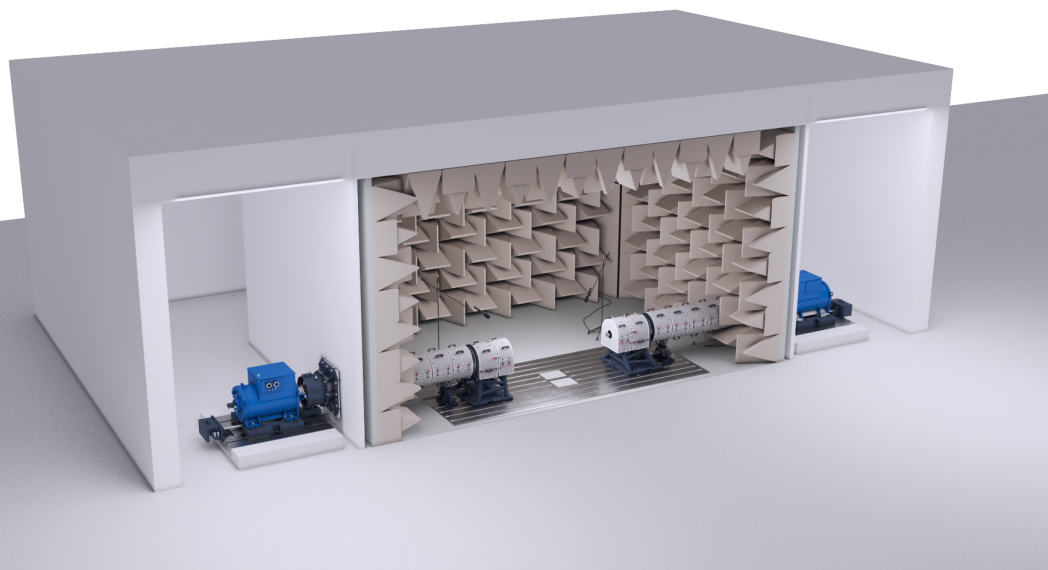
The AVL E-Axle TS™ EMC system enables precise evaluation of electromagnetic emissions and immunity in accordance with the CISPR 25 standard. Tailored for integrated e-drive systems, it ensures compliance with stringent industry regulations and safeguards compatibility with other vehicle electronics.

The modular shaft system allows for flexible adaptation to various UUT sizes, track widths, and performance classes – scalable up to 5,000 Nm and 3,500 rpm. Its slim, chamber-friendly design supports multiple measurement positions and can be customized to individual layout requirements. In addition, the shaft system is retrofittable and compatible with other AVL EMC solutions and turntables. This makes AVL's EMC platform ideal for ensuring the electromagnetic robustness of future mobility applications.

PRODUCTION TESTING

Beyond development, AVL supports seamless validation at scale with production-level test systems. The e-axle production test systems enable efficient End-of-Line (EOL), Quality Assurance (QA), and Conformity of Production (COP) testing for e-axles across all vehicle classes. With cycle times as low as 90 seconds and scalable power handling up to 440 kW per wheel, the system ensures fast, repeatable testing under production conditions.

Its modular design supports manual, semi-automated, or fully automated handling – including robot and AGV integration. Acoustic checks, safety monitoring, and diagnostic functions ensure quality and traceability. Thanks to flexible layout options and compact design, the system fits seamlessly into existing production lines.





Smart Testing Solutions for Cost and Energy Efficiency

Our pre-engineered e-axle test systems are designed to minimize Total Cost of Ownership (TCO) while meeting demanding requirements for durability, NVH and EMC compliance. Their compact footprint and low energy demand ensure efficient use of lab space and infrastructure.

To enhance productivity, the systems support fast test cycles and integrate seamlessly into automated environments for fully autonomous operation. By significantly reducing grid power consumption, they lower operating costs and environmental impact – supporting energy-efficient testing throughout the entire development and validation process.

Why AVL – Your Partner for E-Axle Testing

With decades of experience in electrified propulsion and test system engineering, AVL provides a unique combination of application know-how, system integration expertise, and scalable test technology. From performance and NVH to EMC and production testing – our e-axle test solutions cover the entire development and validation process.

Whether you are developing light-duty or heavy-duty systems, AVL supports you with:

- **Modular and pre-engineered test solutions** for rapid deployment and consistent results
- **End-to-end support** – from prototype to SOP, including automation and digitalization
- **Global reach with local expertise** for commissioning, training, and service
- **Reliable partner for innovation** – continuously adapting to evolving vehicle architectures and standards

**Accelerate your development.
Validate with confidence.
Test with AVL.**



Reimagining Motion

For a greener, safer, better world of mobility.

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