



## PSV-500 Scanning Vibrometer

Optical 1D and 3D Vibration Measurements

Product Brochure



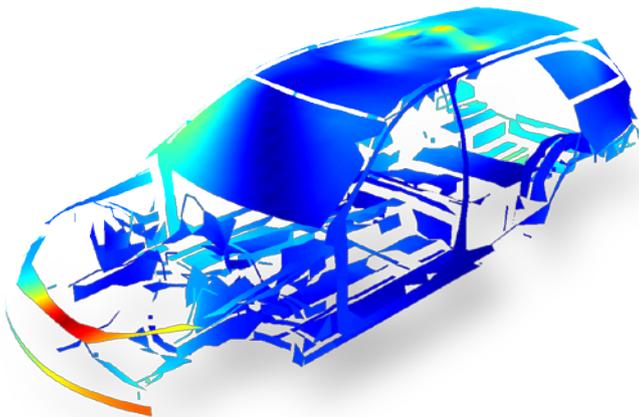
# Non-contact measurement of vibrations – quite simple

## Your challenge:

You need a reliable tool to efficiently measure vibrations. You want to quickly generate reliable data for integration with CAE:

- to validate simulations,
- to visualize data,
- to identify acoustic problems before production starts,
- and to confirm the latest metrological research methodologies.

How do you achieve that without distorting the measurement by attaching physical sensors to the test object?



## Your solution:

Choose scanning vibrometry from Polytec. These sophisticated systems measure, for example, amplitude and phase response over an entire surface and assemble the data into deflection shapes. In this way these systems enable you to carry out experimental modal analyses and operational deflection shape analysis with unparalleled dynamic and spatial resolution.

### Non-contact and independent

A very important characteristic of Polytec's Scanning Vibrometers is that they measure even the most light-weight of components vibrating at high frequency, using only a laser. The technology works without contact, so there are no sensors or cables to attach to the object under test. But that's not all: Vibrations are measured exactly as they occur in reality – without any disturbance caused by the sensor itself. Non-contact also allows you to carry out measurements over large working distances with high flexibility and extreme precision.

### Convincing and plausible

Besides very exact measurement data, the Scanning Vibrometer also directly provides visually convincing animated presentations of deflection shapes. The technical picture drawn during the measurement allows you to visualize the condition and come up with a solution.

**Decide in favor of a Polytec scanning vibrometer today!**

## The Polytec company

More than 40 years of innovation, performance and quality ensures Polytec's continued role as the leading supplier of optical, non-contact vibration measurement solutions. Polytec, the technology leader, has for over 25 years set the standards worldwide for the very best products in optical vibrometry. Polytec has made a name for itself in professional circles, a name synonymous with high quality and proven Scanning Laser Doppler Vibrometers. As a supplier of measurement systems and engineering services, Polytec supports development departments and universities all over the world in the optimization of cutting edge products and research into pioneering new fields

### Highlights of the optical measurement technology:

**Non-contact –**

non-invasive for more precise data

**Full-field –**

complete coverage with high spatial resolution

**Anytime –**

operates during hot, rough and noisy conditions

**Everywhere –**

measures on smooth, rough, porous or rotating surfaces

**Versatile –**

wide frequency bandwidth from 0 Hz up to 25 MHz

### Highlights of the PSV-500:

**Modular –**

also as notebook-based version, upgradable from 1D to 3D to the fully automated RoboVib® test center

**Application-specific –**

diverse accessories and software options for specialized NVH, acoustics, structural dynamics or ultrasonic analysis

**Open-minded –**

PSV software with open data and control interfaces

**Close to the measurement object –**

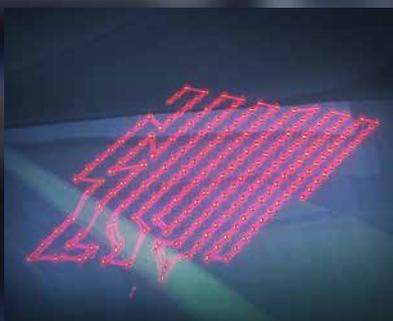
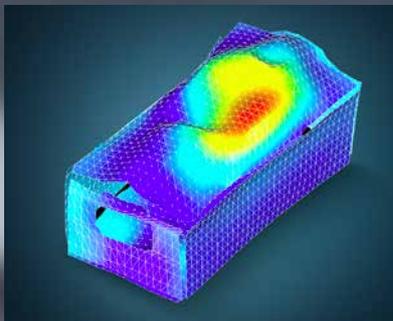
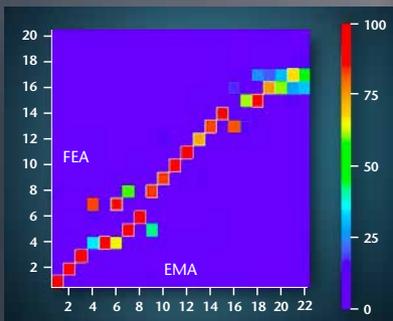
measuring object geometries or importing from CAE

**Integrated –**

building the bridge between simulation and test



# The PSV-500 integrated in your product development cycle



06

## Export data

Back to the source:

- Modal parameter extraction
- Numerical optimization
- Model updating
- Evaluations in MatLab®, LabView®, MS Excel®, ASAM ODS

## Evaluate and visualize

- Impressive 3D visualization of deflection shapes
- Quantitative measurement data for post-processing within the PSV software and 3rd party applications

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## Scan automatically

- Autonomous, automated measurement
- Full function control with scripting and with the open "Polytec File Access"- interface

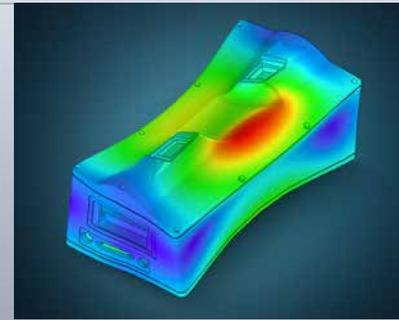
04

The PSV-500 Scanning Vibrometer is an extremely efficient, easy to integrate platform that optimizes your product development cycle, shortens enormously the time-to-market and improves product quality. Standard exchange formats and an open data interface allow you to seamlessly integrate it into your CAE workflow. In doing so, you control the PSV-500 via a documented interface through external applications – ideally with Polytec software which is optimally adapted to your device. Your own programs can also be used with the system.

01

### Simulate

- Source and goal of the measurements
- Validation of models and assumptions
- PSV bridging CAE and test



02

### Define scan points

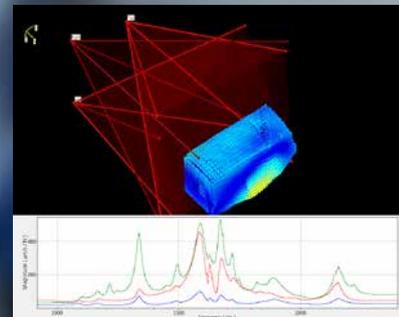
- Geometry imported or directly measured with integrated Geometry sensor
- Virtual sensor – CAE requirements determine location and number of points
- Applies also to the smallest structures



### Define measurement parameters

- The requirements determine the parameters
- Optimal setup of bandwidth, MIMO capability, signalgenerator, time and frequency domain

03



## Growing with your demands

Fifth generation PSV scanning vibrometers are versatile in their application as well as flexible and expandable like never before. From the compact notebook-based system all the way up to the complete RoboVib® Test Center – the PSV adapts to all your requirements! It is the number one choice for every task in 1D or 3D operational deflection shape analysis, experimental modal analysis, wave propagation studies and finite element model validation.



**Portable Notebook version**



**3D measurements**

### **Hardware – more flexible than ever**

The PSV is a platform that can be expanded at any time – from a portable measurement system for mobile use thru the sturdy workstation versions to the fully automated RoboVib Test Center.

The notebook model simplifies mobile measurement – from lab to lab. The sturdy rack systems achieve the high performance day-in, day-out. For the greatest efficiency, the fully automated RoboVib® takes over the measurement process, day and night.

### **Software – practical as always**

The highly intuitive PSV user interface enables even beginners within a few minutes to successfully carry out measurements. The comprehensive PSV software package is especially designed for full field visualization of structure-borne vibrations in a CAE integrated development environment. It offers you detailed measurement data analysis including 3D color representation, deflection shape animations and numerous export interfaces.

Thanks to open interfaces and scripting, a scanning vibrometer integrates easily into your software environment. Data access via MatLab®, LabView® or Microsoft Excel® expands the integrated evaluation and post-processing capabilities.



### With the right accessories you can...

- ... magnify the measurement area,
- ... measure even smallest components,
- ... trigger on noises,
- ... position heads with a motorized drive,
- ... integrate into CAE,
- ... test MIMO,
- ... and measure in the wind tunnel.

#### **From tripod to robot**

Manual and motorized stands, all the way up to the robot version allow quick and easy positioning. The vertical test stand together with the coaxial unit and close-up lenses locate and focus the  $\mu\text{m}$ -sized laser spot onto the smallest of objects.

#### **Handle complex geometry**

An integrated distance sensor generates geometry data for 3D visualization as well as for comparison with CAD data. In cases where complex geometries and locations are difficult to access, mirrors, image processing or "PSV-Commander" tablet remote control help to position the laser.

#### **Operational and modal instrumentation**

The PSV software masters time-critical measurements and enables gating and triggering for acoustic events as well. Integrate several shakers, accelerometers and force transducers into your measurement system, and operate with TEDS and with ICP® as usual.

## Fully automatic vibration measurement in 3D

Through the intelligent combination of a 3D scanning vibrometer with an industrial robot, Polytec offers you a unique automated measurement station: the RoboVib®. It is suitable for a large range of different measurements – from complex components up to complete vehicle bodies. With RoboVib® you can automatically acquire and record the data necessary for a modal analysis which can be indispensable for the development of new products.



### Begin faster

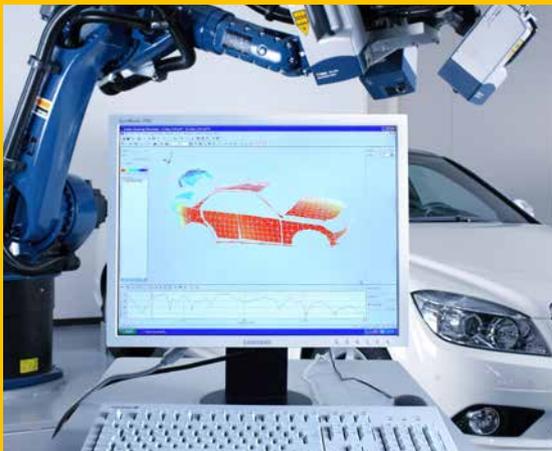
The test preparation takes place almost entirely at the computer. Dedicated test rooms and prototypes are employed for the measurements. RoboVib® uses a high spatial density array of measurement points, extracted from the finite element model for validating models with considerable ease.

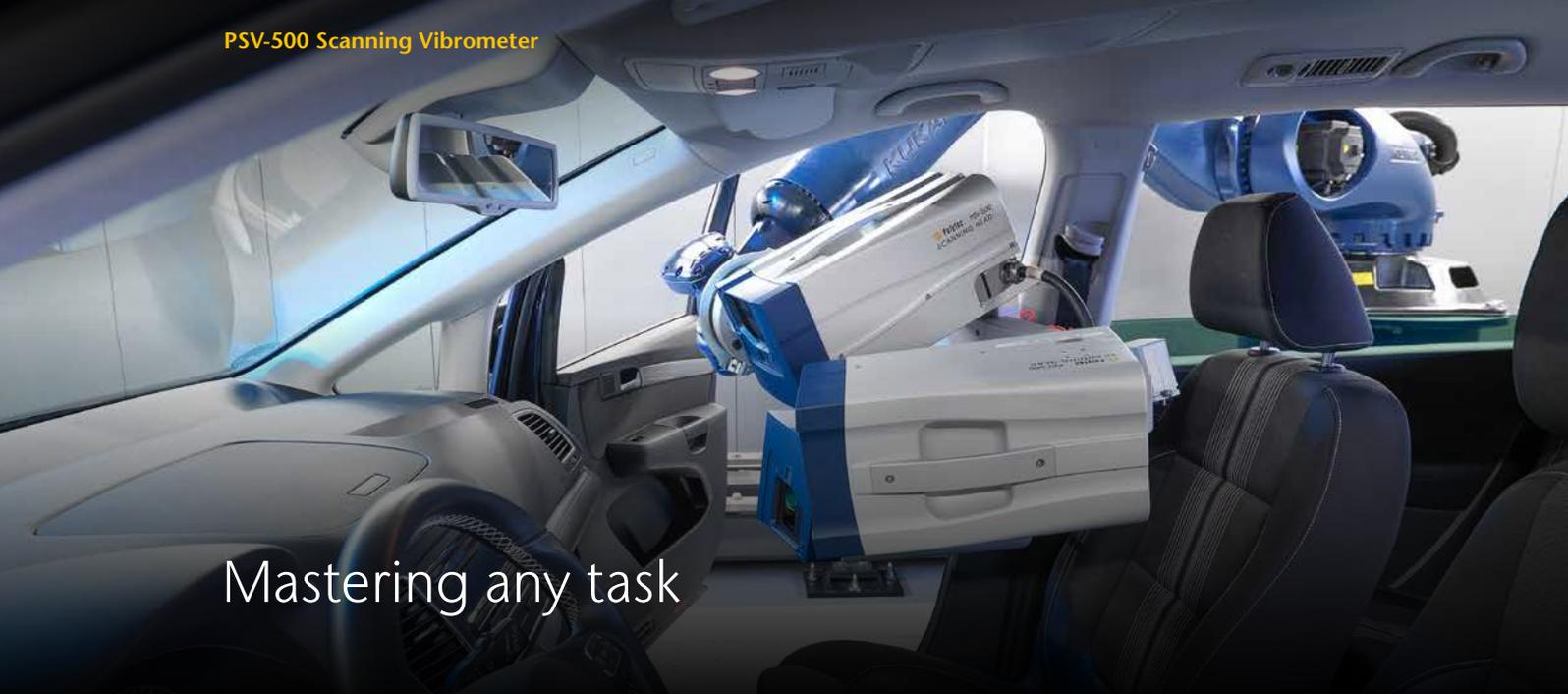
### Measure faster

The laser procedure works extremely accurately and much more quickly than conventional tactile methods. One beneficial outcome is that the measurement data are generated quickly, overnight and with a higher spatial resolution. This allows you, for example, to completely test an automotive vehicle body within 1 or 2 days instead of spending weeks just for the preparation.

### Develop faster

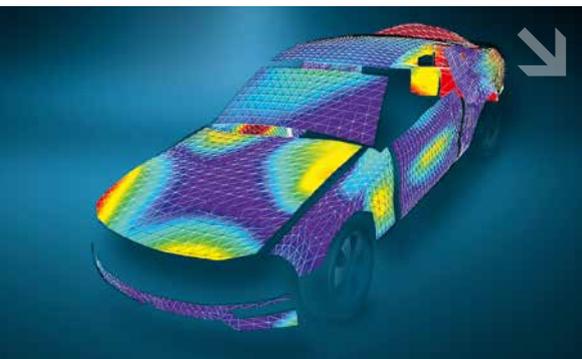
Experienced Polytec engineers can also carry out the planning, setup, measurement and analysis on your behalf, which includes test consulting, automated experimental modal analysis and data evaluation. In this way, Polytec ensures that your product is introduced to the market more rapidly and with higher performance.





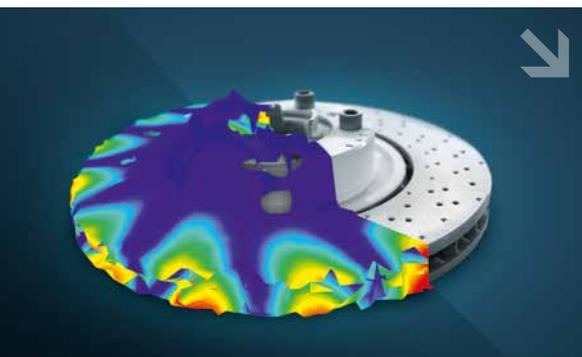
## Mastering any task

Vibration engineering tasks are similar in many fields of research and development. Amplitudes, resonances, and deflection shapes are essential for the evaluation of product performance as well as for improving durability. And even if dimensions and frequencies vary: The dynamic range and flexibility of PSV technology will fulfill your requirements.



### Experimental modal analysis

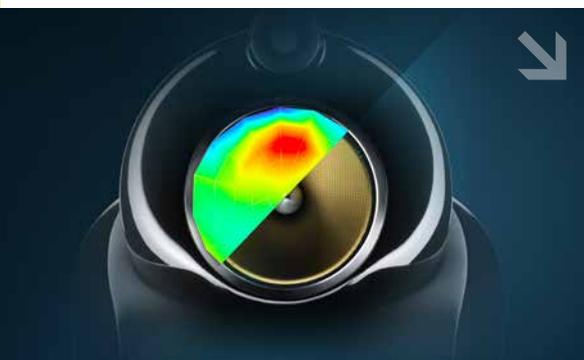
Polytec's experimental modal test includes planning, setup, transfer function measurement, deflection shape visualization and modal analysis based on measured data. The PSV-500 Scanning Vibrometer enables you to achieve precise measurements at a large number of locations leading to impressive MAC-values from comparisons between experiment and simulation.



### Operational deflection shape analysis

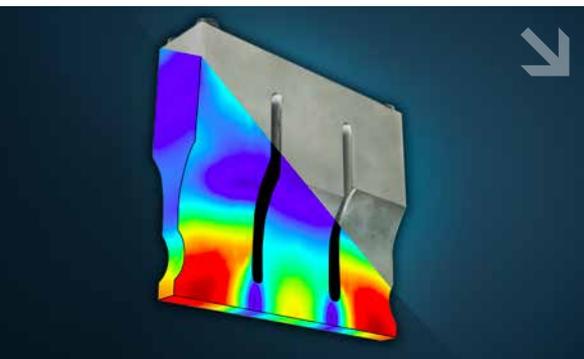
For you as a test and simulation engineer, three-dimensional scanning vibrometry is a unique tool for determining quickly and with extreme precision, operational deflection shapes and Eigen modes of complex objects over a wide frequency range. The PSV-500-3D Scanning Vibrometer guarantees reliable measurement data because its non-contact method reflects the real vibration characteristics of the measured object. This technology is perfectly suited when addressing your stringent demands for high performance, precision and data analysis during structural dynamics testing.

**Polytec Scanning Laser Vibrometers extend your potential and improve your results.  
Many measurements are only possible and economically feasible using these instruments.**



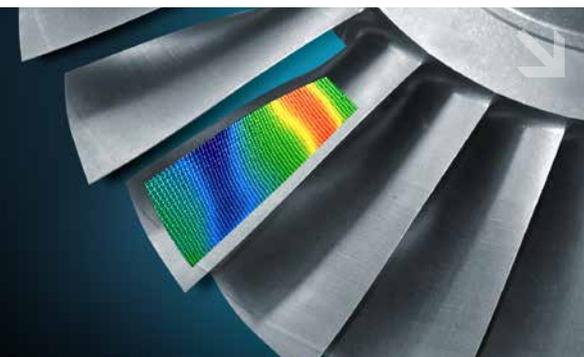
#### **Acoustics & NVH**

No matter whether your goal is to develop quiet, low-vibration products or parts with a specific sound signature, scanning vibrometers from Polytec allow you to detect and analyze sound or vibration sources quantitatively with a high spatial resolution using experiment coupled with simulation. 3D visualization helps you understand the vibrations that give rise to wanted or unwanted acoustics.



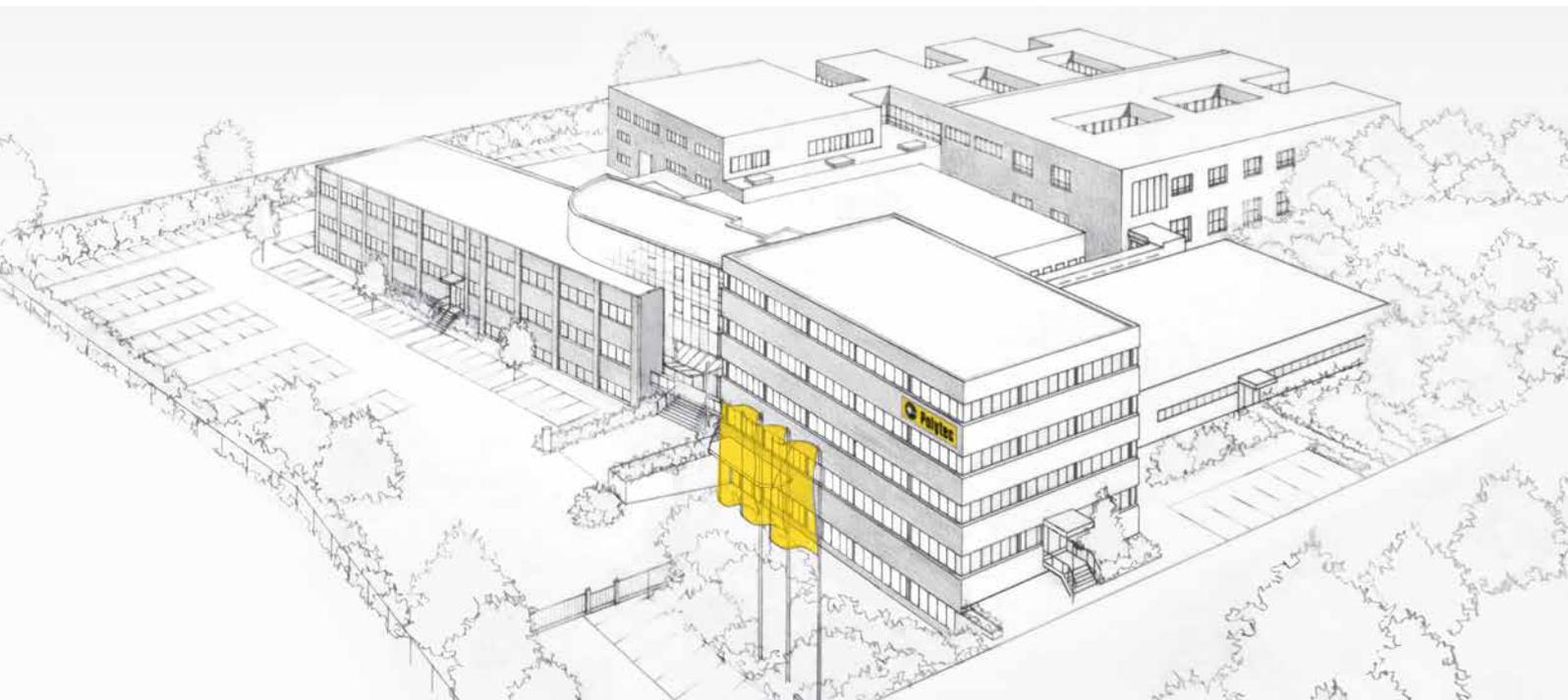
#### **Ultrasonics & non-destructive testing**

Renowned manufacturers of ultrasonic equipment for industrial and medical applications rely on scanning vibrometers from Polytec for their research, development and production testing. Measure and visualize vibration characteristics of actuators and sensors with laser vibrometry – the precise and reliable tool for FE validation, optimization and troubleshooting. Research NDE by studying wave propagation interactions with defects in metals and composites.



#### **Stress & strain measurement**

Scanning 3D vibrometry provides a fast and precise validation of stress and strain calculations. It angles the laser to measurement locations imported directly from the FE mesh and avoids the expense, uncertainties and added mass associated with conventional tactile methods such as strain gages. High spatial resolution locates stress and strain maxima with high precision, leading to improved component design.



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