

Environmental simulation and electrical tests

Germany | Dresden

- 18.12.2025
- Christian Hammer
- Public





BUSINESS OVERVIEW

We strengthen our client's product competitiveness and innovative processes through testing and certification.

About Applus+ Group

Who we are and what we do

From where we operate

Core business

Applus+ Group

Applus+ is a global leader in inspection, testing and certification. Driven by our passion for progress and technological development, we'll keep moving towards a more sustainable future alongside our customers; re-enforcing our mission and company motto: **Together beyond standards.**

**29,742**

People in 2025

**€2,338M**

Revenue in 2025

**58**

Countries in all continents

**Accredited**

By main international entities



Energy & Industry Division

**€ 1,169M**
revenue**18,532**
personnel

Laboratories Division

**€ 327M**
revenue**3,059**
personnel

Automotive Division

**€ 467,7**
revenue**4,703**
personnel

IDIADA Division

**€ 347M**
revenue**3,448**
personnel

From where we operate

We have a network of multi-disciplinary laboratories and certification offices worldwide

CANADA

- Toronto (ON)
- Ottawa (ON)
- Dundas (ON)

USA

- Detroit (MI)
- Independence (OH)
- Cleveland (OH)
- Troy (MI)
- New Castle (PA)
- Zeeland (MI)
- Manchester (CT)
- Hampton (VA)
- Indianapolis (IN)
- Greenville (SC)
- Raleigh (NC)
- Ithaca (NY)
- Baltimore (MD)
- Houston (TX)

LATAM

- Mexico DF (México)
- Santiago (Chile)
- Bogota (Colombia)

SPAIN

- **Barcelona (HQ)**
- Madrid
- Toledo
- Granada
- Vizcaya
- Navarra
- Asturias
- Guadalajara
- Sevilla
- A Coruña

REST OF EUROPE

- Bordeaux (FR)
- Fraisses (FR)
- Gradignan (FR)
- Dresden (DE)
- Bremen (DE)
- Amaro (IT)
- Barneveld (NL)
- Silverstone (UK)

CHINA

- Shanghai
- Taicang
- Beijing
- Shenzhen
- Chongqing



State-of-the-art & multi-technological capabilities

Testing

Materials & Structures

From medical implants to wind blades, rail bodies or full-scale aircrafts.



Non-destructive Testing (NDT)

For Aerospace, from its initial design on to its final inspection.



Electrical & Electronics

Ensuring safety, reliability and connectivity for e-mobility, consumer and industrial appliances.



Cybersecurity

Ensuring the security of chips, devices, systems, and networks.



Fire & Building Products

Ensuring fire safety on buildings, infrastructures and transports.



Test Benches and Engineering Solutions

Digital+

Digital solutions to enhance our testing solutions and customer services.



Certification

Product Certification

Certifying your products following market access, industry-led and voluntary certification schemes.

Global Market Access

Facilitating market access worldwide and across different industries.

Systems Certification

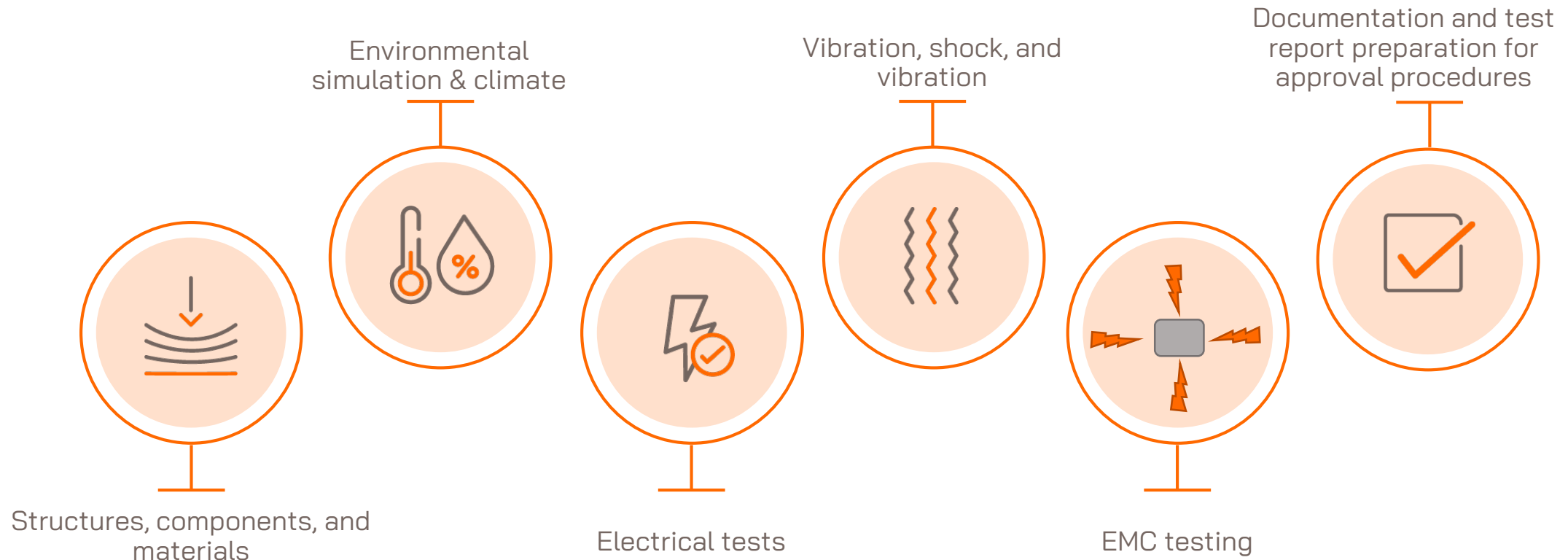
Helping companies to demonstrate their commitment to HSQE and CSR standards.

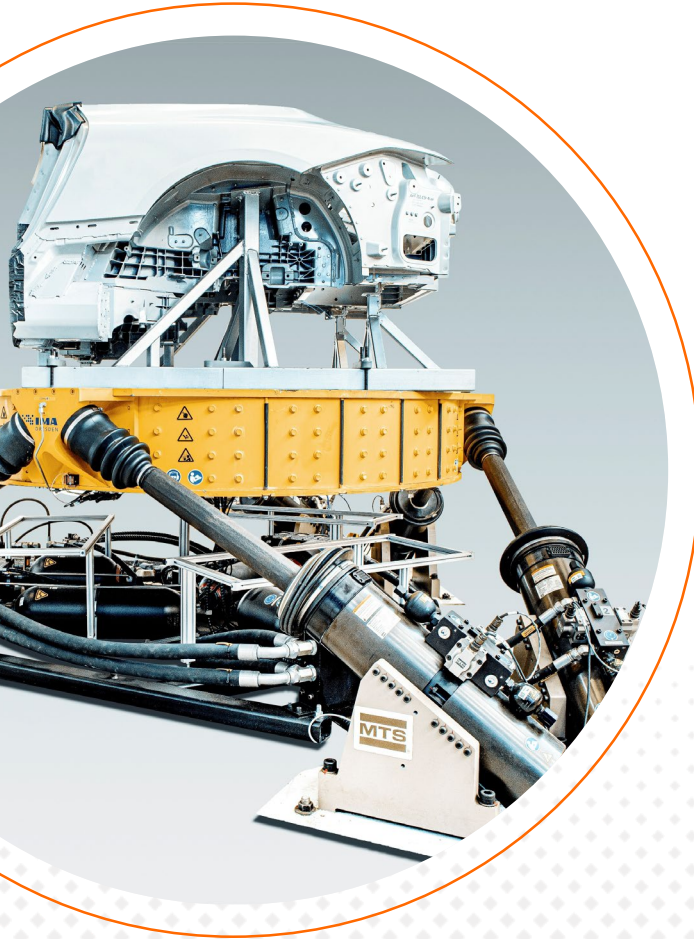
Metrology

Industrial calibration & Legal metrology.

Our global testing centers with experts cover all testing areas.

A new product must pass a series of mechanical, environmental, electrical and safety-related tests. We support you in bringing your application to market safely.



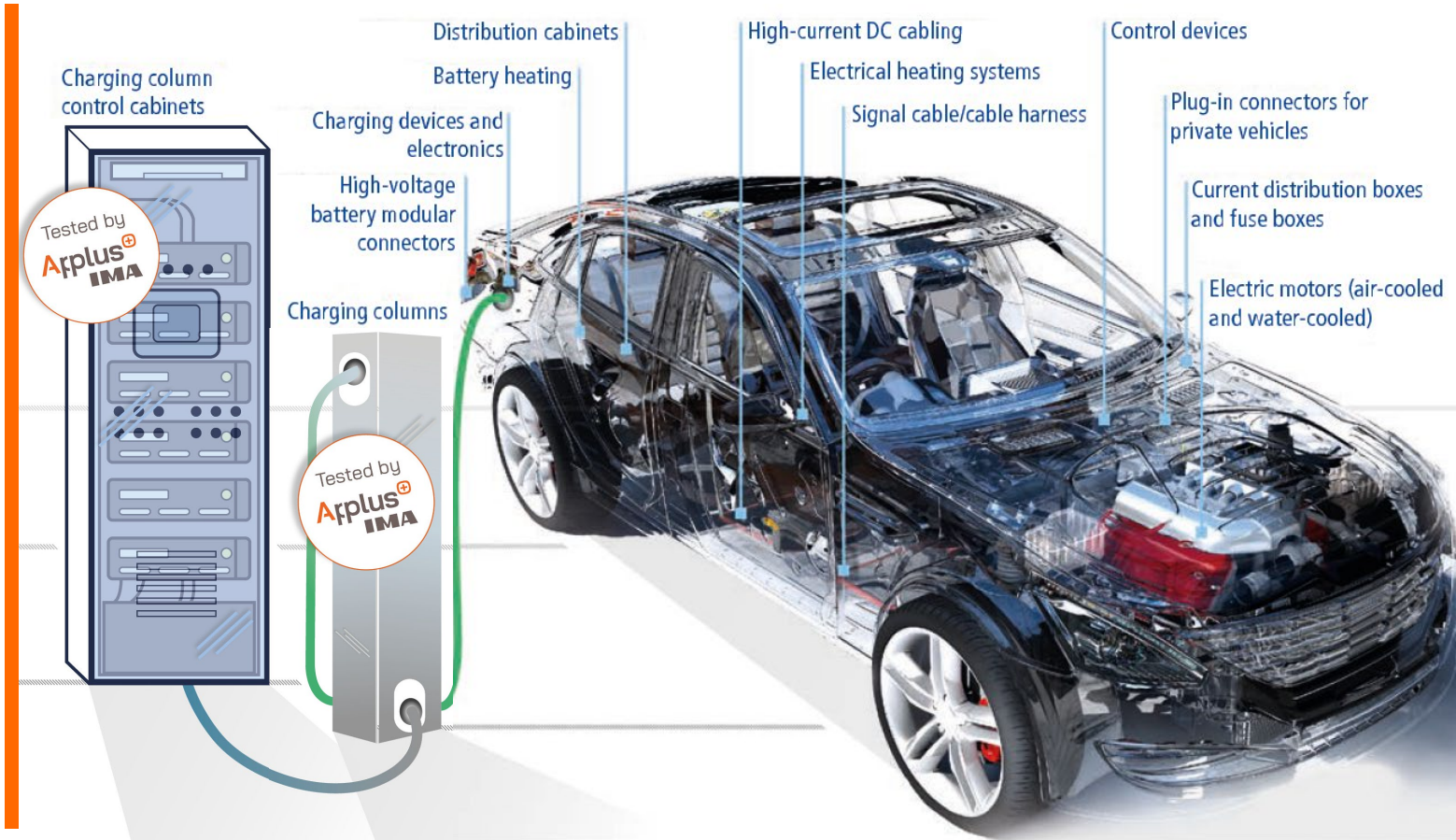


For the automotive and commercial vehicle industry

Your partner for testing and certification

- Electrical tests
- Environmental simulation
- Testing of structures, components, and materials
- Testing according to LV 124 / ISO 16750

For testing E/E components and LV-tests



Electrical & electronic components:

- Power supply and continuous current tests
- Service life tests
- Vibration and shock tests
- Climate tests
- Short circuit
- Short-time current resistance
- Switching capacity

LV-tests:

- LV 214 Electrical connectors in motor vehicles
- LV 124 Electrical and Electronic Components in Motor Vehicles up to 3,5 t
- LV 123 Electrical Characteristics and Electrical Safety of High-Voltage Components in Road Vehicles
- Special tests and special solutions according to customer-specific specifications



For the rail vehicle industry

Your partner for testing & certification

- Environmental simulation
- Switching and insulation tests
- DIN EN 60077
- EN 61373
- EN 50155



For aviations and aerospace

Your partner for testing & certification

- Tests according to DO 160G
- Climatic influences and accelerated aging
- Shock, noise and vibration
- Functionality and durability
- Negative pressure and positive pressure

For testing according to RTCA DO-160G for the aviation industry

Testing capabilities

- Section 4.0 Temperature and Altitude
- Section 5.0 Temperature Variation
- Section 6.0 Humidity
- Section 7.0 Operational Shocks and Crash Safety
- Section 8.0 Vibration
- Section 10.0 Waterproofness
- Section 11.0 Fluids Susceptibility
- Section 12.0 Sand and Dust
- Section 14.0 Salt Fog
- Section 15.0 Magnetic Effect
- Section 16.0 Power Input
- Section 17.0 Voltage Spike
- Section 18.0 Audio Frequency Conducted Susceptibility - Power Inputs
- Section 19.0 Induced Signal Susceptibility
- Section 20.0 Radio Frequency Susceptibility (Radiated and Conducted)
- Section 21.0 Emission of Radio Frequency Energy
- Section 24.0 Icing
- Section 25.0 Electrostatic Discharge (ESD)
- Section 26.0 Fire, Flammability

Testing by external partners

These tests can be carried out as part of larger projects through proven partners:

- Section 9.0 Explosive Atmosphere
- Section 13.0 Fungus Resistance
- Section 22.0 Lightning Induced Transient Susceptibility
- Section 23.0 Lightning Direct Effects



For other industries

Your partner for testing & certification

- **Military – Mil. – Standard**
- **Shipping DNVGL**
- **Industry**
- **Construction products**

Approval and development tests



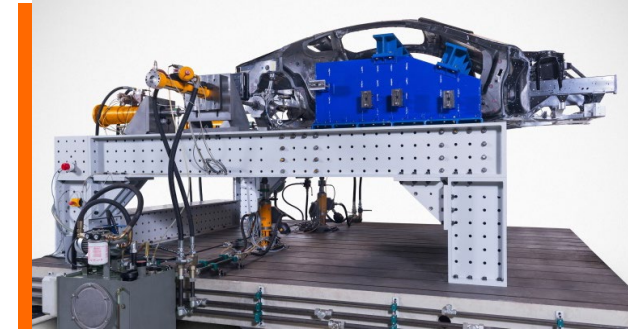
Electrical tests

- Power supply tests
- Service life tests
- Short circuit
- Short-time current resistance
- Switching capacity
- Continuous current tests



Environmental simulation

- Vibration testing
- Combined testing involving vibration, shock and climate
- Pressure pulse testing
- Burst pressure testing
- Leak testing
- Corrosion testing
- Transport simulation
- Wöhler curve determination



Structure & component testing

- Structural and component testing
- Operational and fatigue testing
- Strength testing
- Operational load simulation
- Short-term and long-term measurements
- Damage analysis
- Simulation and strength assessment
- (FE analyses)

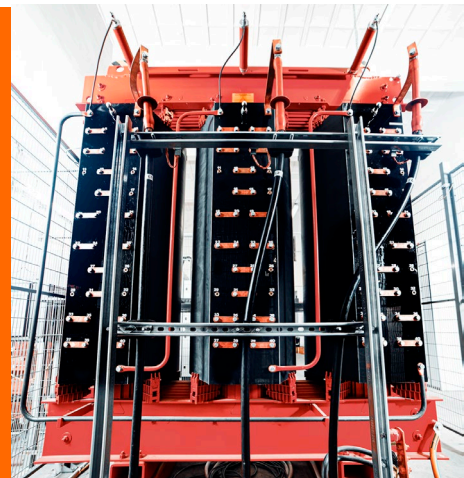


Electrical endurance tests

Reliable electrical endurance testing –
from individual tests to complete
assembly validation.

- **Tests on electrical/electronic components**
- **Short circuit tests**
- **High current tests**
- **Functional tests and current profiles**

High-power test field and high-current test facility



High-current test field:

- Test field designed for test voltages in the range of 12V / 48V / 72V
- Test voltages continuously adjustable from 10V to 110V

Fields of application:

- Cell contact systems
- HV cables, HV connectors
- DC fuse, short circuit tests
- Battery management systems
- Multiple busbars
- DC relays
- Pyrofuses

High-power test field	switching capacity / operating behavior / electrical lifetime	Short-circuit
Test voltage	Test current	
AC up to 800V	up to 15.000A	up to 25.000A*
DC up to 1.100V	up to 15.000A	up to 35.000A*
Load	ohmic, inductive	

*up to 0.06 s or when protected with fuses or another protective device

	Continuous current	Short circuit / 1 second current	Short circuit
Test voltage	Test current		
AC up to 80V	up to 5.000A	up to 60.000A	up to 80.000A*
DC up to 10V - 110V	up to 5.000A	up to 60.000A	up to 80.000A*
Load	ohmic, inductive		

* up to 0.3 s or when protected with fuses or another protective device

Hybrid capacitor – high-performance test field up to 1,100 V and 35 kA

Advantages

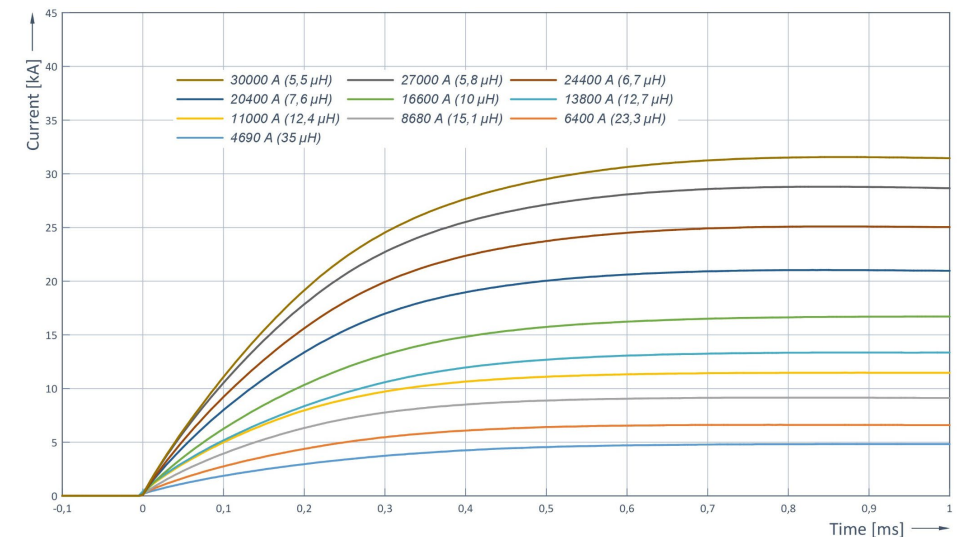
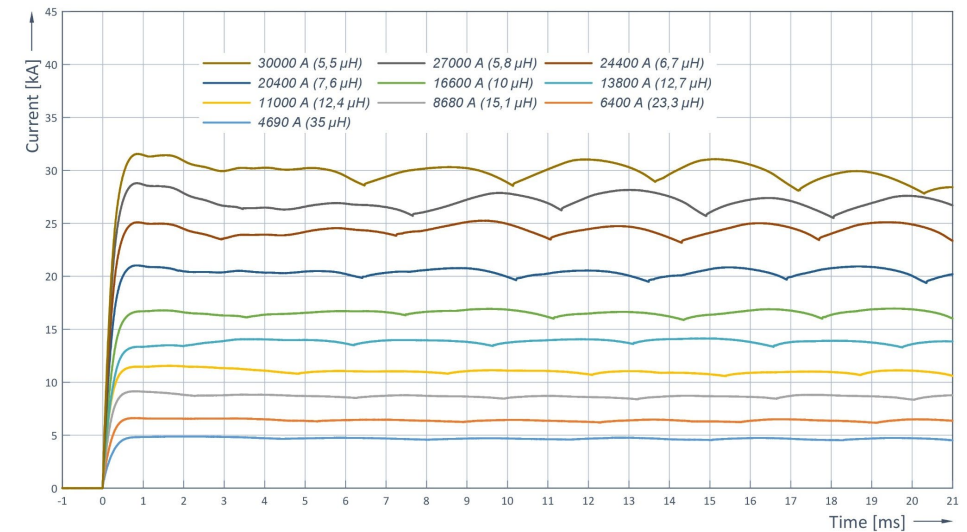
- The test bench combines the advantages of a capacitor bank with the proven characteristics of a conventional test bench.
- Rapid current rises due to low mains inductance, as occur in battery-supported systems, in conjunction with constant power output over a longer period of time, can be simulated with our system.

Characteristics

Test voltage	Test current	Test circuit inductance
110V up to 1.100VDC	up to 35 kA	< 10 μ H
Load	ohmic, inductive, capacitive	

Areas of application:

- DC switch
- DC fuse
- DC relay
- Pyrofuse
- Battery management systems



Continuous current testing / Load profiles

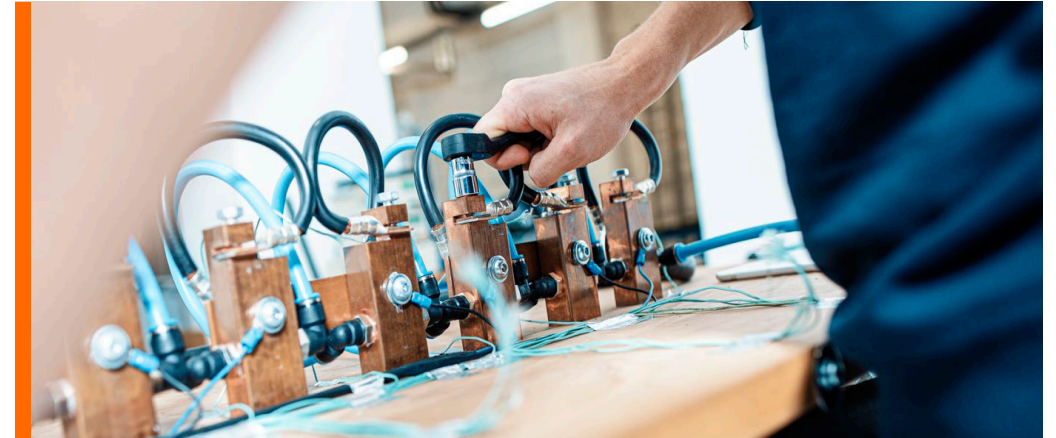


Example: L03 Life test - thermal cycling test on a power distribution board / fuse box



- Continuous currents up to 6.000 A DC
- Automated DC load: up to 700 controlled individual current paths available with loads up to 170 A
- Recording of total and individual currents
- Voltage drop measurements / continuous recording
- cont. temperature measurement
- Overlay with climate chamber

Water-cooled continuous current test / Load profiles



- Set-up of cooling circuits
- Continuous currents up to 6.000 A DC
- Automated DC loads
- Recording of total and individual currents
- Voltage drop measurements / continuous recording
- cont. temperature measurement

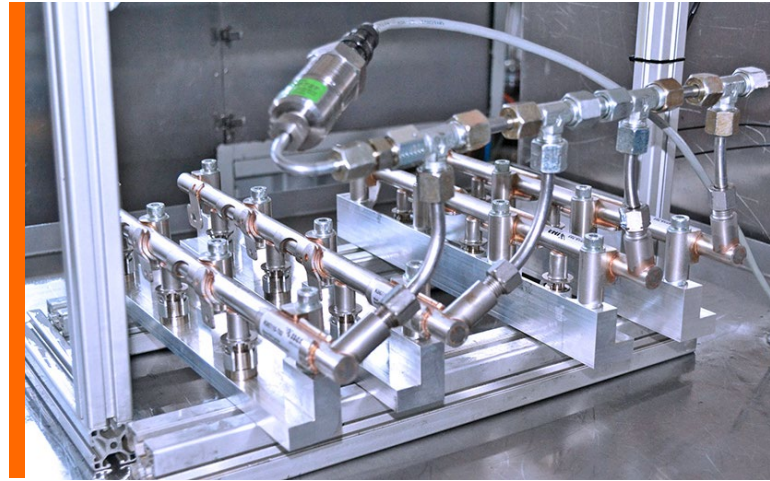
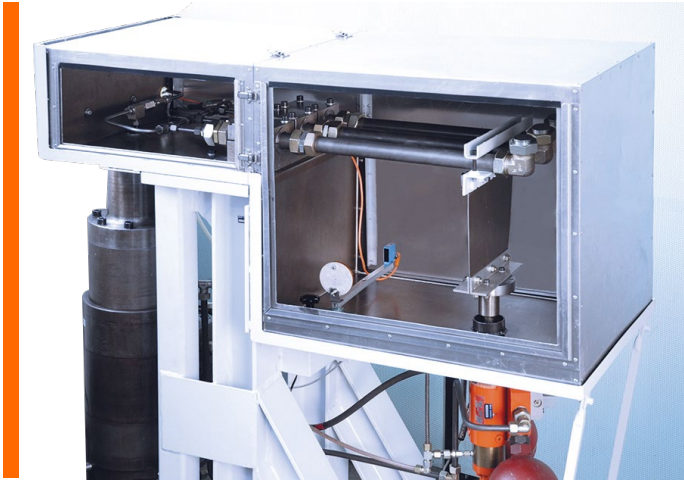


Environmental simulation

Reliable testing under normal and extreme environmental conditions – for maximum quality and safety

- **Pressure pulse tests**
- **Climate, temperature, salt spray**
- **IP protection class testing**
- **Media-carrying systems**
- **Vibration, shock**

Pressure Pulse Tests



- (Hydro pulse tests
- Combined pressure pulse and vibration test
- Burst pressure test (burst pressures up to 4.500 bar)
- Pull-Out-Tests
- Leak tests with different media (oil, water, nitrogen, helium...)
- Vacuum testing
- Corrosion test
- Optionally with climatic stress

Climate, temperature and salt spray tests



Temperature-/ Climate-test

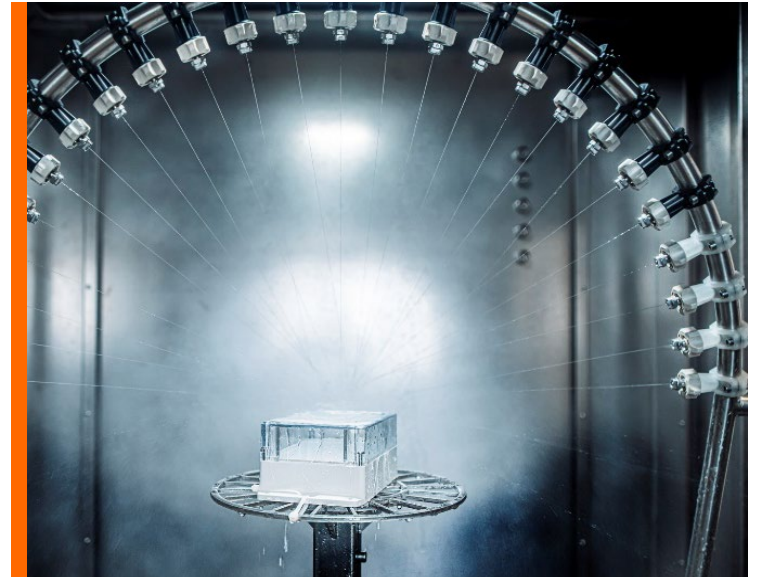
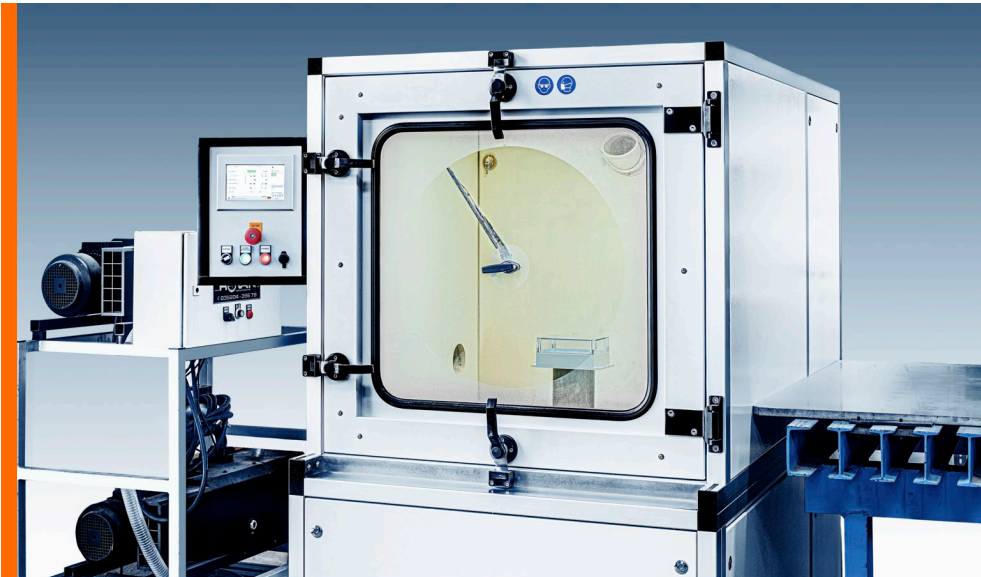
- Various climate chambers up to 4 m³ in size
- Temperature gradients up to 20 K/min
- Thermal shock chambers with a volume of up to 300 liters and a payload of 100 kg



Salt spray test

- Superimposed with: Current up to 6.000 A DC
- Simulation of the loads by PLC-controlled electronic loads
- Recording of total and individual currents
- Voltage drop measurements
- Continuous monitoring

IP protection



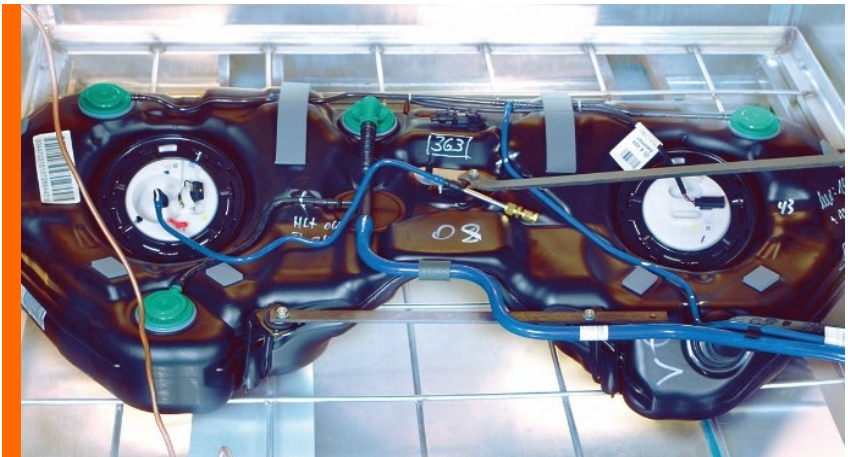
Foreign bodies and contact protection

- IP1X – Foreign bodies > 50 mm
- IP2X – foreign bodies > 12 mm
- IP3X – Foreign bodies > 2.5 mm
- IP4X – Foreign bodies > 1 mm
- IP5X – protected against dust
- IP6X – dustproof

Water protection

- IPX1 -drip water test
- IPX2 -drip water test when the enclosure is tilted up to 15°
- IPX3 -water spray test
- IPX4 -Spray water test
- IPX5 -jet water
- IPX6 -strong jets of water
- IP X7 Temporary immersion
- IPX8 Continuous immersion

Media-Carrying Systems



Media

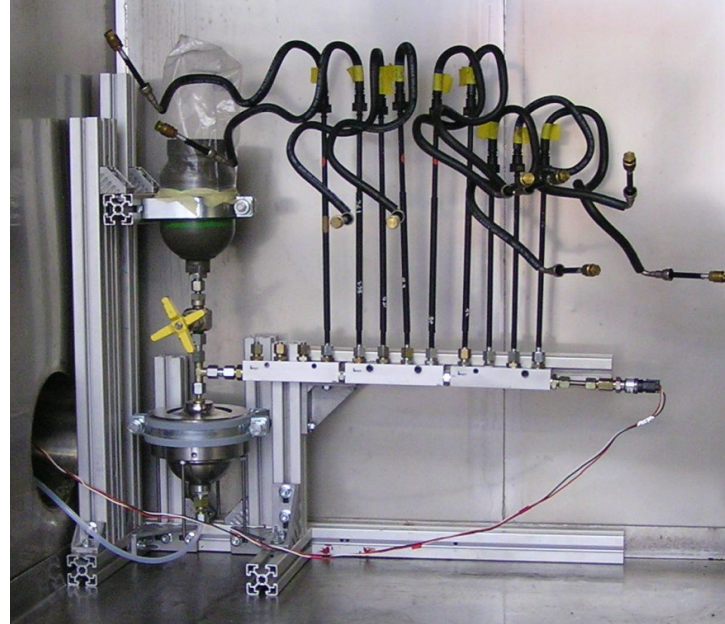
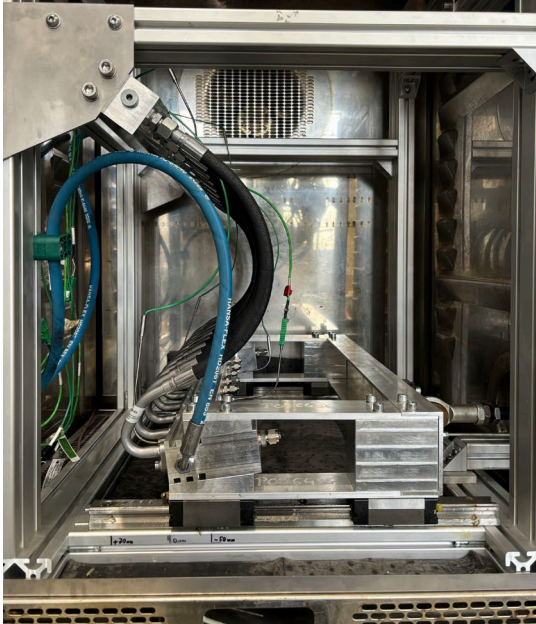
- Air: -1 bis 300 bar rel.
- Fuels (Otto, Diesel and Alternative)
- Coolants
- Lubricants (various oils)
- Special media (e.g. Urea/ AdBlue®)

- Tank systems / fuel-carrying systems
- SCR systems (exhaust gas aftertreatment)
- Charge air systems, cooling systems, lubrication systems, brake systems
- Leak testing
- Internal high-pressure testing of fuel-carrying systems
- Flow measurement
- Pressure threshold testing
- Burst pressure testing
- Motion simulation
- Functional testing
- Fuel permeation tests
- Pressure/vacuum testing
- Pressure cycle testing
- Slosh testing on automotive tank systems
- Chemical testing
- Hot gas testing

Media-Carrying Systems – Combined tests

Example of superimposed service life testing on pressure hoses

- Hose with pressure change
- Pressure medium cooled/heated via conditioning unit (-50 °C to 220 °C)
- Pressure hose is moved according to installation situation
- Test specimens subjected to climate conditions (-70 °C to 180 °C)



Vibration and shock testing



Shaker test benches

vertical:

- 8 kN
- 35 kN
- 60 kN
- 80 kN

with slip table:

- 35 kN
- 60 kN
- 80 kN

Vibration testing:

Sine sweep, random, mixed-mode, resonance dwell

- Frequency range 2 ... 3.000 Hz
- Force vectors 9 ... 80 kN
- Acceleration up to 100 g

Shock testing:

Half-sine, sawtooth, trapeze, shock response spectrum (SRS) a.o.

- Peak acceleration max. 200 g
- Force vectors up to 254 kN
- Shock duration 1 ... 50 Ms

Specimen mass:

- horizontally up to 2.000 kg
- vertically up to 1.000 kg

All vibration and shock tests also combinable with temperature and humidity:

Climate testing:

- Useable volume up to 2,2 m³
- Temperature range -60 ... +180 °C
- Gradient 10 K/min
- Relative humidity 10 ... 95 %

Vibration and shock testing – application in e-mobility

Example of superimposed vibration testing on electric motors (EDU) and battery management systems

- Test specimens supplied with up to 1.500 VDC
- Test specimens climate superimposed (-70 °C to 180 °C)
- Control via CAN and ETAS
- Coolant cooled/heated via conditioning unit (-50 °C to 220 °C)
- Flow measurement and control
- Vibration and shock superimposed
- Function and insulation test
- Leak test



Multi-axial vibration testing (MAST)

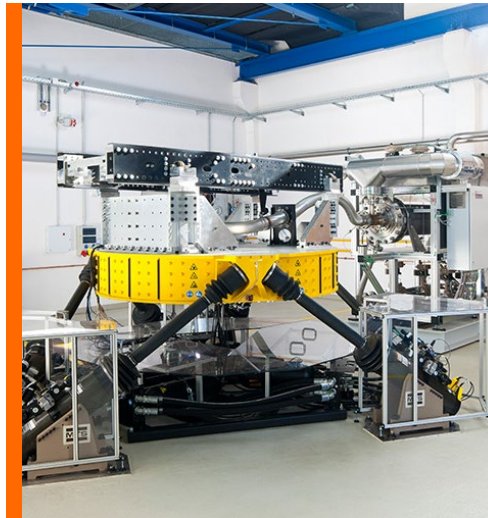
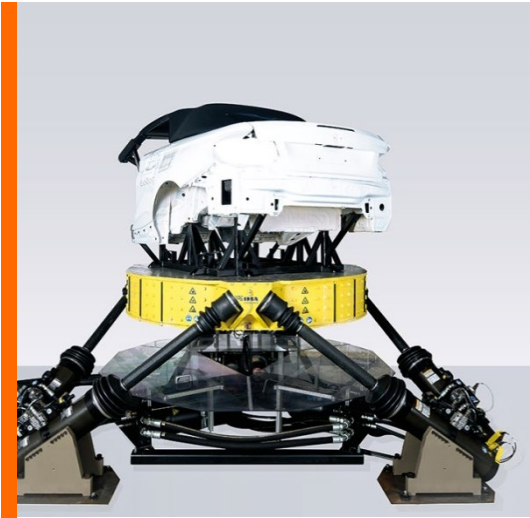
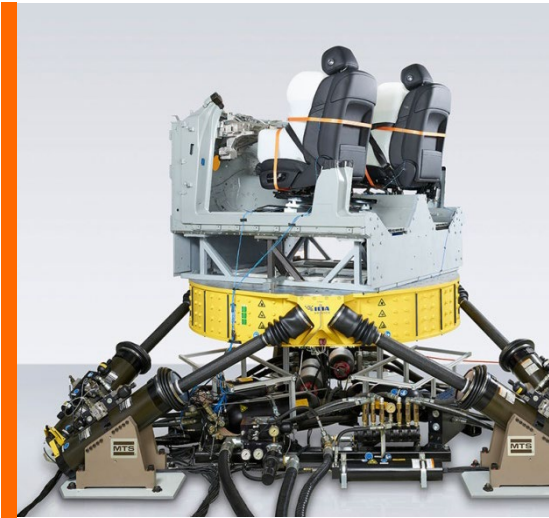


Table size:	2,2 m diameter
Payload:	max. 680 kg
Frequency range:	up to 100 Hz
Acceleration:	max. 20 g
Velocity:	max. 1 m/s
Displacement:	max. ± 145 mm

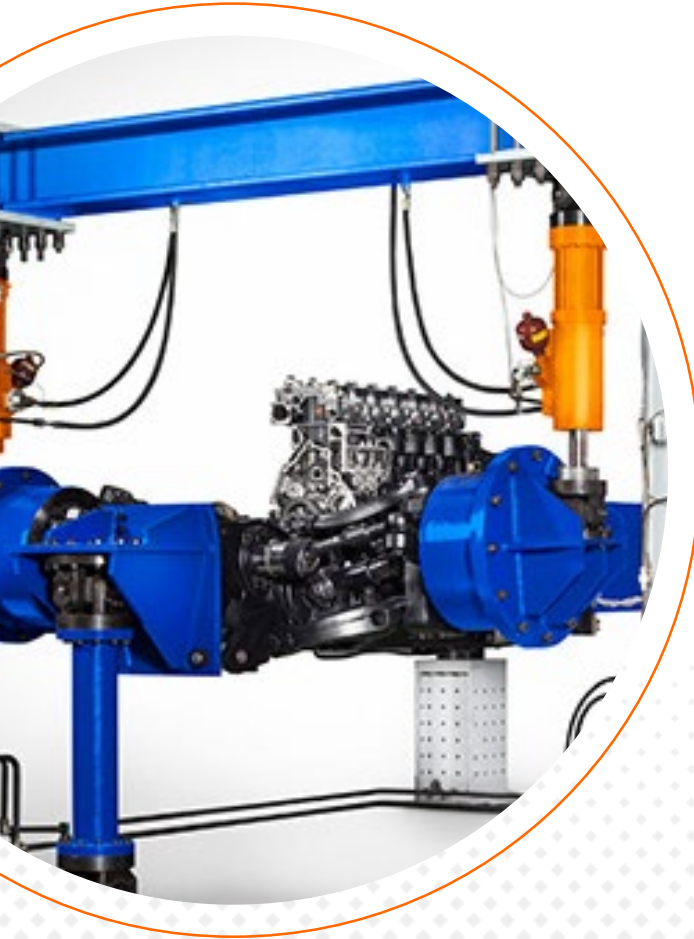
Operational strength tests on all vehicle components

Simulation of the operating loads:

- Road unevenness
- Steering and braking loads
- Load change
- Vertical and rolling motion
- Transport simulation

Specific environmental factors:

- Hot gas flow to testing of commercial vehicle exhaust systems
- Puddle passage simulation

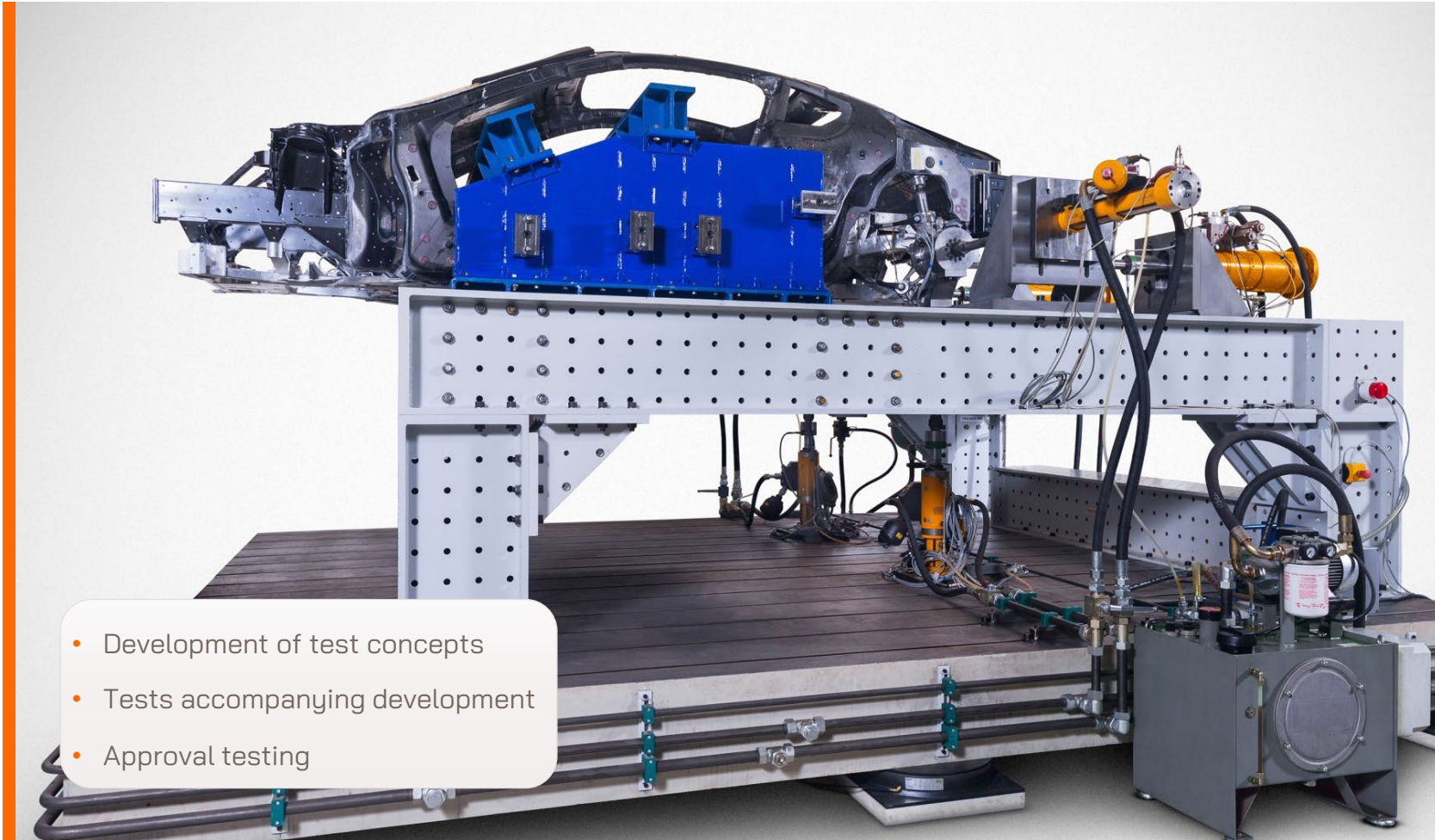


Testing of structures, components and materials

Reliable testing for operational stability and service life of vehicle structures and components.

- **Vehicle structures**
- **Vehicle components**
- **Materials testing**

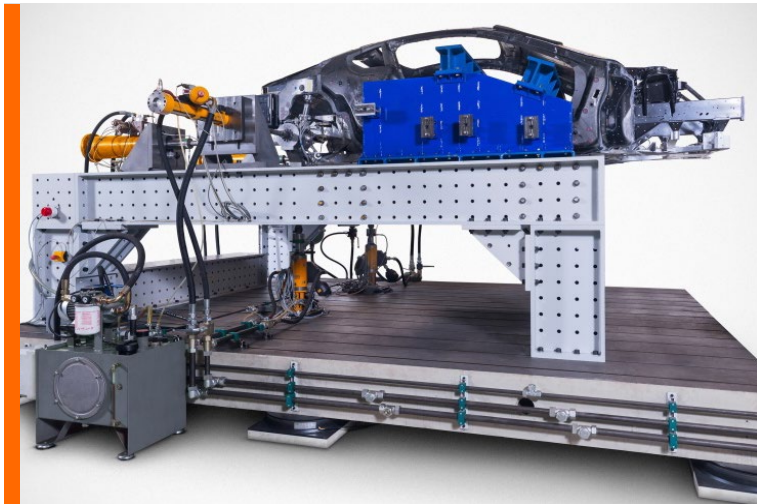
Tests on motor vehicles and commercial vehicles



- Development of test concepts
- Tests accompanying development
- Approval testing

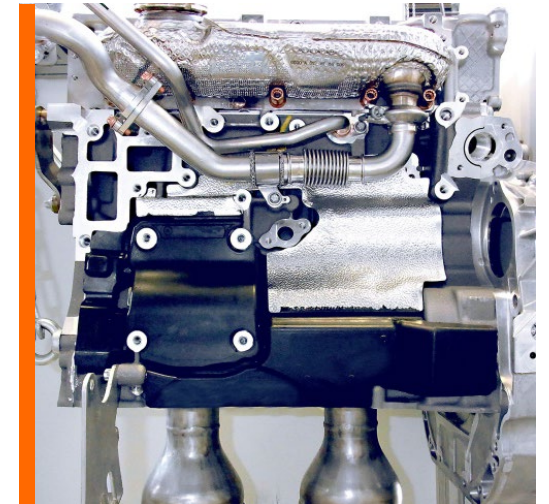
- Structural and component tests
- Operational and fatigue tests
- Environmental simulation
- Strength testing
- Operating load simulation
- Short and long term measurements
- Material tests
- Pressure pulse and shock tests
- Damage analysis

Testing of vehicle structures and components



Chassis & Chassis components

- Front and rear axle
- Subframe and wishbone
- Wheel carriers
- Stabilisers
- Spring-damper systems
- Brakes, brake components
- Slosh test (starting and stopping)
- Leak tests, e.g. with helium
- Ventilation and deaeration system
- Fuel permeation tests
- Pressure / vacuum test
- Pressure cycling test

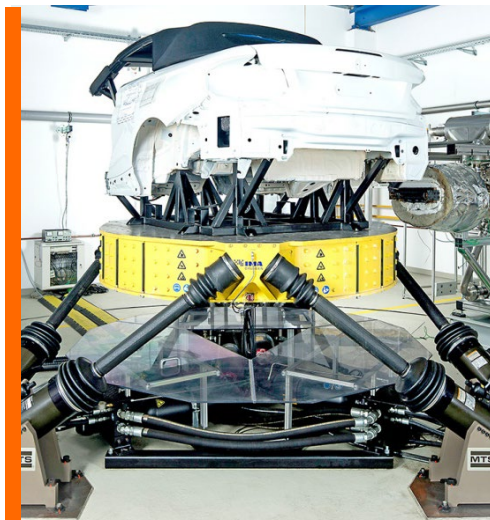


Car bodies

Operating load simulation on:

- Roof systems
- Overall vehicle structures
- Front and rear end structures
- Body part structures

Design of specific test setups



Engines & Engine Components

- Single and dual channel strength testing of crankcases
- Strength testing of connecting rods, crankshafts, camshafts
- Strength testing of engine structures

Material tests



Material: Metals

- Specimen manufacturing
- Fatigue tests
- Strength assessments of mechanical joints, welds and adhesive connections
- Mechanical-technological tests
- Fracture mechanical tests
- Testing of screwed connections
- Corrosion tests
- Crash and deformation capacity



Material: Composites

- Laminate and specimen manufacturing
- Physical tests
- Thermal analysis
- Chemical analysis
- Static-mechanical tests
- Material creep tests
- Climate and temperature tests



Materialography

- Damage Analysis
- Edge Layer Changes
- Layer Thickness Measurement
- Purity of Steels
- Determination of Grain Size
- Roughness Measurement and Profilometry
- Hardness Testing
- Chemical Composition
- Tribological Testing



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