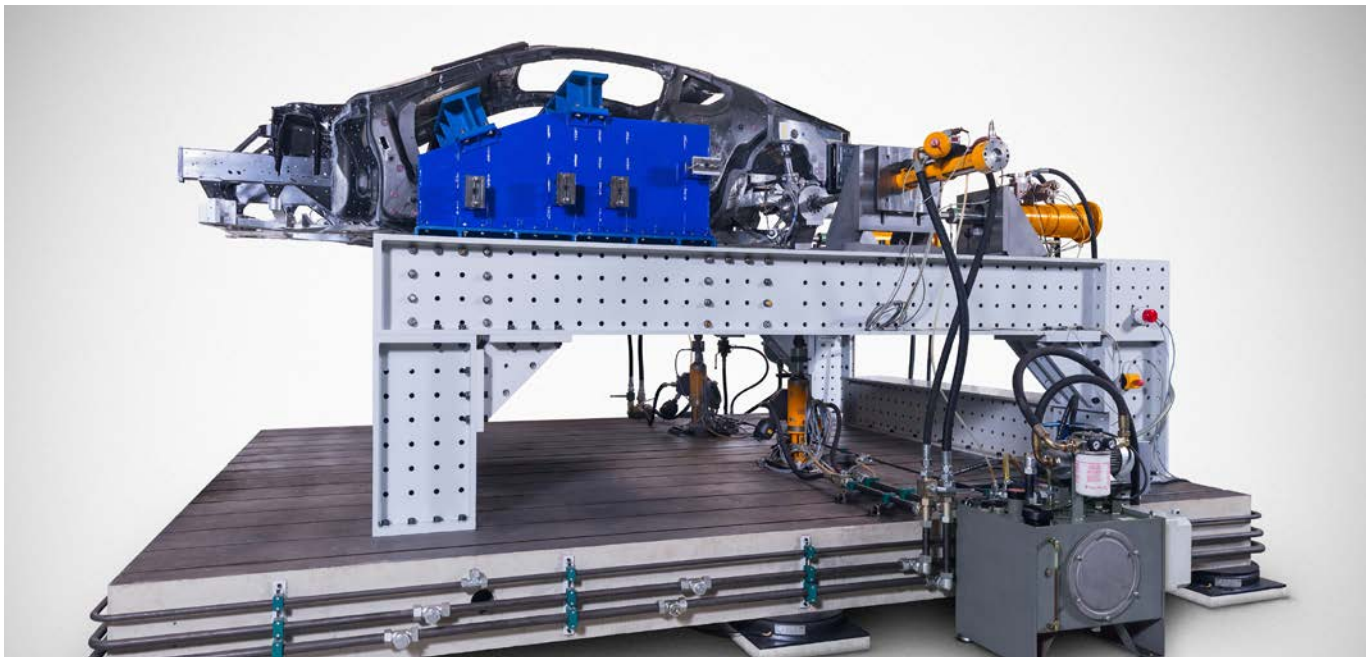
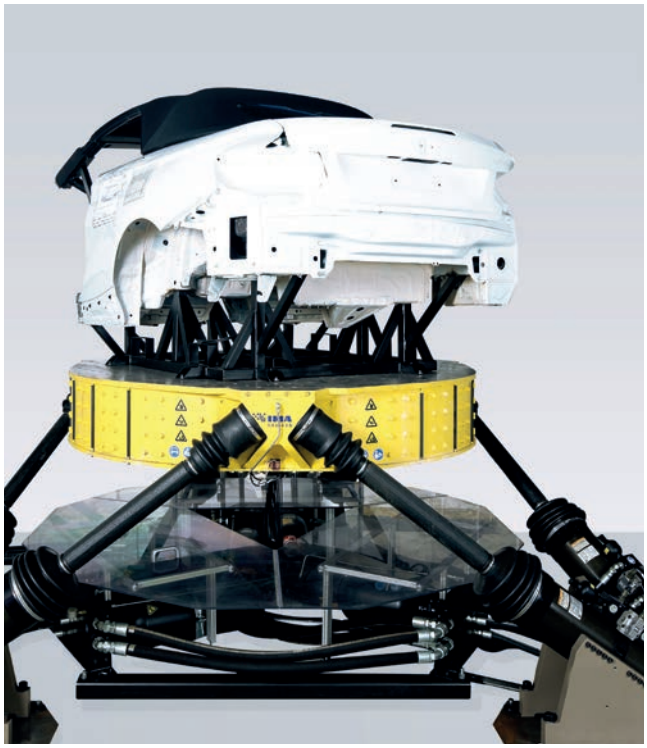
Applus IMA DRESDEN



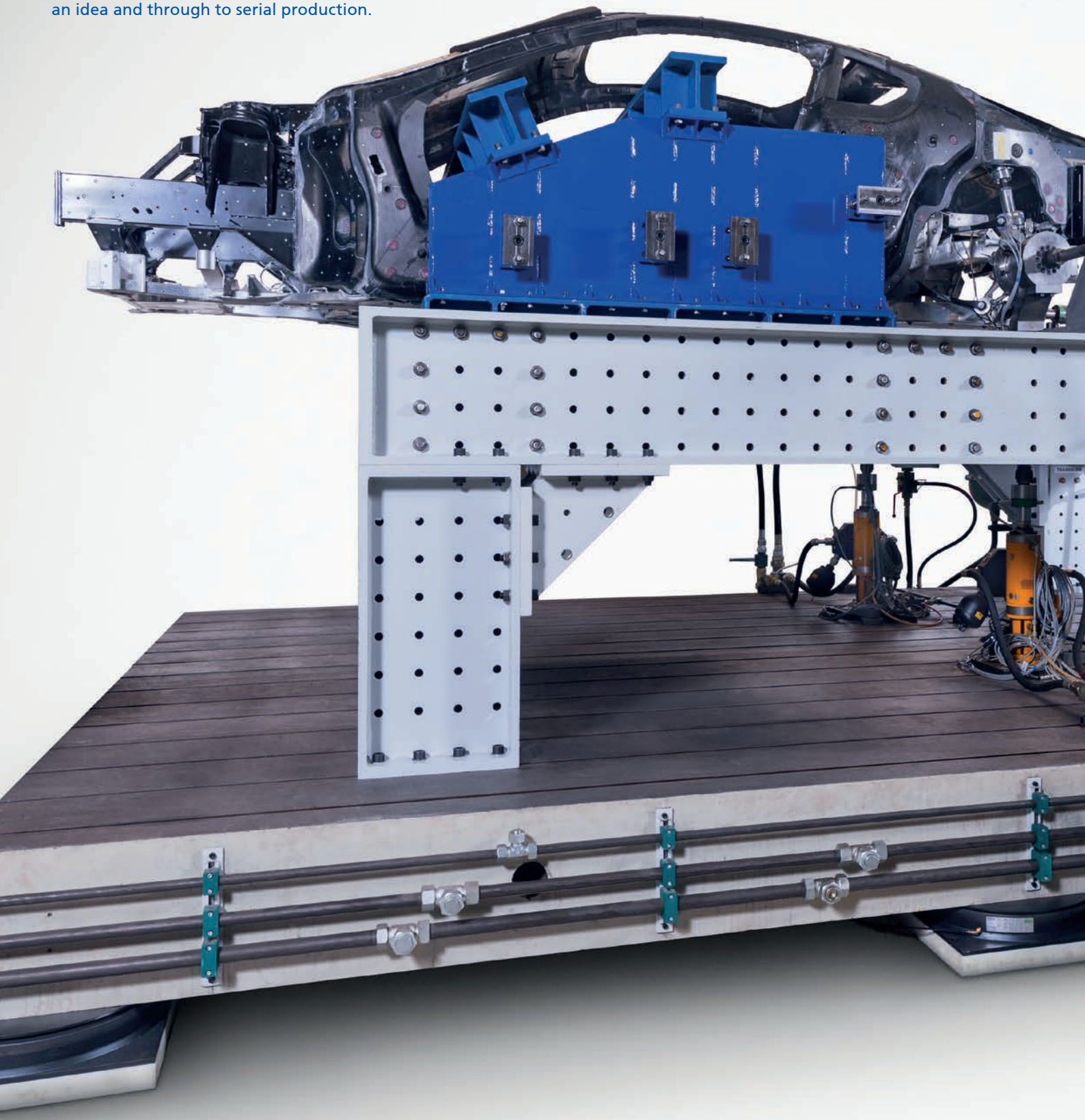


TEST AND DEVELOPMENT CENTER FOR THE AUTOMOTIVE INDUSTRY

As an independent, accredited testing, monitoring and certification body, we test your components, materials and complete systems according to the applicable standards and guidelines or individual test programs.

THE NUMBER ONE ADDRESS FOR COMPONENT AND MATERIALS TESTING FOR PASSENGER AND COMMERCIAL VEHICLES

A strong automotive industry requires a performance-capable and reliable partner who can be relied on completely for the development of vehicle structures and components commencing with an idea and through to serial production.



IMA Materialforschung und Anwendungstechnik GmbH, in short Applus+ IMA Dresden, is the development and test centre for manufacturers and the entire supplier´s industry and enables new developments to be capable for market launches more quickly.

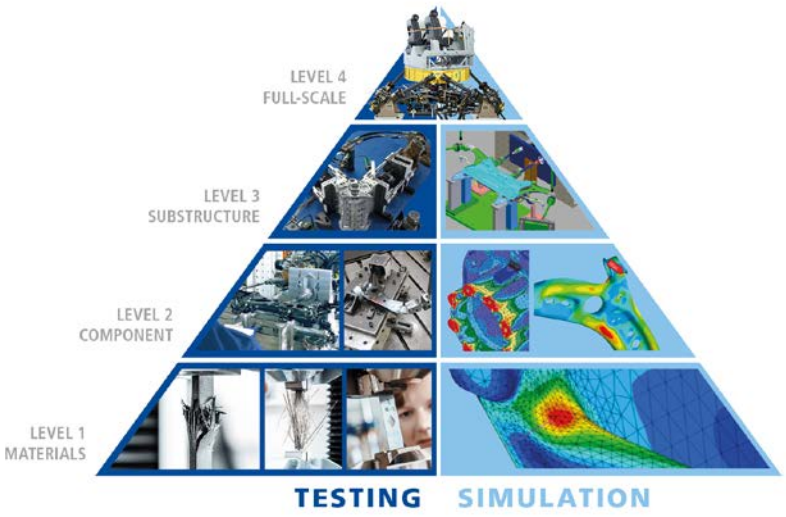
For this purpose, IMA engineers test, simulate or compute the respective design and structural groups of an vehicles such as e.g. complete vehicles and vehicle bodies, chassis, engines, transmission, media-conducting systems, electrical components and materials. With such tests, we offer possibilities to experimentally examine different influences on the strength, to compare material use and design principles, and to verify calculation methods.

You can rely on us: our laboratories are certified according to DIN EN 9100, accredited according to ISO 17025. This therefore ensures that we can always provide tailor-made solutions for a wide range of structures and test requirements.

Applus+ IMA Dresden – and it works:

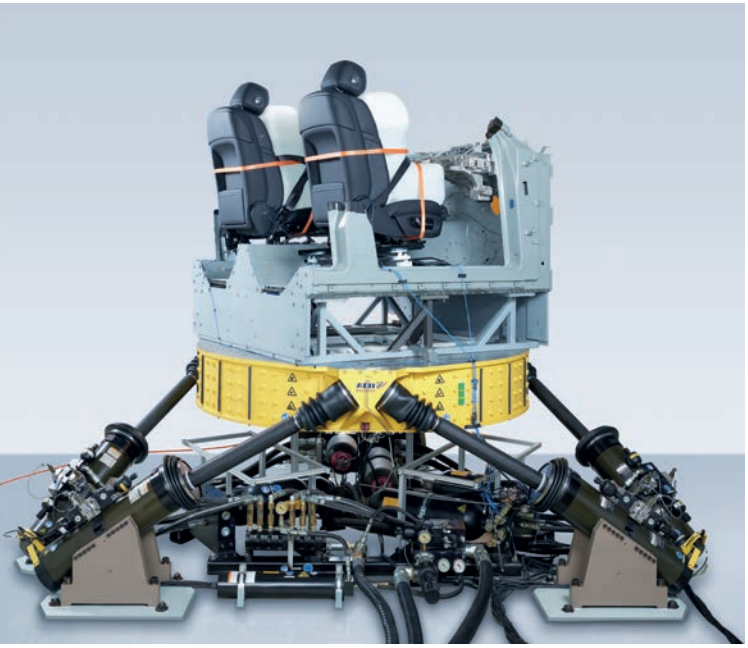
- Structure and component testing
- Testing of media-conducting systems
- Vibration testing
- Pressure pulse testing
- Material testing
- Non-destructive testing
- Electrical testing
- Materialography and damage analysis
- Simulation and strength verification
- Software systems for test and laboratory data

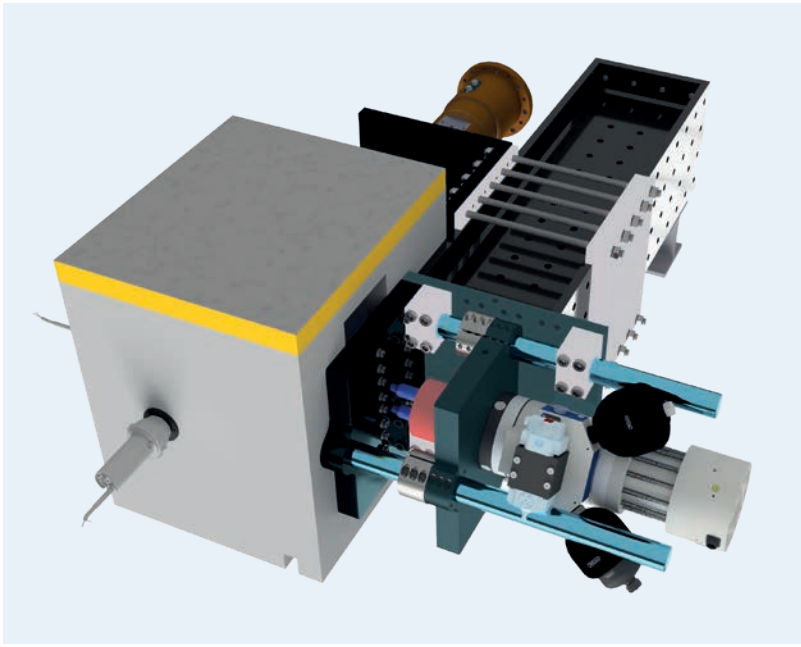
FROM MATERIAL TO COMPLETE VEHICLE – EQUIPPED FOR A LONG DISTANCE



IN FOCUS: VEHICLE STRUCTURES AND COMPONENTS

We bring the road to the lab for you. To determine the service life through experiments, we offer fatigue testing in which the loads that occur during driving are simulated is a realistic manner.





COMPLETE VEHICLES AND VEHICLE BODIES

Experimental verification of operational stability is carried out on complete vehicles and body components:

- roof systems, whole vehicle structures
- front / rear vehicle structures
- body substructures (e.g. body strut dome)

Our engineers, measurement technicians and test mechanics offer you extensive experience in operational load simulation, where real-time signals are measured on the multi-channel test bench. Whether you want to look at cornering, poor conditions, braking torque or steering manoeuvres, in the laboratory we simulate all possible load on the vehicle structures.

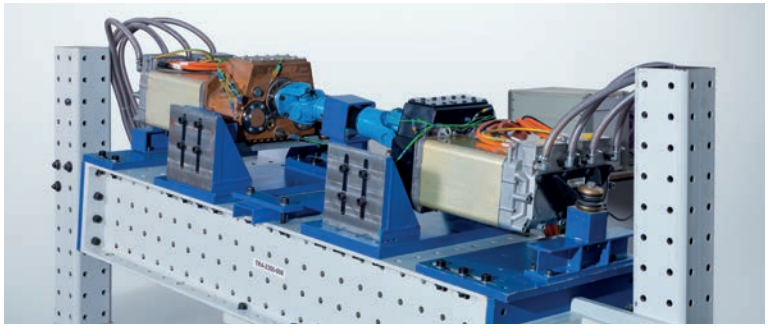
The range of services includes the computer-aided design of specific test stand set-ups and simulation. In the design phase of the development process, we can also support you by providing measurements for determining load data and put together load configurations for experimental simulations.

For instance, our flexible test stands allow us to reproduce accelerations on a course with poor conditions and fully feed them into the structure. The frequency range that can be reproduced in the test stand is between approx. 3 and 50 Hz and covers all critical conditions. All regular operating loads, single incidents and even instances of misuse are included in the load simulation tests.

The complex load conditions of real driving are simulated. In the process, a vehicle's whole service life is traversed as quickly as possible, with reliable conclusions drawn about its system reliability.

CHASSIS AND CHASSIS COMPONENTS

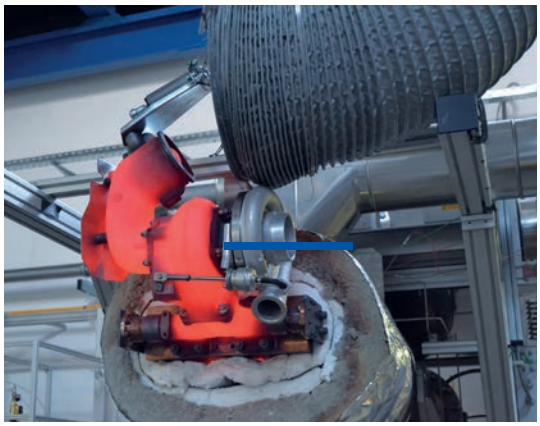
We help suppliers in the automobile industry to ensure quality with required proof of service life. Our experimental examinations of chassis components and trials of all kinds using different modes offer you the chance to evaluate different design, technology and material options. Of course, we offer the whole service under different climatic and environmental influences.

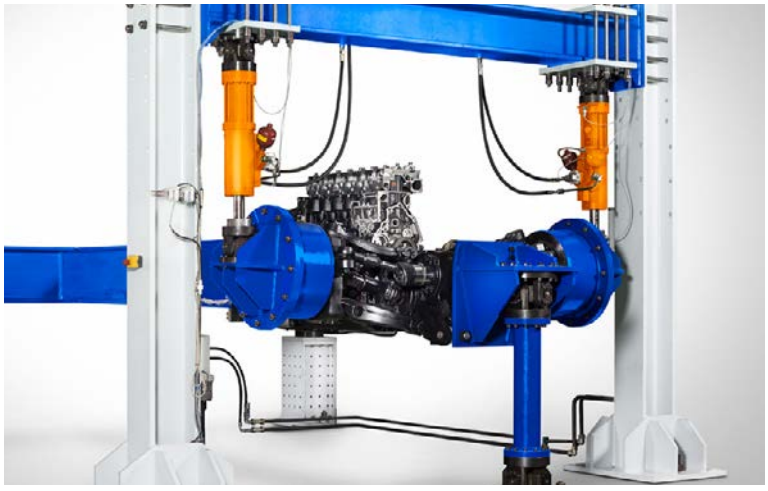


ENGINES AND ENGINE COMPONENTS

We offer innovative test stand solutions for strength tests on engine components:

- one- and two-channel strength testing of crankcases
- strength testing of connecting rods, crankshafts and camshafts
- wear testing of camshafts





TRANSMISSION COMPONENTS

Applus+ IMA Dresden can support you as a skilled, experienced partner in the development of vehicle transmission by providing the following services

- Development, construction and operation of customised special test stands
- Implementation of various test scenarios: continuous operation, load cycles, determination of sound emissions, low ad high temperature test, impermeability
- Early detection of damage through continuous monitoring by means of vibro-acoustic diagnosis

- Auxiliary frame and wishbone
- Half-axes
- Axles, front axle, rear axle (single and multichannel)
- Spring damper systems
- Stabilisers
- Brakes, brake components
- Chassis pivot joints as per AK-LH 14

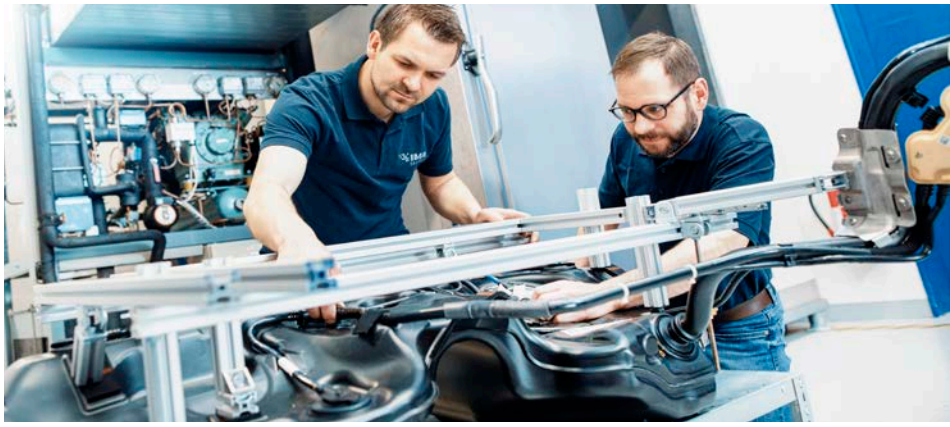
This enables the implementation of one-stage loads, block programmes and real-time signals in our test stands. The tests are carried out under the influence of matter such as salt spray or under different climate conditions.

EXHAUST SYSTEMS

For exhaust systems and exhaust gas-carrying components we use a hot shaker test stand for operational load simulation, whose main components are a multi-axle vibration table and a hot gas generator. Using the multi-axle vibration table, it is possible to generate controlled loads from mechanical vibrations. The hot gas generator is capable of generating variable thermo-mechanical loads for components. Combining both systems allows the overlaying of stresses through experimental simulation.

IN FOCUS: TANKS, FLUID TECHNOLOGY AND MEDIUM-CONDUCTING SYSTEMS

In our efficient laboratories, fitted with modern equipment and explosion protection, we determine the behaviour of your test specimen under the real driving load, combined with temperature changes, pressure changes, volumetric flow and vibration simulation. Special media are applied according to your specifications, regardless of whether we are testing individual circuits, components, units (pressure generators, pressure consumers) or whole systems.



We can inspect the loading capacity of your test objects under real and extreme conditions in our test laboratory in accordance with generally accepted standards, OEM specifications or for your individual specifications.

Irrespective of fuel systems using SCR systems or brake and lubrication systems, there are many test examples: Tanks, fuel lines, rails, connections, valves, seals, pressure regulators, radiators, heat exchangers, evaporators, condensers, auxiliary heaters, electric heaters, independent vehicle heaters, expansion tanks, circuits, tubes, filler pipes, SCR circuits, intercoolers, charge air pipes.

TESTING METHODS

- Impermeability with excess pressure and/or vacuum
- Internal high-pressure testing of fuel-carrying systems
- Tightness test using total pressure change methods (Group D – DIN EN 13184)
- Flow measurement
- Pressure threshold testing
- Bursting pressure testing
- Motion simulation
- Function testing

TESTING METHODS FOR TANKS AND TANK SYSTEM TESTING

- Fuel permeation for tank systems in accordance with GS 97014 (SHED test)
- Pressure / vacuum test
- Pressure change loading
- Slosh testing on car tank system (starting and stopping)
- Vibration testing
- Tightness testing, including with helium

ELECTRICAL TESTING

Operating behaviour is decisively influenced in fluid technology due to the increasing use of electrical /electronic systems and components within the sensors and actuators periphery. It is therefore important to ensure the safe and reliable use of components. We can inspect the performance capability under specified loads.

- Electrical supply for components according to the technical specification requirements with voltages up to 24 V / high voltage up to 1000 V
- Signal recording
- Characteristic curve evaluation

IN FOCUS: VIBRATION TESTING AND ENVIRONMENTAL SIMULATION

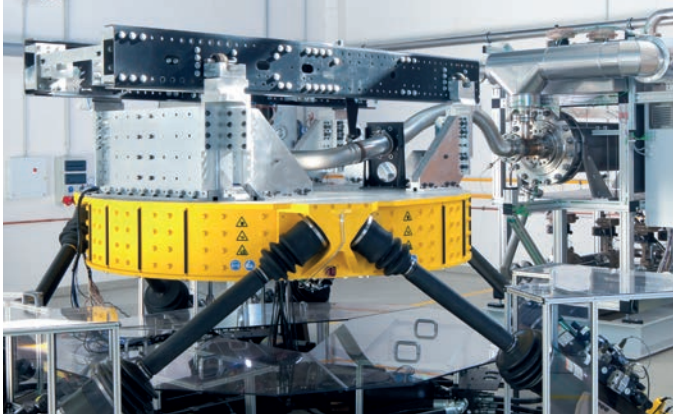
Real measured external influences such as vibration, shock, cold, heat, moisture, or splashing water can be mapped on vibrating tables and in climatic chambers.

There is a vast field of work for you between development, quality assurance and the approval certification in all industries, including vibration testing, shock testing, climatic testing, Wöhler curve evaluation, pressure impulse testing, burst pressure testing, leakage testing, corrosion testing and transport simulation. A probit test, stair step process and a test for fuel resistance complement the portfolio.

We evaluate via experimental paths in order to verify the reliability of your product dynamic characteristics such as resonances, spring coefficients, damping variables as well as mass distributions, horizontally excited up to 2000kg and vertically excited up to 1000 kg.

TEST SPECTRUM

- Vibration testing
- Vibration examinations
- Oscillation tests
- Combination tests with oscillation, vibration, shock and climate
- Pressure impulse tests, burst pressure tests
- Tightness test
- Corrosion testing
- Transport simulation
- Probit test
- Wöhler curve evaluation
- Stair step procedure
- Sonic fatigue test
- Testing for fuel resistance



MULTIAXIAL VIBRATION TEST WITH/ WITHOUT THERMAL LOADING

For operating load simulation for transport stress, we utilise a shaker test bench within the framework of the operating strength examination for the automotive industry, whose main components are a multi-axle oscillation table and a combinable hot gas generator. Utilising the multi-axial oscillation table makes it possible to generate the loads from mechanical oscillations as regulated, whether for the simulation of the operating loads such as unevenness on roads, steering and braking loads, load interchanging and vertical and roll motions.

This test equipment is particularly suitable for testing components, modules, assemblies and subsystems such as, for example, tanks, attachment and dismantling parts, exhaust systems, roof and rear-mounted carrier systems, front-end modules, cooling systems and much more.

PRESSURE PULSE TEST

We can execute pressure pulse testing, leak tests, burst pressure tests on hydraulic components, pipework, fittings, fixtures, fuel lines, injection systems and rails. This enables the pressure pulse strength to be tested with indoor dynamic tests. Combining pressure pulse tests and vibration tests in accordance with IACS and DNVGL Type Approval also enables hydraulic fittings to be tested for bending with loads for internal pressure. Certification tests for hydraulic systems are just one part of our testing spectrum as well as comprehensive validation inspections e.g. for fuel rails.

TEST SPECTRUM

- Pressure impulse testing
- Hydro pulse tests
- Combined pressure pulse testing and vibration testing (IACS, DNVGL)
- Bursting pressure test
- Leakage tests with various media (oil, water, nitrogen, helium among others)
- Pull-Out-Test
- Vacuum testing

E-MOBILITY

IN FOCUS: ELECTRICAL TESTING

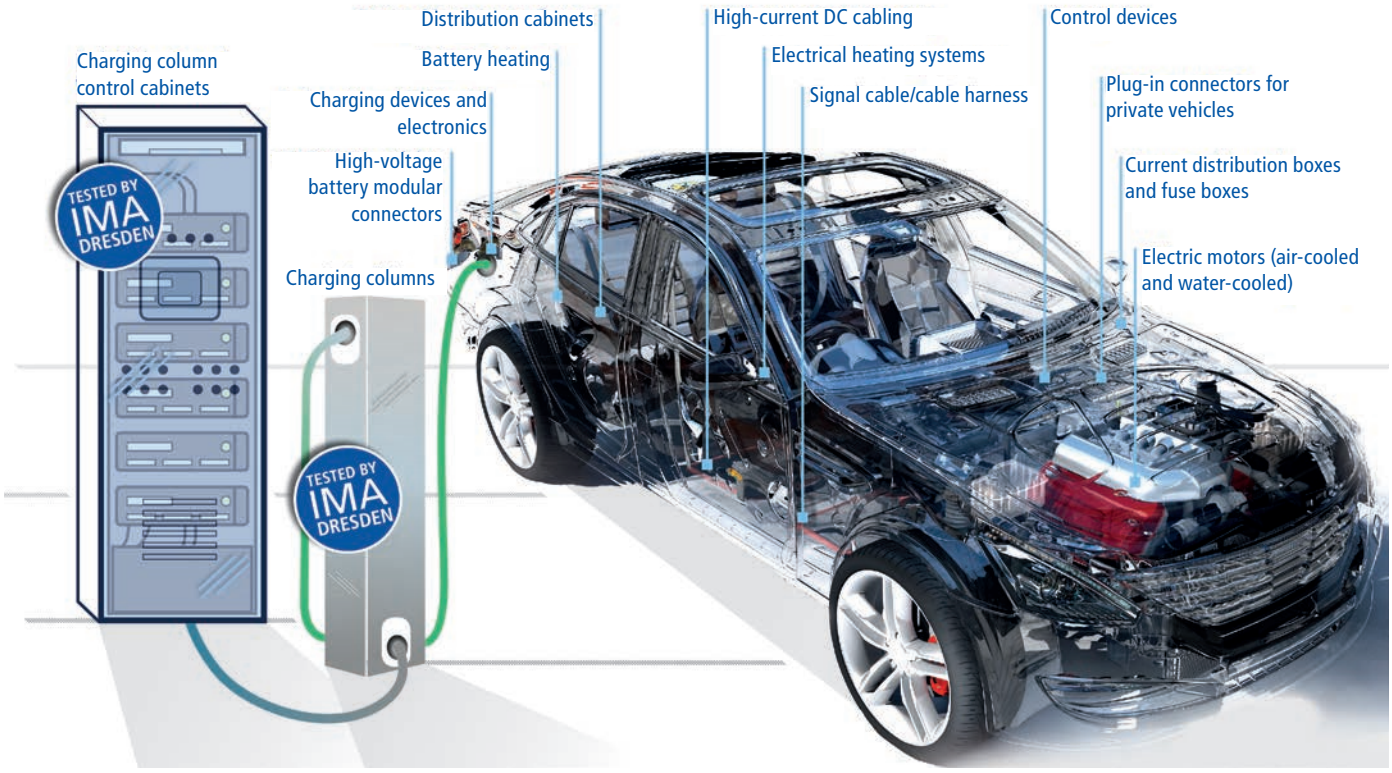
Whether you need short-circuit, short-time withstand current capacity, switching capacity or continuous current testing, with its in-house transformers Applus+ IMA Dresden can offer testing services with test currents of up to 30,000 A, alternating current at 1,000 V and 30,000 A, and direct current at 1,100 V.

LV 124 / LV 214 - TESTED ELECTRICAL AND ELECTRONIC COMPONENTS

Electrical components and e.g. plug-in connectors have to withstand electrical, climatic, mechanical and corrosive stress scenarios during tests according to the LV 124 and LV 214 Standards.

We bring engineers and technicians from numerous fields of competence together for this purpose: Tests for vibration, oscillation and shock, electrical operating durability, media conducting tests and IP protection.

For example, we test control devices and components from the fields for comfort electronics, engine and interior cooling systems, high-voltage power electronics and electric drive motors in precise detail according to OEM specifications and also provide additional special tests.



CLIMATE

- High and low temperature storage
- Staged temperature test
- Temperature shock
- Moist heat, cyclical (with frost)
- Low-temperature operation

ELECTRICAL TESTS

- Power supply / current curves
- Voltage curves
- Excess current
- Short-circuit
- Insulation

VIBRATION, OSCILLATION AND MECHANICAL REQUIREMENTS

- Free fall
- Vibration
- Mechanical shock
- Multiple-axial oscillation in 6 degrees of freedom

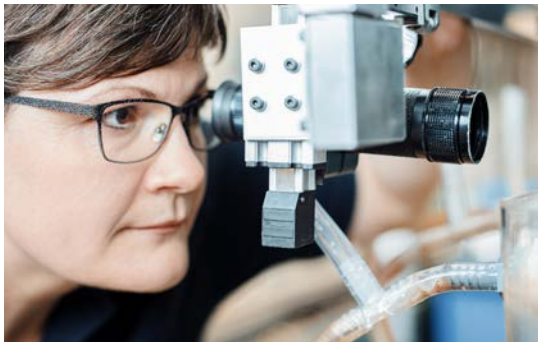
MEDIUM-CONDUCTING SYSTEMS

- Complete circuits, fuel pipework, coolants...
- Slosh test on private vehicle tank systems
- Leak and airtight tests, pressure pulse
- Chemical test

MATERIALSTESTING ON PLASTICS & METALS

Determining the failure limits of a material under different types of loading in order to prove the service life of a component is a demanding task - for us a core competence.

We take care of the comprehensive determination of material characteristics as well as the determination of the stressability of metallic and non-metallic materials, joints or hybrid material combinations.



LAMINATE AND SAMPLE PRODUCTION

Our laboratory offers versatile options for producing test laminates: from textile semi-finished products, pre-impregnated semi-finished products, fiber yarns and resin systems.

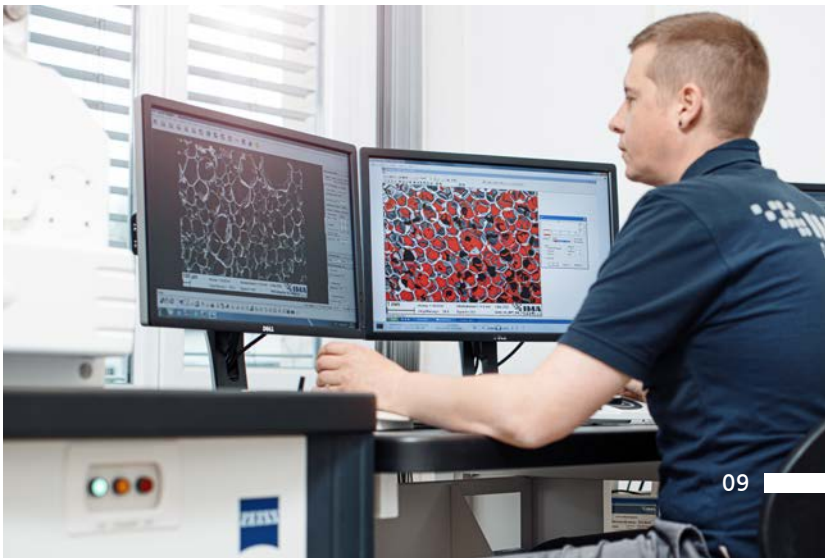
Benefit from our experience in thermoplastic processing as well as laminate production with vacuum infusion, RTM and winding processes. We produce high-quality test specimens from the test laminates in accordance with national and international test standards.

MATERIALOGRAPHY

Whether for quality assurance, damage analysis or research and development - in our accredited materialography laboratories we take a close look at both metallic and non-metallic materials of the most varied compositions using the appropriate qualitative and quantitative characterization methods. This includes sample preparation procedures and the application of all microscopic methods from light to electron microscopy up to the analysis, evaluation and documentation of the microscopic examination results. If required, the investigations can be supported and accompanied by further material-analytical, mechanical-technological and physical methods.

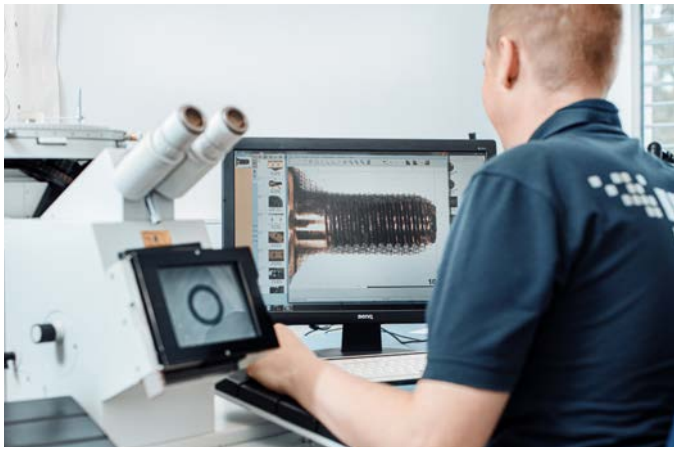
TEST SPECTRUM

- Physical tests
- Static-mechanical material testing
- Material fatigue testing
- Material creep test
- Thermal analyses
- Environmental testing
- Fracture mechanics test
- Corrosion test
- Impact test



THE FULL SERVICE TEST CENTER


NON-DESTRUCTIVE TESTING




ELECTRICAL TEST

DAMAGE ANALYSIS

Is it because of an unfavourable distribution of forces? Lacking characteristics of the material or technology? Improper heat treatment, overstressing, friction or wear? Our experienced engineers can assists you to explore undesirable damage phenomena down to the last detail – for example by means of materialography and acoustic damage detection.

For this we use the very latest testing techniques and tailor-made testing concepts. Alongside the traditional methods that make use of manual testing, we also use special procedures such as the immersion technique, the phased array technique on CFK, GFK und GLARE® and the four-frequency rototest. Our specialists in non-destructive testing will help you with the most suitable procedure for your Needs.

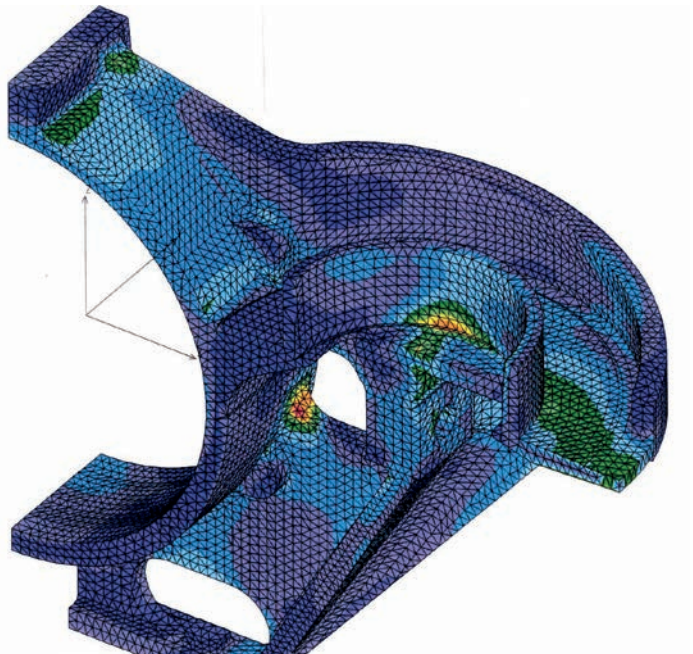
NON-DESTRUCTIVE TESTING

The interdisciplinary area of Non-Destructive Testing at IMA+ Dresden examines structures and components in the test phase and in real use in cases of damage. Moreover, it examines when and where damage occurs, how it develops and how a structure reacts to cyclic loads after an impact. Delaminations, material deviations, tears or foreign material that has entered are made visible, allowing conclusions to be drawn about materials, technology, processes, operation and optimisation. Our qualified inspectors offer extensive experience in planning, coordinating and implementing large-scale testing and inspection activities, from coupon testing to across-the-board permanent monitoring of technical equipment.

In our own laboratories, but also at your premises, we can make statements regarding the quality of your test item. Our test personnel are qualified according to the ISO 9712 and EN 4179 standards and offer many procedures that allow non-destructive testing. We work according to German and international standards and guidelines (DIN, ASTM, ISO, etc.), or in accordance with factory settings.

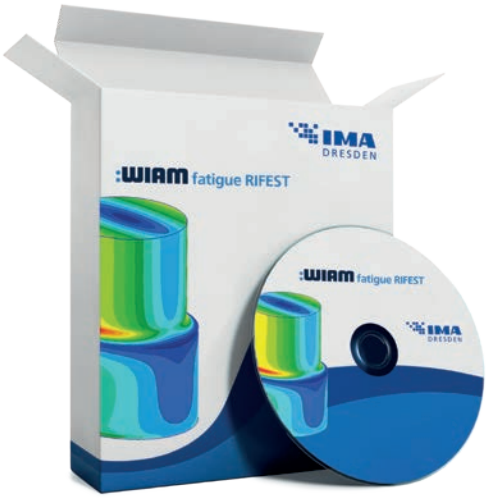
FEM ANALYSIS

Experienced calculation engineers from the fields of statics, operational strength and dynamics are on hand to optimise your product by scaling its mass and form on the basis of FE analysis. We determine stresses and deformations, examine the stability behaviour, obtain static, operational and permanent strength verifications, evaluate natural modes and resonances, and analyse and assess damage.



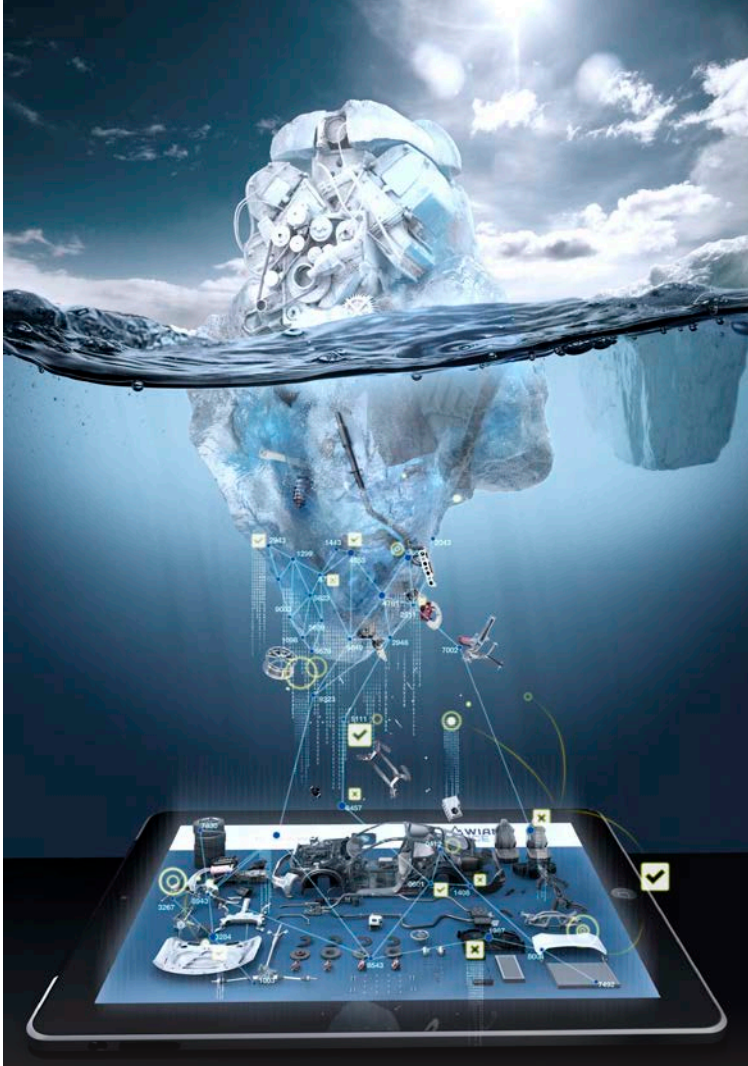
STRENGTH EVALUATIONS

Applus+ IMA Dresden is there fore you, with high-performance technology, ready to analyse the stress and reliability of components and structures using the finite elements method and carry out strength tests. We make statements about the safety of designs, in the form of static strength verification, operational strength verification, fatigue strength verification and drive comfort investigations on the basis of calculated and measured stresses. The complete knowledge on strength assessment is also available for measuring data analysis and the creation of test loads for strength tests. We calibrate our calculations against our own measuring results, optimise masses and shapes for both static and dynamic behaviour, and analyse and assess damage.



WIAM® FATIGUE RIFEST

WIAM® fatigue RIFEST is software for the design process and component stress analysis, and displays the guideline-compliant strength test results at verification points for non-welded and welded components according to FKM Guidelines, 2012 edition. The guidelines apply to machine components and was first developed in 1994 under the management of IMA Materialforschung und Anwendungstechnik GmbH.



FIND INFORMATION, MANAGE DATA, NETWORKING KNOWLEDGE: WIAM® ICE

The structuring, processing and management of information helps to ensure expert technological know-how in the long term, streamline processes and thus increase quality and efficiency. The standard WIAM® ICE product promotes the flow of knowledge, simplifies areas of complexity and ensures added value and innovative strength. Having originated in the field of Material Sciences, the generic WIAM data model can now manage all kinds of knowledge and information. With WIAM® ICE, you can record, research, link, visualise, compare and evaluate diverse data easily and clearly.

BENEFIT FROM THE COMPETENCE OF APPLUS+ IMA DRESDEN FOR YOUR VEHICLE COMPONENTS.

IMA Materialforschung und Anwendungstechnik GmbH, in short Applus+ IMA Dresden, is the development and test centre which can speed up the process for your new developments and ensure that they are suitable for the market. As an independent test provider we guarantee reliable results and strict confidentiality.

Whenever it comes down to strength, resistance, validation or material characteristic data, then Applus+ IMA Dresden can combine the efforts with regard to test standards, approval and certification tests as well as experimental investigations. We have over 10,000m² of test area in certified and accredited testing laboratories where we can test innovative products and technologies from aerospace, rail vehicle, automotive and medical technologies, shipbuilding, plastic, metal and electrical industries and other industrial branches. You can rely on us: the testing tasks at Applus+ IMA Dresden will be processed according to the current state of the art technology and enjoy worldwide acceptance and trust.

Since May 2021, IMA Dresden is part of Applus Laboratories.
Please do not hesitate to contact us for any questions or inquiries at sales@ima-dresden.de

DAkkS Deutsche Akkreditierungsstelle D-PL-13119-02-00

According to accreditation certificate

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