m+p international

Experts in Vibration

Test Stand Engineering

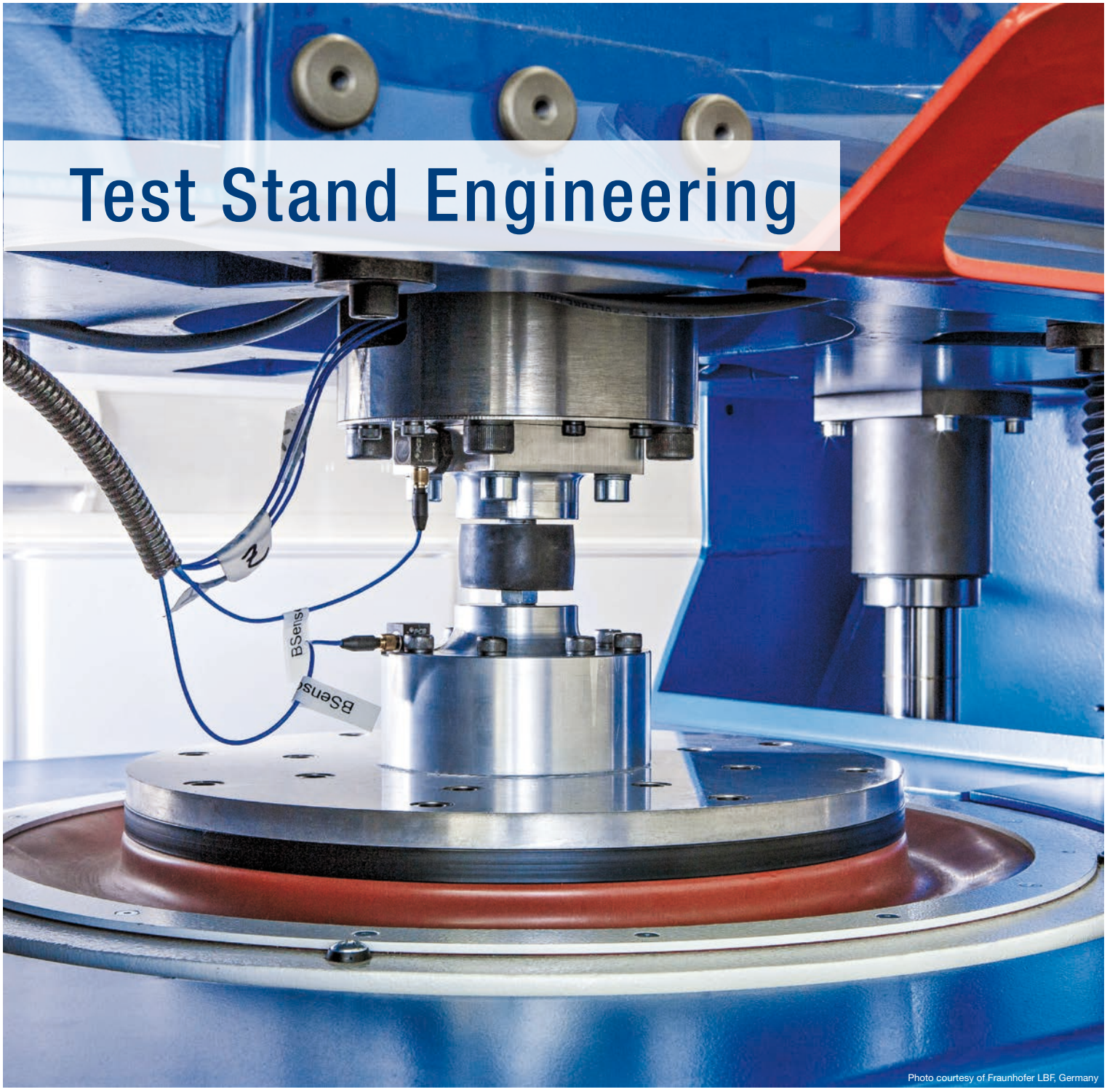
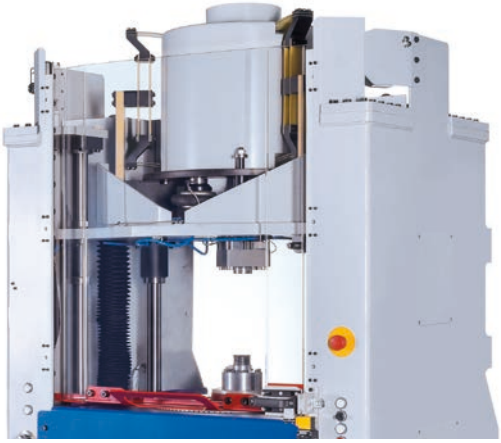


Photo courtesy of Fraunhofer LBF, Germany

High-Frequency Testing of Elastomer Mounts m+p HFDST-3000-E

m+p HFDST-3000-E high-frequency test rig: measuring the dynamic stiffness of elastomer mounts up to 3,000 Hz



High-Frequency Dynamic Stiffness Test Rigs for Elastomer Mounts

Car manufacturers are making ever greater efforts to generate a specific driving experience for the customer, which is essentially determined by the vibration and acoustic refinement. The sources of the noise and vibration, such as the engine and transmission or the exhaust system, must be supported by suitable mounts which are capable of being durable as well as able to attenuate noise and vibration transmission.

Modern elastomer mounts for supporting these systems are thoroughly investigated and optimized for their specific application. Dynamic stiffness is a key criterion in mount

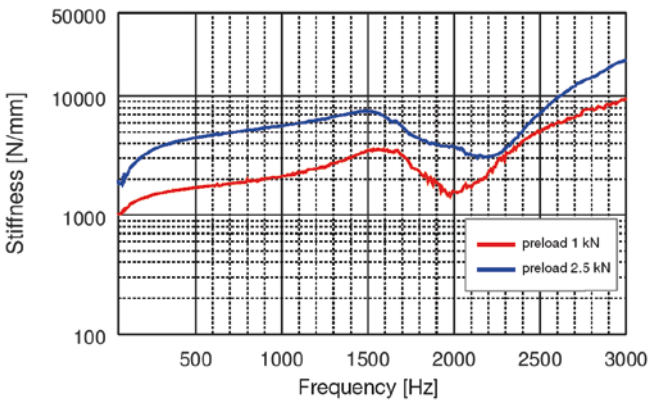
optimization and describes the reaction force of an elastomer mount due to deformation. Driven in particular by e-mobility, the test spectrum for determining dynamic stiffness is changing towards ever higher frequencies.

With the m+p HFDST-3000-E, m+p international has developed a new generation of test rigs, which measures the dynamic stiffness of elastomeric mounts up to 3,000 Hz with a simultaneous static preload of 5,000 N. The purpose is to characterize a wide range of different engine mounts, chassis mounts, suspension bushes, vibration absorbers, etc. dynamically under static preload.

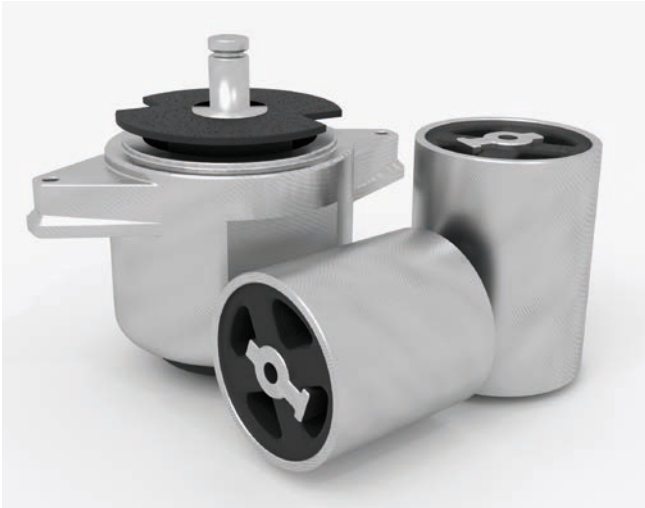
Safe operation is a top priority: The test rig adheres to the latest safety regulations and the EU Machinery Directive 2006/42/EC. During operation, a fully enclosed test chamber protects the operator from all hazards. No person can unintentionally intervene in the test chamber.

The concept of the m+p HFDST-3000-E is based on a specially adapted electrodynamic shaker. The test specimen is mounted between the shaker and a seismic mass, which can be lowered to apply a static preload from 0 to 5,000 N. The test mode is automatically controlled by the well-proven m+p VibControl vibration control software. It enables users to easily parameterize the measurement and control channels and provides a variety of tools for the analysis of elastomeric mounts. During testing, dynamic stiffness and loss angles of the mounts are calculated and displayed online. Thus, the user has an overview of all important parameters at any time.

Due to the multitude of test specimens with different geometries and stiffnesses, a suitable test fixture is required to adapt each specimen to the shaker and the force sensor. These fixtures need to be designed carefully with the test frequency range of up to 3,000 Hz in mind. m+p international offers the design and manufacturing of these fixtures as a service along with the test rig.



Dynamic stiffness determined with a preload of 1 kN (red curve) and 2.5 kN (blue curve)



Elastomer mounts used in cars

> *You will find this requirement for high-frequency evaluation up to 2 kHz in almost every specification. [...] Almost everyone wants to have its components dynamically measured and evaluated up to 2 kHz.*
>
> Reinhard Eder, Head of Testing at SumiRiko AVS Germany GmbH, Steinau an der Straße, Germany

Test Stand Solutions

Three m+p ACON stations operated in parallel

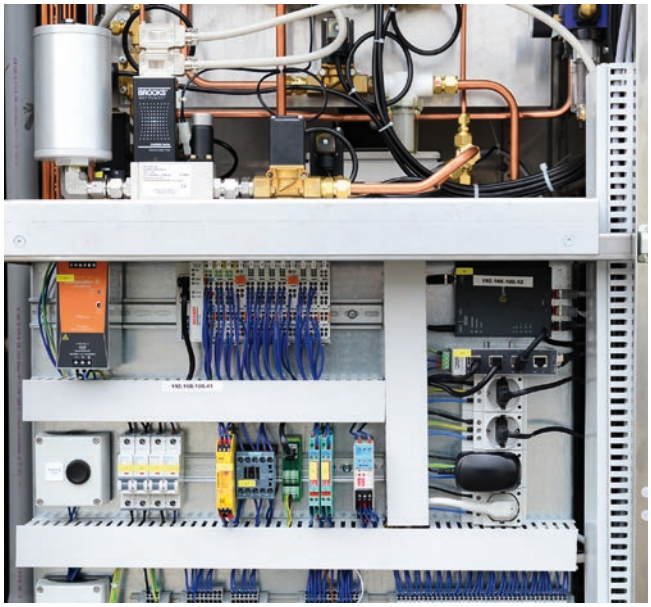
Evaporative Emission Testing

Emissions from vehicles do not only come from the exhaust produced by the engine but also evaporate from the rest of the vehicle (mainly the fuel systems). Activated carbon canisters prevent evaporative hydrocarbon emissions escaping into the environment from the fuel tank.

With m+p ACON, we provide a fully automated canister conditioning and test system which meets the latest EPA, CARB, EU and Chinese requirements using butane/nitrogen and fuel vapour procedures. The test reliably verifies the correct functioning of the canister and is mandatory for subsequent evaporative emission measurements in the SHED chamber. The m+p ACON system controls and monitors the preconditioning procedure, records the results and displays the current state online on the monitor.

m+p ACON supports both in-vehicle and benchtop operations which can be left unattended.

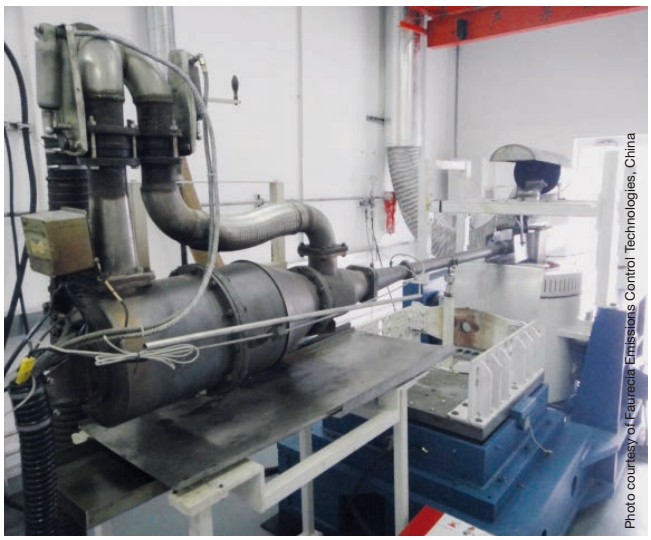
Inside an m+p ACON station



Exhaust Systems Test Stand

We do not only design and construct new test stands, but also help customers improve the performance and capabilities of their existing test stands. For example, we have updated and perfected an integrated exhaust systems test rig.

To realize the communication with the new m+p vibration control system, our engineers modified the existing ignition system control software which was achieved without the need for any additional hardware. The updated system controls the synchronization of the ignition and vibration test cycles and also detects and safely handles fault conditions. With the expertise of m+p engineers, vibration testing has been matched to the customers' special requirements, providing a much wider range of experimental testing methods.



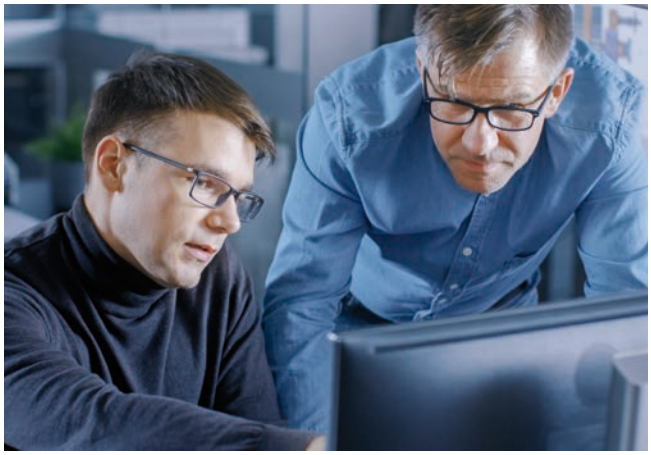
Exhaust systems test stand

Engineering Expertise and Innovation

m+p international has been designing, developing and fabricating vibration and functional test stands for many years. Our engineers apply the latest techniques and a broad range of know-how and experience to create innovative solutions. A track record of successfully implemented test stands is proof of our expertise.

All these test stands are built in close co-operation with our customers and in accordance with their specifications. Often venturing into uncharted technological terrain, these requirements are frequently at the limits of what is technically possible.

Our engineering department would be pleased to help you solve your demanding test tasks.



Experienced and young engineers work hand in hand at m+p international

> ***m+p always considers customers' requirements as first priority, doing their best to adapt controllers and design-specific software during operation. We also appreciate the quick response and after-sales support.***
>
> Levin Sun, Component Test Manager at Faurecia Emissions Control Technologies, Shanghai, China

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Founded in Hannover, Germany in 1980, m+p international develops and manufactures test and measurement systems for vibration testing, dynamic signal analysis, multi-channel data acquisition and monitoring and test stand engineering. Our product reputation and broad experience coupled with valuable user feedback have led to significant market share in numerous key industries worldwide.

The company has its headquarters in Hannover, Germany with sales/marketing subsidiaries in New Jersey (USA), England, France and China, along with representatives and agents in many countries.

Learn more on the full range of m+p international products and services and their applications. Select the m+p literature library on our website and download the desired product literature.

m+p VibControl, m+p Analyzer, m+p Coda, m+p VibPilot, m+p VibRunner, m+p VibMobile, m+p HFDST-3000-E and m+p ACON are products of m+p international.

Specifications subject to change without notice.

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