

Bring performance to the test.

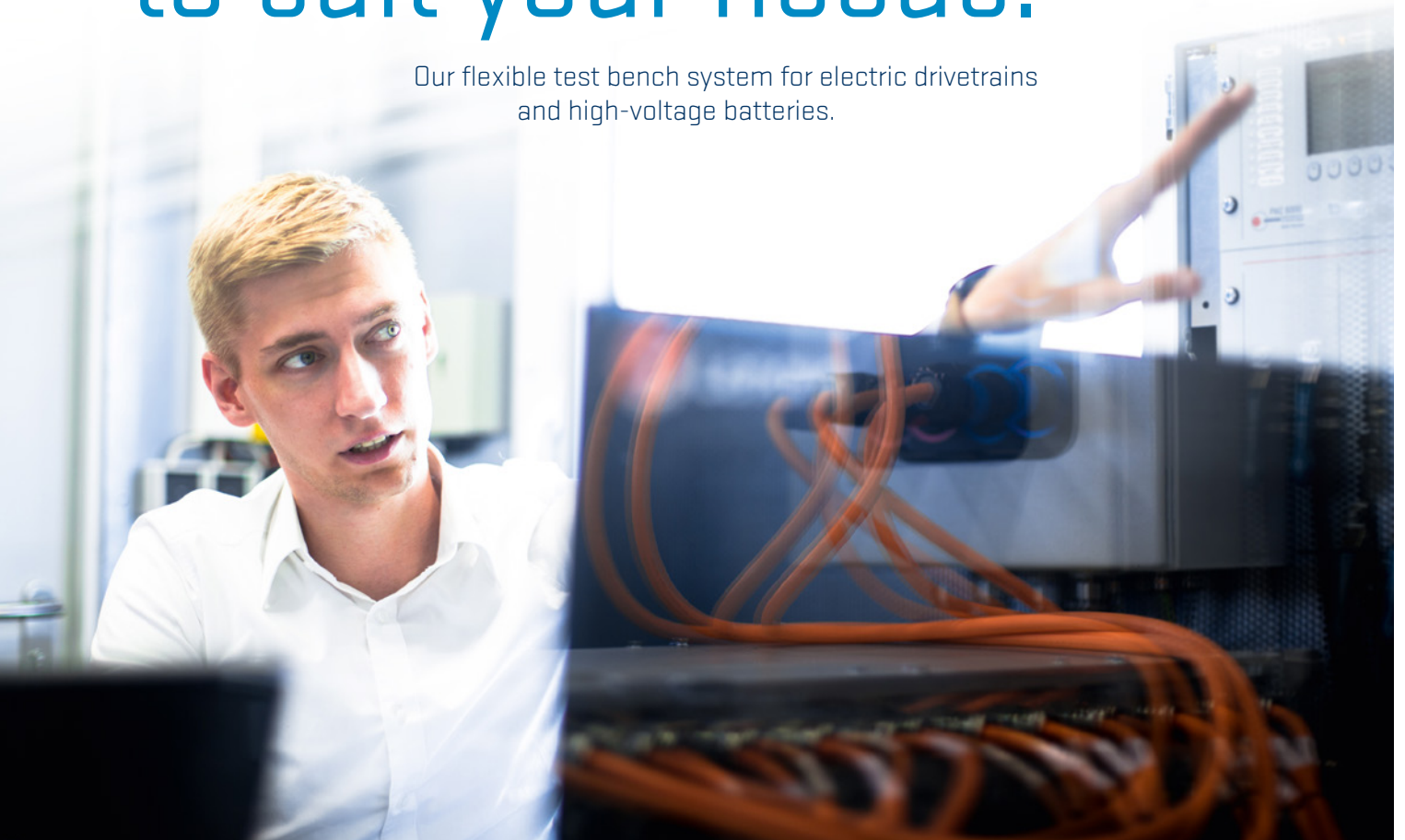
Meet the next generation of flexible test bench
measurement technology for electric traction systems:
the Powertrain-in-the-Loop Dynamometer

PIL powertrain
in the loop



PIL – measurement to suit your needs.

Our flexible test bench system for electric drivetrains
and high-voltage batteries.



COMPONENTS IN A SYSTEM.

Test motors, inverters, energy storage systems – individually and in combination.

The world of electric drive technologies and their peripherals has long since arrived on the market. We're talking about everything from classic on-highway commercial utility vehicles through specialized off-highway vehicles to marine applications. In motorsport as well, the success of Formula E is being followed by the announcement of further electric racing series. As of today, market demand and performance requirements for reliable electric drivetrains and powerful, stable energy storage systems have grown to an exceptionally high level.

In order to match this need for quality, professional testing and evaluation are playing an ever more prominent role in the development process. With our Powertrain-in-the-Loop (PIL) dynamometer, we offer our customers a polyvalent test bench measurement solution capable of carrying out stationary, highly dynamic testing processes with unparalleled flexibility, performance and efficiency.

RELIABILITY AND SYNERGIES IN THE DEVELOPMENT PROCESS.

Powertrain performance tests and battery validation.

The electric powertrain components electric motors, inverters and traction batteries are subject to the highest quality standards and must be able to fulfill a wide variety of performance and safety conditions. The PIL allows us to realistically simulate all load conditions, and thereby define all parameters needed for the characterization and validation of system components. An integrated e-axle unit with separate side-mounted load and brake motors makes it possible to subject complete drive units consisting of an electric motor, inverter, gearbox, control unit and traction battery to true-to-life driving simulations with authentic road load. In our battery test bench, we can also test and validate everything from individual modules to complex traction batteries for their load and continuous load characteristics as well as their charging and discharging cycles.

The PIL is utilized during the development process of individual components to optimize their separate performance properties. However, its full potential lies above all in the complete, true-to-life simulation of combined applications working in total system operation. Through realistic simulation under controlled and precisely definable conditions, the PIL reduces the number of field tests required for development to a minimum, while at the same time fulfilling the highest possible demands for system safety. This allows you to generate technologically sound, cost-efficient synergies which directly benefit the time and cost framework of your project.

PIL FIELDS OF APPLICATION:

- Testing and evaluation of individual components (electric motors, inverters, batteries)
- System testing of components in flexible combinations
- Continuous load testing of complete electric drive systems
- Performance data verification of electric drive systems
- Validation and characterization of high-energy storage devices (traction batteries)
- Testing and evaluation of brake energy recovery



PERFORMANCE MEETS FLEXIBILITY.

Our Powertrain-in-the-Loop dynamometer in numbers.

PIL TECHNICAL DATA:

Selectable voltage range (battery model implementable)	20-1000 Vdc
Traction (continuous)	250 kW
Recuperation (2 brake motors)	330 kW
Maximum braking torque per wheel	3500 Nm
Maximum rotations per wheel	3375 rpm
Battery charging and discharging (continuous)	250 kW
Battery maximum discharge	330 kW

Single wheel control for differential or torque vectoring analysis
Programmable battery models and CAN interfaces
Powerful dSpace Scalexio HIL simulator

VARIABLE CONDITIONING SYSTEM FOR COOLING CIRCUITS OF BATTERY, INVERTER AND MOTOR:

Maximum coolant temperature	140 °C
Maximum volume flows	30 l/min
Heating capacity	2x4 kW
Cooling capacity	2x15 kW

OPTIMIZE TEST PROCEDURES, REDUCE TRIAL PHASES.

The growing importance of test bench measurement technology in the value chain.

Today's market for electric traction concepts and performant drive systems is growing, the pressure for speed in the associated development cycles is increasing - all while demands on quality and safety continue to rise. For those seeking not simply to meet this challenge on a technological and procedural level, but to be capable of proactively generating competitive advantages, we see the intelligent integration of test bench measurement technology within the development process to be a powerful, highly sensitive adjustment screw enabling the achievement of future-oriented engineering in one of the most promising and important traction segments of our time.

Get in touch. We're happy to support.

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