Polytec

VibroScan QTec

Optical vibration measurement in 1D and 3D

Product brochure

VibroScan QTec – patented data quality

The analysis and control of dynamics and acoustics are crucial in order to make them usable for better products and new findings. Measuring vibrations without contact, making them visible and thus understanding the world better is the task for which we developed VibroScan QTec.

Do you want to generate areal vibration data quickly and reliably? Scanning laser Doppler vibrometers with QTec® multi-path interferometers are your solution. **Simple, fast, reliable.**

30 years

Scanning vibrometer from Polytec.

Model validation and acoustic troubleshooting were at the heart of the development of the first Polytec scanning vibrometers. For the past 20 years, these vibrometers have also been used for triaxial measurements. The experience of thousands of customers has resulted in an indispensable tool for better data and better products.

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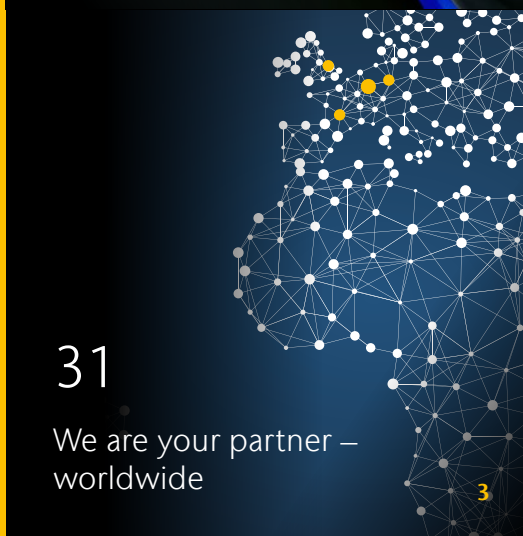
Up to any task



31
We are your partner –
worldwide

No compromises – always the best data quality with QTec®

VibroScan QTec measures vibrations in a new way – without contact and with unprecedented precision.

With its groundbreaking multi-path interferometry and diversity combining, QTec® sets new standards in optical sensitivity and interference immunity.

FLEXIBLE
For objects from µm to m

BEST DATA QUALITY
Unbeatable signal-to-noise ratio thanks to QTec®

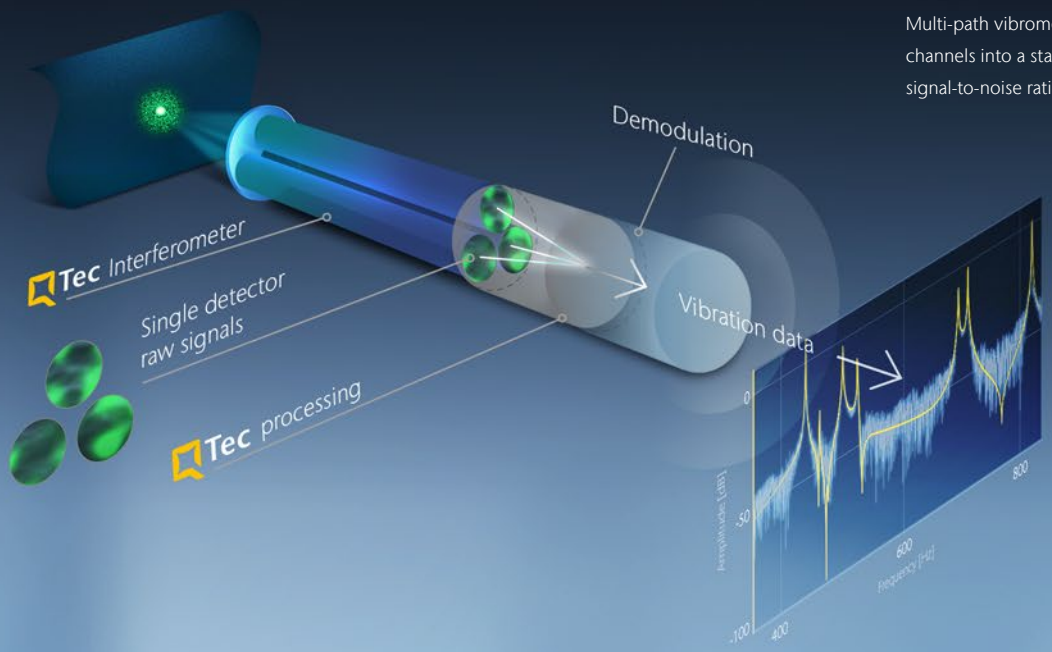
FAST ELECTRONICS
Always enough bandwidth

COPES WITH EVERYTHING
Hot, rotating, vacuum, in water

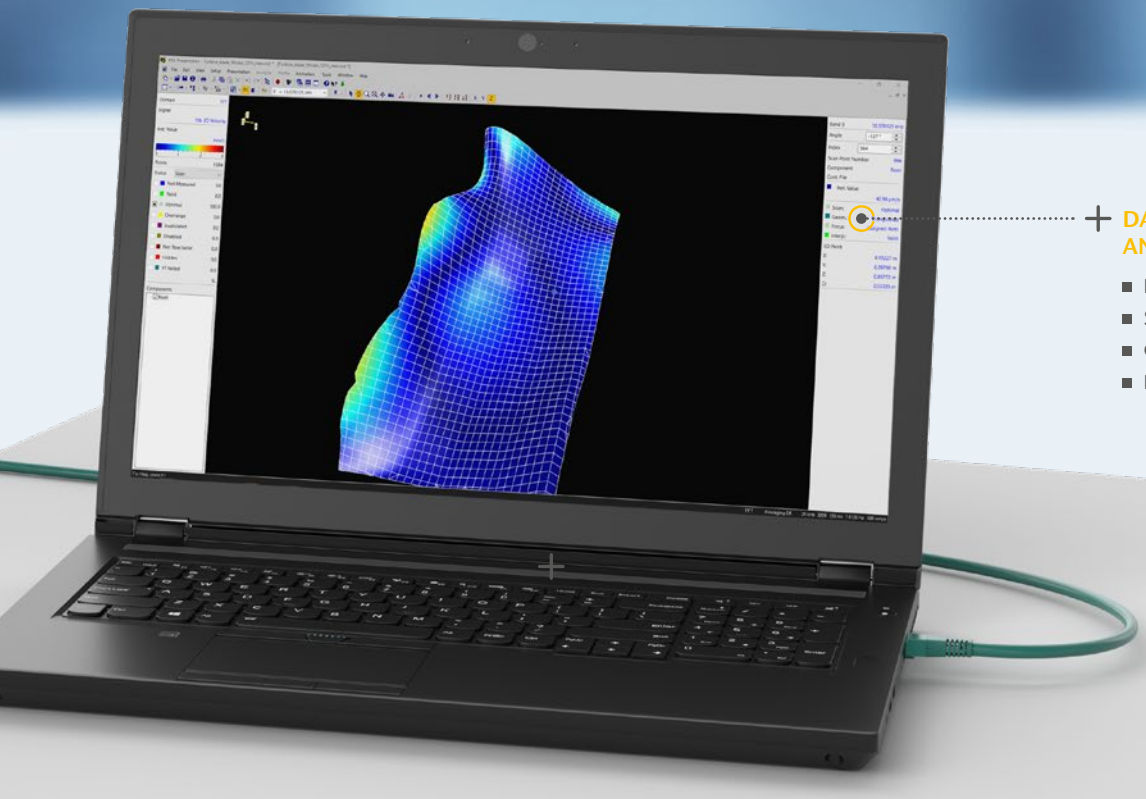
TRAVEL FRIENDLY
Compact and portable

EFFICIENT
Fully automatable

FLEXIBLE
Expandable to 3D measurements



Multi-path vibrometry weights receive channels into a stable signal with the best signal-to-noise ratio – diversity combining



DATA ACQUISITION AND ANALYSIS SOFTWARE

- **Intuitive:** 3D deflection shapes in minutes
- **Self-explanatory:** the PSV software
- **CAE integrated:** virtual measuring
- **Future-proof:** open architecture

The QTec® technology – a revolution

Highlights

- Highly stable vibration signal
- High signal-to-noise ratio
- Shorter measurement time
- Precise data acquisition
- Suitable for all surfaces and environments

What is QTec®?

Polytec's QTec® technology revolutionizes laser vibrometry through multi-path interferometry with diversity combining. By using independent detection channels, QTec® captures the signal from different perspectives simultaneously resulting in a stabilized signal and a high signal-to-noise ratio.

Cause of noise

A single receive channel sees a speckle pattern that fluctuates over time. Dark speckles lead to noise, bright speckles contain the full useful signal. With a QTec® interferometer, the pattern is different in each channel and the probability of a dark speckle decreases significantly with the number of channels.

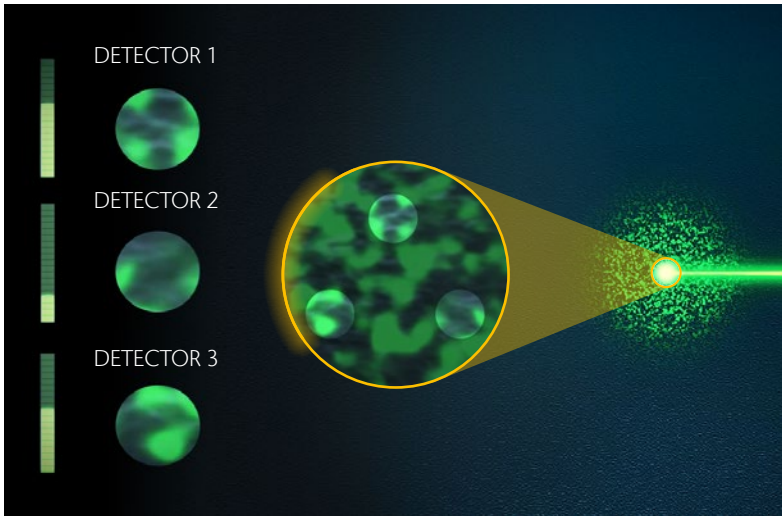
Signal processing

An ultra-fast FPGA uses an algorithm to decide on the best combination of the individual signals. The result is a stable vibration signal at all times.

Learn more about QTec®

Why does QTec® provide better data?

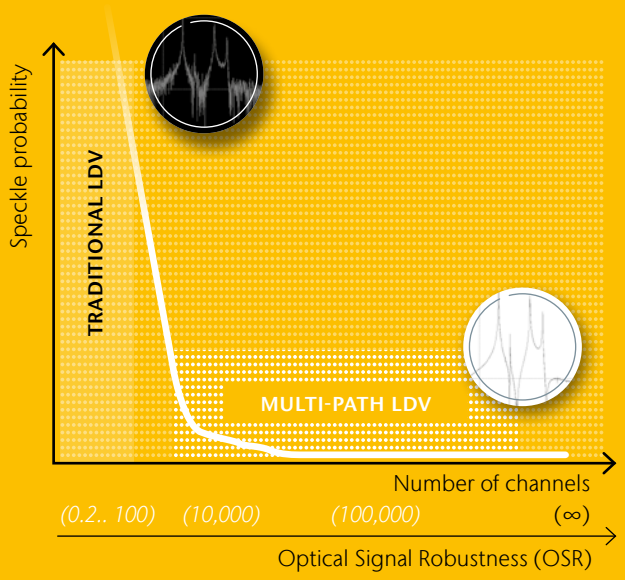
QTec® results in a stabilized signal and a high signal-to-noise ratio. This technology is ideal for technical surfaces, ensures consistent, reliable measurements and shortens the measurement time. It is particularly effective in demanding applications and enables precise data acquisition regardless of surface properties or environmental conditions.



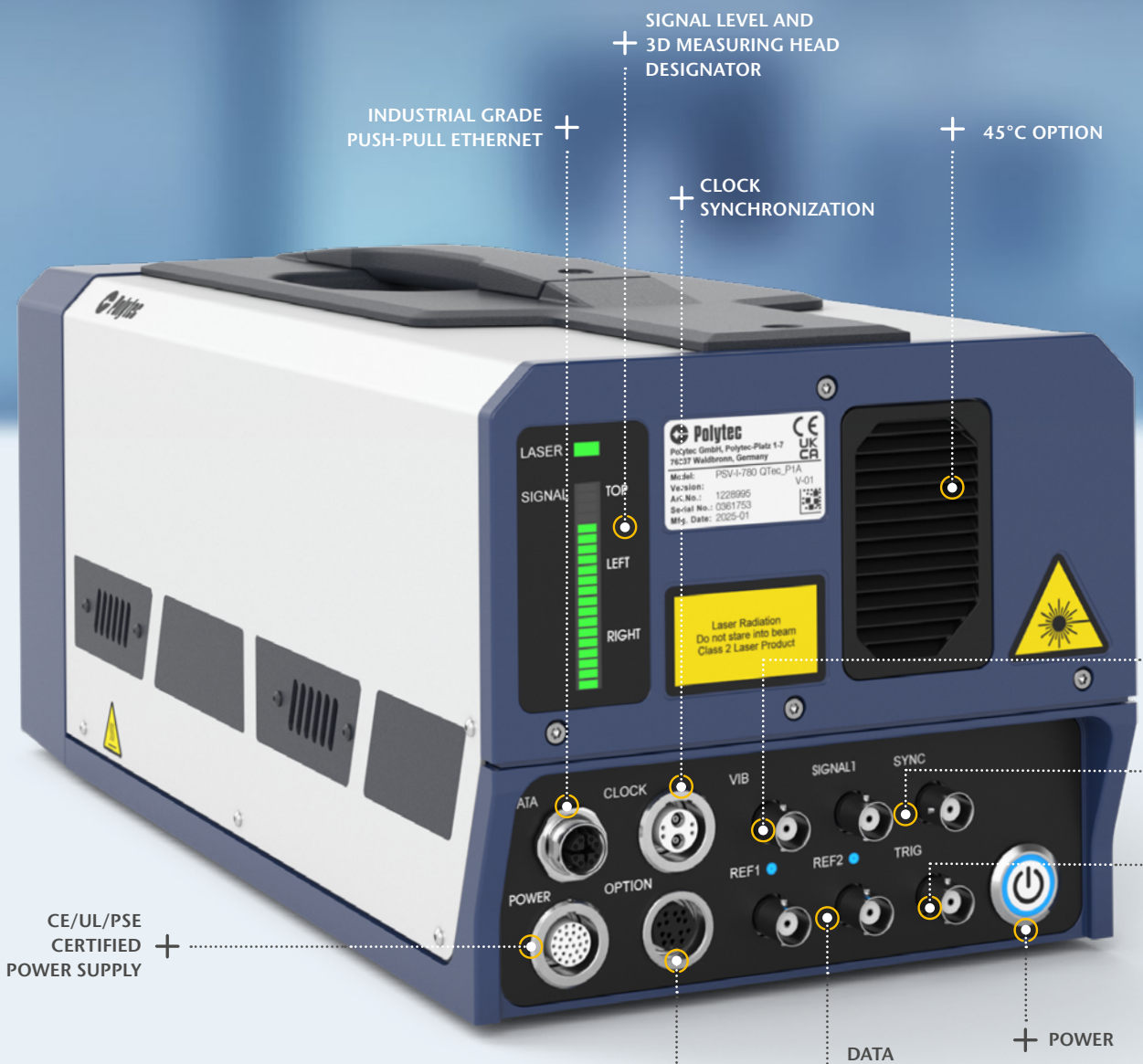
What is OSR?

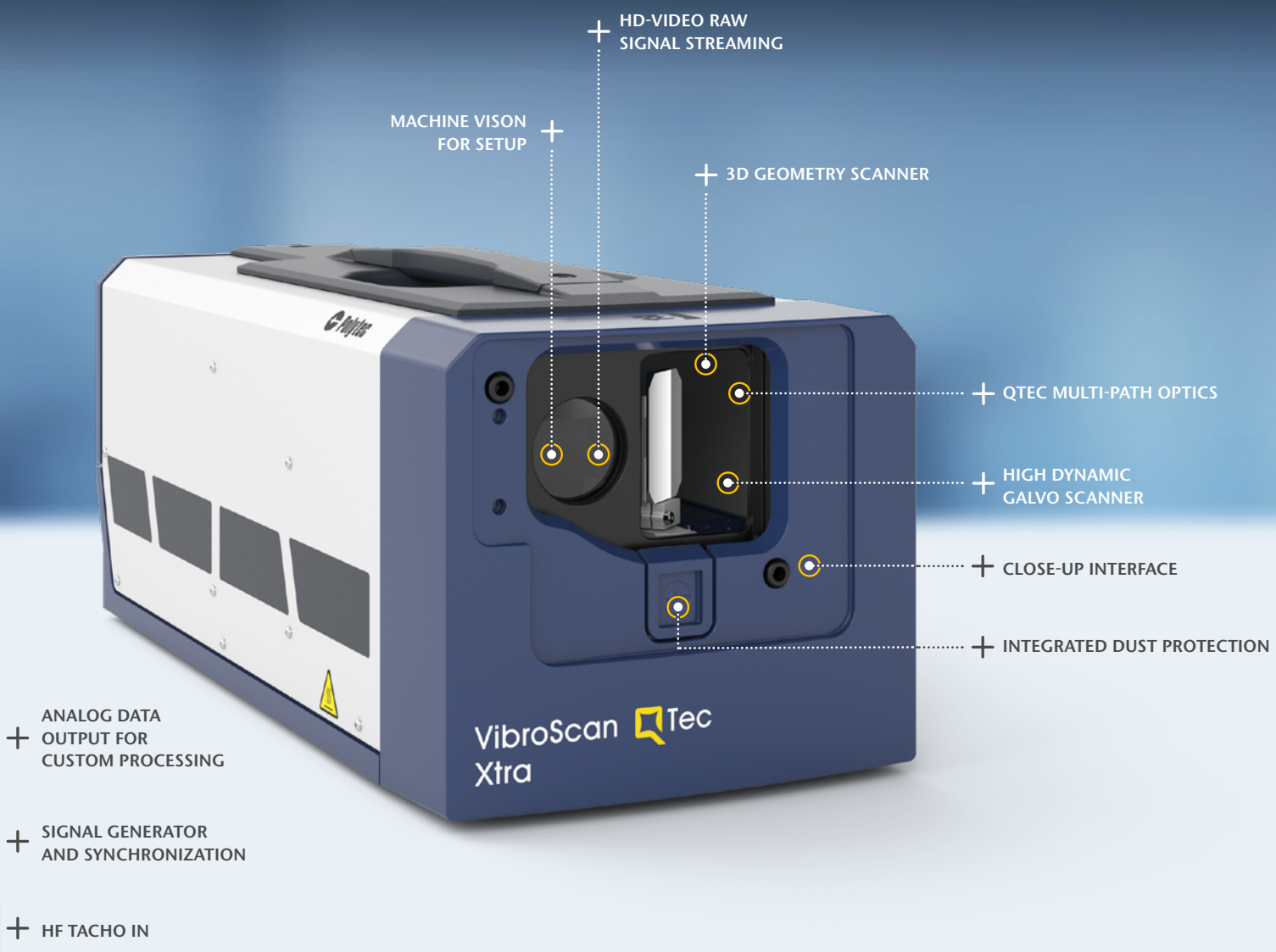
Optical Signal Robustness (OSR) is a measure of the speckle dropout sensitivity of a laser vibrometer.

The OSR value is determined by a simple test on a turntable. The higher the value, the less likely it is that a speckle dropout will occur. The signal-to-noise ratio increases significantly.



VibroScan – the QTec vibrometer





- Increased signal quality for even greater reliability
- Up to 10 times shorter measuring time
- Increased flexibility with a user-friendly setup
- QTec Helium Neon for challenging tasks
- Improved specs for your performance

Our technological edge for your application

QTec

VibroScan QTec Neo

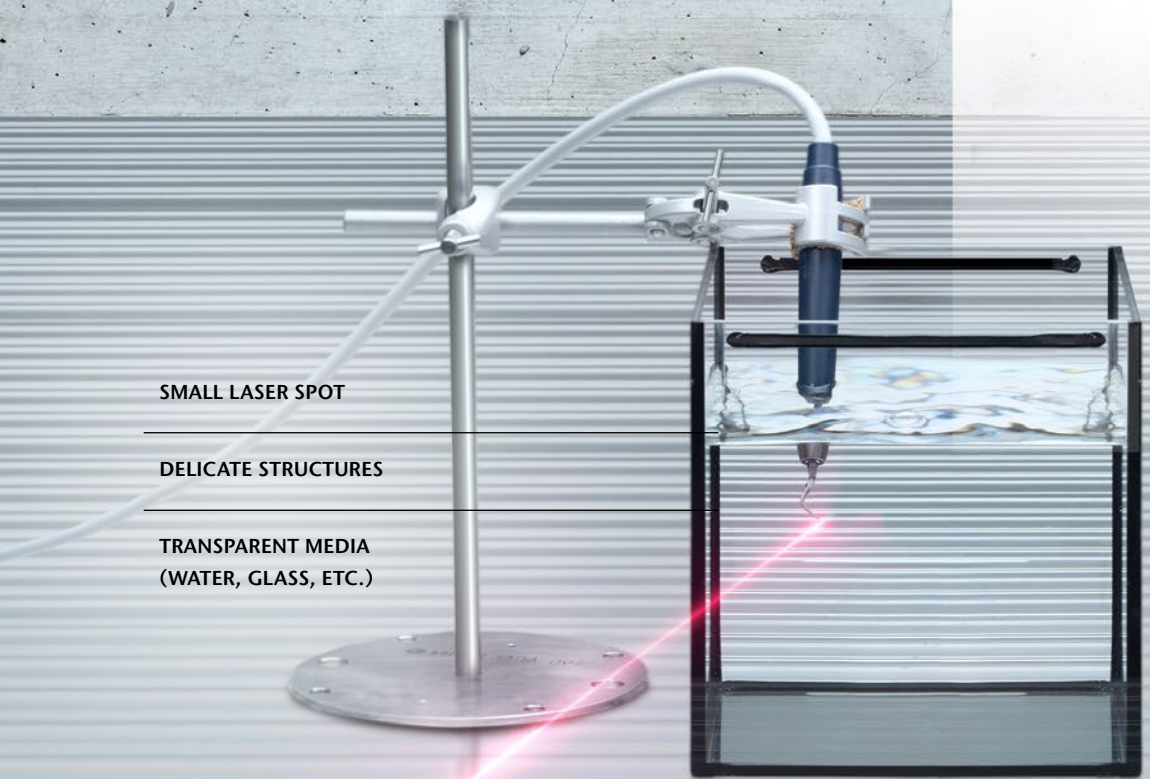
The precise helium-neon laser is suitable with its small laser measuring spot for measurements on the finest structures and even measures in and through water and other transparent media.

(nm/s) *(µm/s)*

Modal analysis

Durability

Acoustics



SMALL LASER SPOT

DELICATE STRUCTURES

TRANSPARENT MEDIA (WATER, GLASS, ETC.)

(mm/s) (m/s)

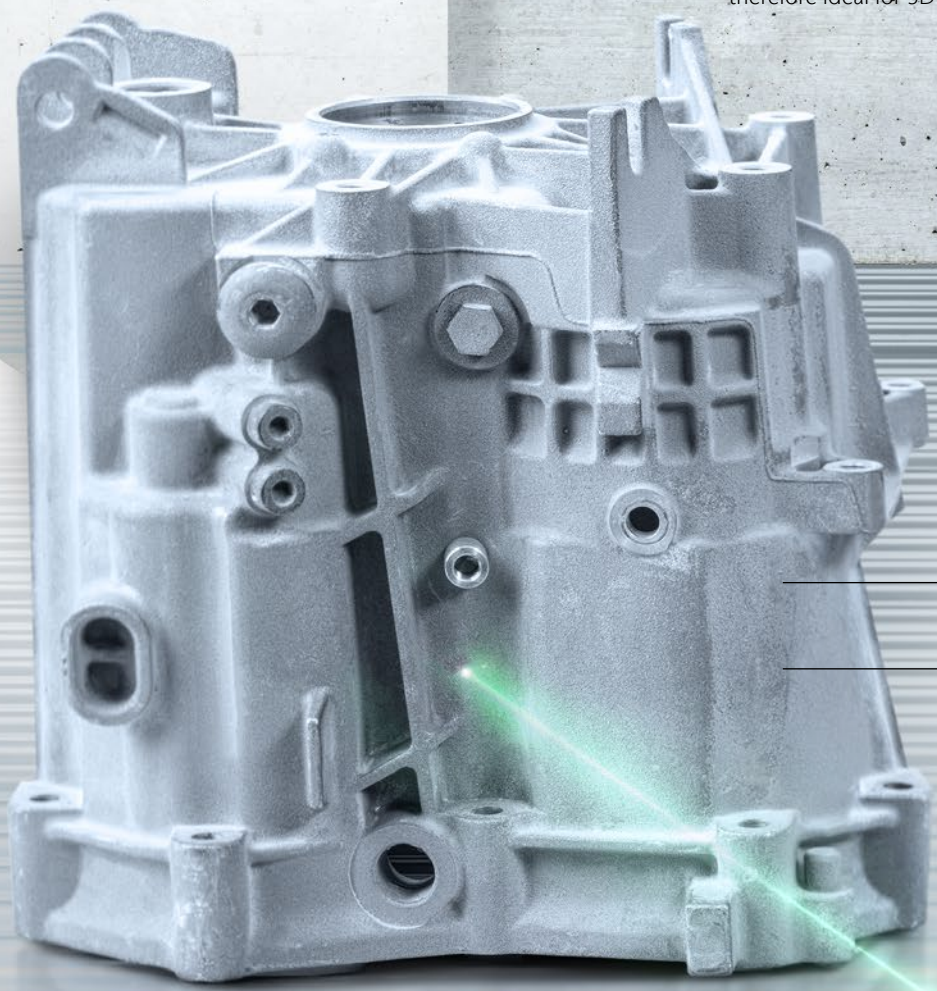
Operational NVH

Ultrasonics

QTec

VibroScan QTec Xtra

With its SWIR wavelength, the Xtra laser brings more power to the measurement. This makes it easy to realize larger measuring distances. The combination with QTec® makes the Xtra laser incident to the angle of impact and therefore ideal for 3D measurements.



BEST SIGNAL QUALITY AT ANY DISTANCE

TECHNICAL SURFACES

HIGH VIBRATION VELOCITIES UP TO 30 M/S

Software: one ecosystem – many possibilities

Simply combine the VibroScan components with each other and synchronize them with picosecond precision. If required, you can integrate single-point vibrometers as reference vibrometers via the central PSV software.

One software for everything – PSV Software

- Controls all vibrometers
- Synchronizes the phase position
- Integrates all measurement data to the analysis
- Interface to CAE and external analysis tools

OINT VIBROMETER
VibroGo
PSV SOFTWARE
MSA- 600
MSA- 060
MSA-
100-3D
MICROSYSTEMS

Software: push forward into new dimensions!

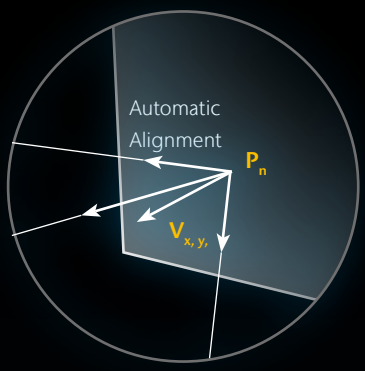
Scanner, camera and data acquisition measure and visualize every vibration shape precisely from the direction of the laser beam. If the measurement object or vibration is complex, only the three-dimensional vibration vector provides complete information. You are always prepared for this in the VibroScan ecosystem.

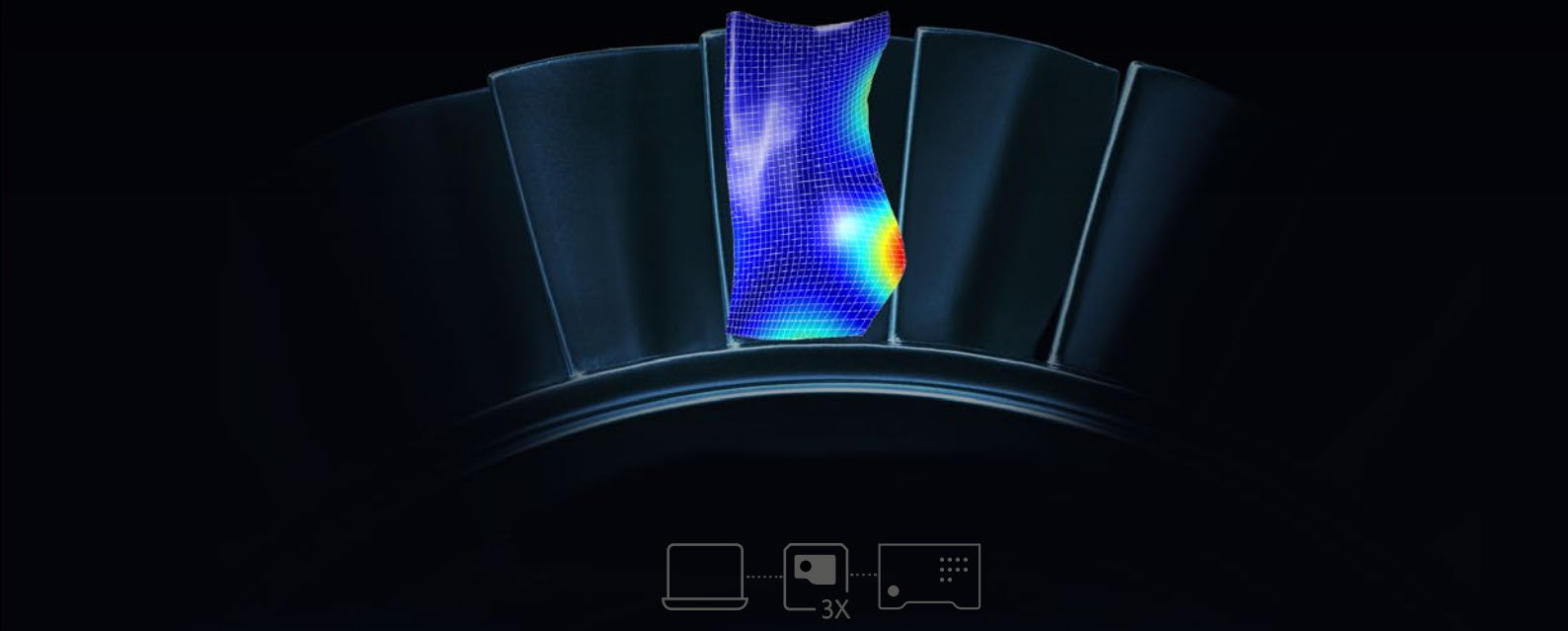
Connect three stand-alone VibroScan QTec sensors to the hub and measure the three-dimensional vibration vector. With three synchronous measurements from three directions, all three dimensions of the vibration open up for analysis.

3D is as easy as 1D

The hub synchronizes two additional vibrometers with picosecond accuracy. MIMO-capable signal generators included.

The PSV software takes over the guidance, recognizes the position of the individual VibroScans QTec in relation to the object, synchronizes the three laser beams and guides them in a µm-sized measuring spot over the measured object. The results are automatically transformed into the FEM coordinate system and animated according to the direction of vibration.

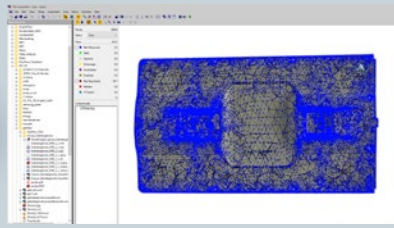




Software: strong internally – open to the outside world

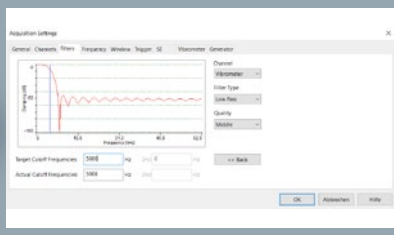
The intuitive operation of the Polytec Scanning Vibrometer enables even beginners to take successful measurements in just a few minutes. The PSV software is the key to this ease-of-use. The comprehensive PSV software package is specially designed for full-field measurement and visualization of structure-borne vibrations in a CAE-integrated development environment.

YOU NETWORK

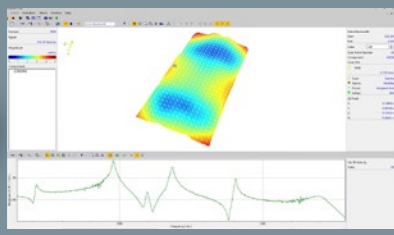


YOU CLICK

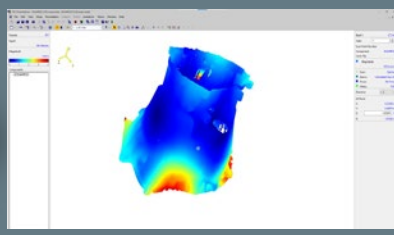
YOU MEASURE



YOU ANALYZE



YOU COMMUNICATE



* optional ** depending on the model and configuration

A live video image, intuitive drawing and meshing tools quickly provide a suitable measurement grid. Image processing* helps you detect the laser position and automatically creates a measurement grid based on the object contour. The integrated distance sensor* provides the exact 3D coordinate for each measurement point.

For experts:
- Measurement grids as provided in an FE simulation – work with imported CAE geometry
- No CAE data? Generate high-resolution measurement grids with a hand-held 3D geometry scanner*

Meshing complex objects is just a mouse click away with the PSV software. You decide in the video image what is to be measured – and, above all, what is not. The software automatically fills the areas with a suitable measuring grid.

For experts:
- A neural network analyzes the video image and identifies relevant objects
- You adjust the density of the generated grid to your requirements
- The automatically generated grid remains editable

Results under control: You define the data acquisition setting and excitation in the time or frequency domain – while your VibroScan QTec automatically scans the object.

For experts:
- Choose from 10 specific waveforms for sample excitation or freely define an excitation signal according to your requirements
- MIMO measurements* with multiple shakers and up to 13 additional sensors
- Optimize your result with signal enhancement and filter tools, as well as automatic measurement range settings

The clear graphic representation of the measurement results and extensive integrated evaluation and post-processing options support you in interpreting the measurement data. 3D animation, identification of resonances via cursor, Bode plots, deflection shape display in volume or sections are among the standard tools for vibration analysis.

For experts:
- The Polytec SignalProcessor* enables individual and flexible signal post-processing
- You can carry out modal and order analyses efficiently with the coordinated PolyWave software*
- Use our interfaces to MatLab®, LabView®, MS Excel®, Python, ASAM ODS*

Your proof of a successful test: 3D animations ensure an intuitive understanding of the measurement results. Texture data from a hand-held 3D scanner convinces with a photo-realistic presentation of the results. With profile sections and sections through volumes, details also become clear and you can find the right optimization approaches.

For experts:
With the free Polytec ScanViewer, you not only present images and animations, but can also select live frequencies and 3D views in Power Point®.

Automation:
using precision efficiently

With turnkey solutions for automated modal analysis, universal interfaces and drivers, VibroScan QTec is even better embedded in your workflow.

Software-defined experimental modal tests
RoboVib® Bench and RoboVib® integrate into the CAE workflow. EMA tests are performed in a time-saving and reproducible manner – even overnight.

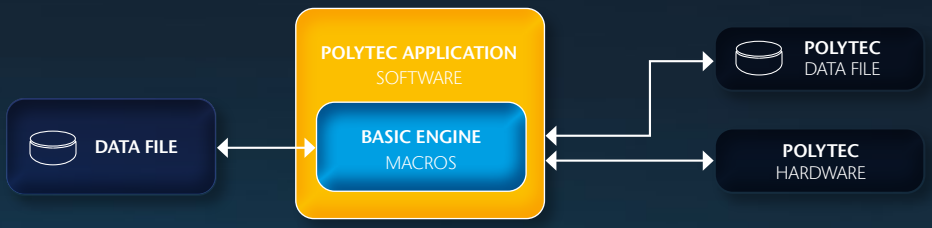
Open source drivers
Operating system-independent automation

Do it yourself – automate with our software tools

The integrated macro language makes it easy to control measurements and evaluations, process data and carry out batch processes. Thanks to the COM/DCOM interface, you can easily integrate MATLAB or Python, and the Polytec File Access API gives you full access to measurement data. Live data transfer via a cross-platform driver makes it easy to integrate VibroScan QTec into test sequences. VibroScan QTec thus becomes a test machine.

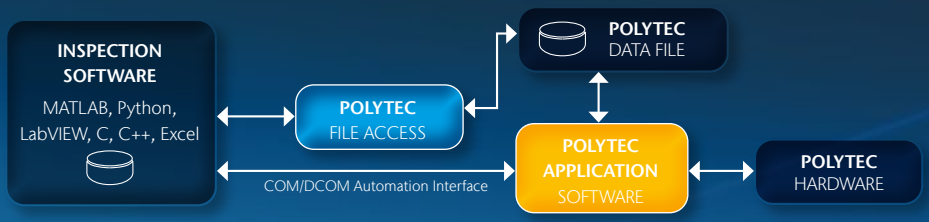
Basic Engine

Benefits from the integrated macro language



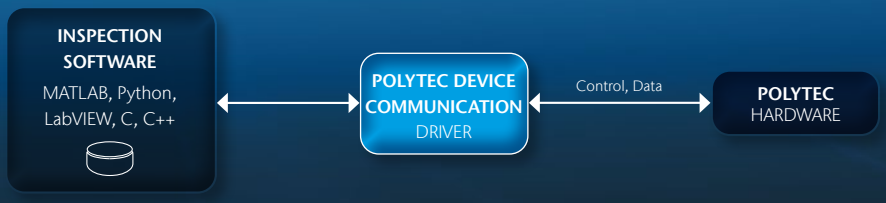
COM/DCOM Automation Interface

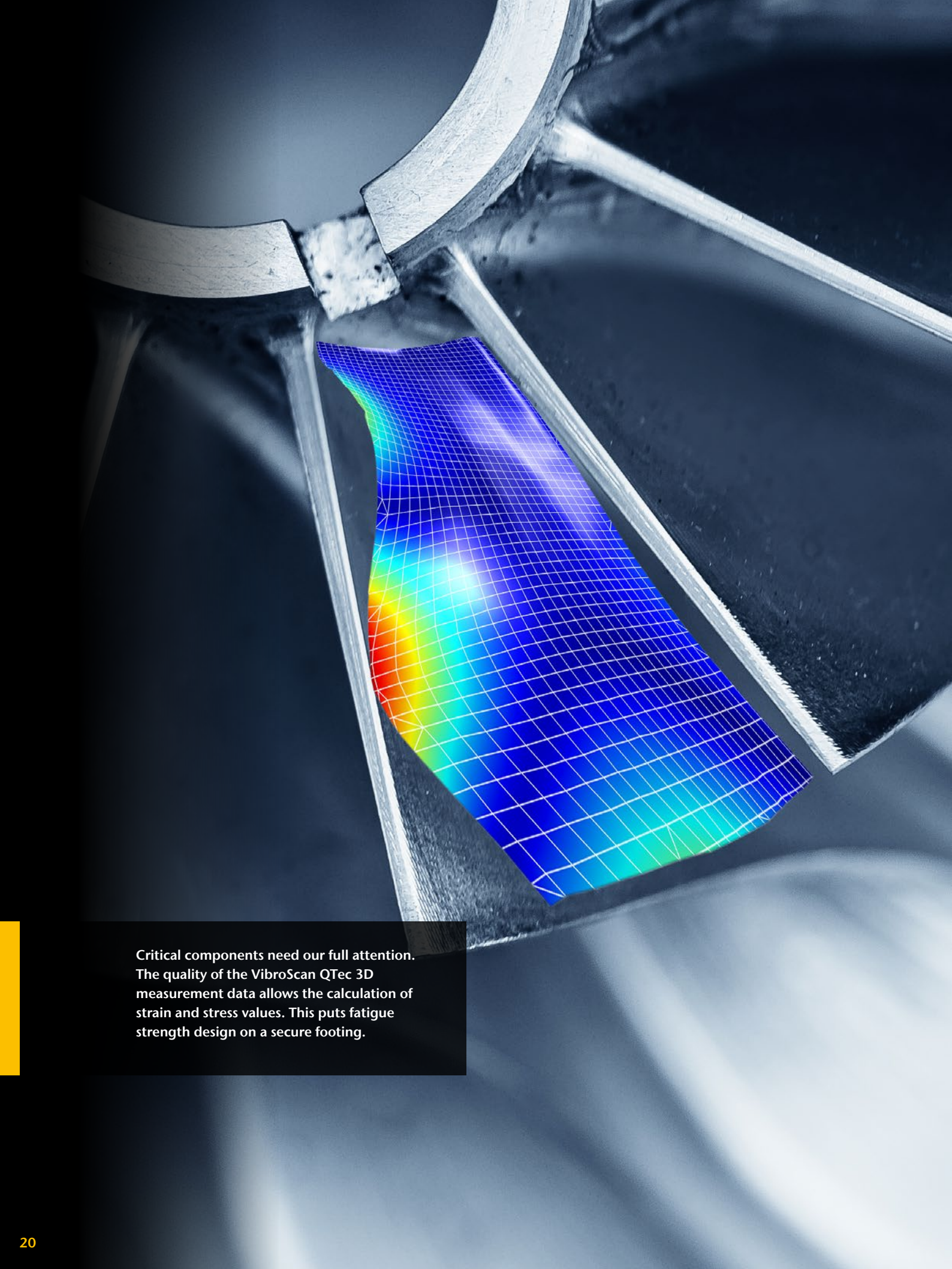
Control of the Polytec system software by external programs



Polytec Device Communication

Direct integration of the measuring system into external programs





Critical components need our full attention. The quality of the VibroScan QTec 3D measurement data allows the calculation of strain and stress values. This puts fatigue strength design on a secure footing.

Strain software: post-processing as a system

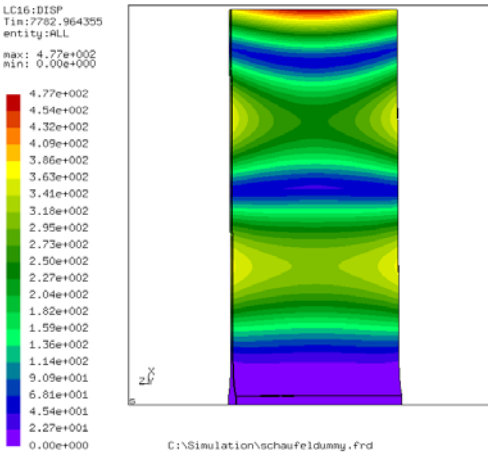
What is crucial for good strain data? Both the uncertainty of the true positions of the lasers representing the grid points and the noise of the in-plane oscillations must be minimized, since the strain data are derivatives of the displacement data.

Why VibroScan QTec is the solution:

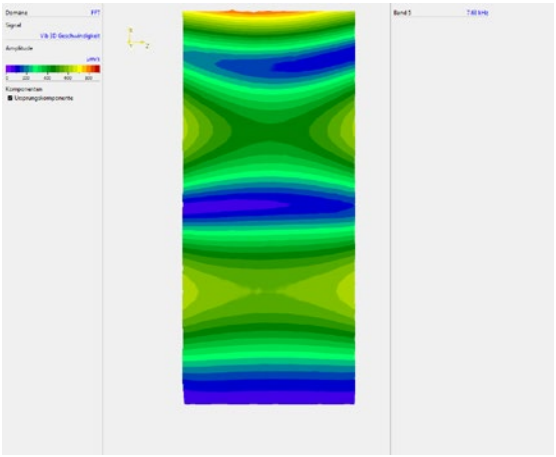
- The true position of the three lasers and the perfect overlay are determined by Polytec's unique VideoTriangulation® based on image processing
- In addition to the vibration measurement the true position of the 3D lasers is located with µm accuracy and the geometry model is adjusted
- QTec® delivers low-noise in-plane data on all surfaces – even at the high angles of incidence required for 3D measurements

StrainProcessor

- Validation measurements of strain-based FEM models
- Post-processing of dynamic 3D displacement data
- Determination of stress distributions and stress peaks



Simulation



Measurement result

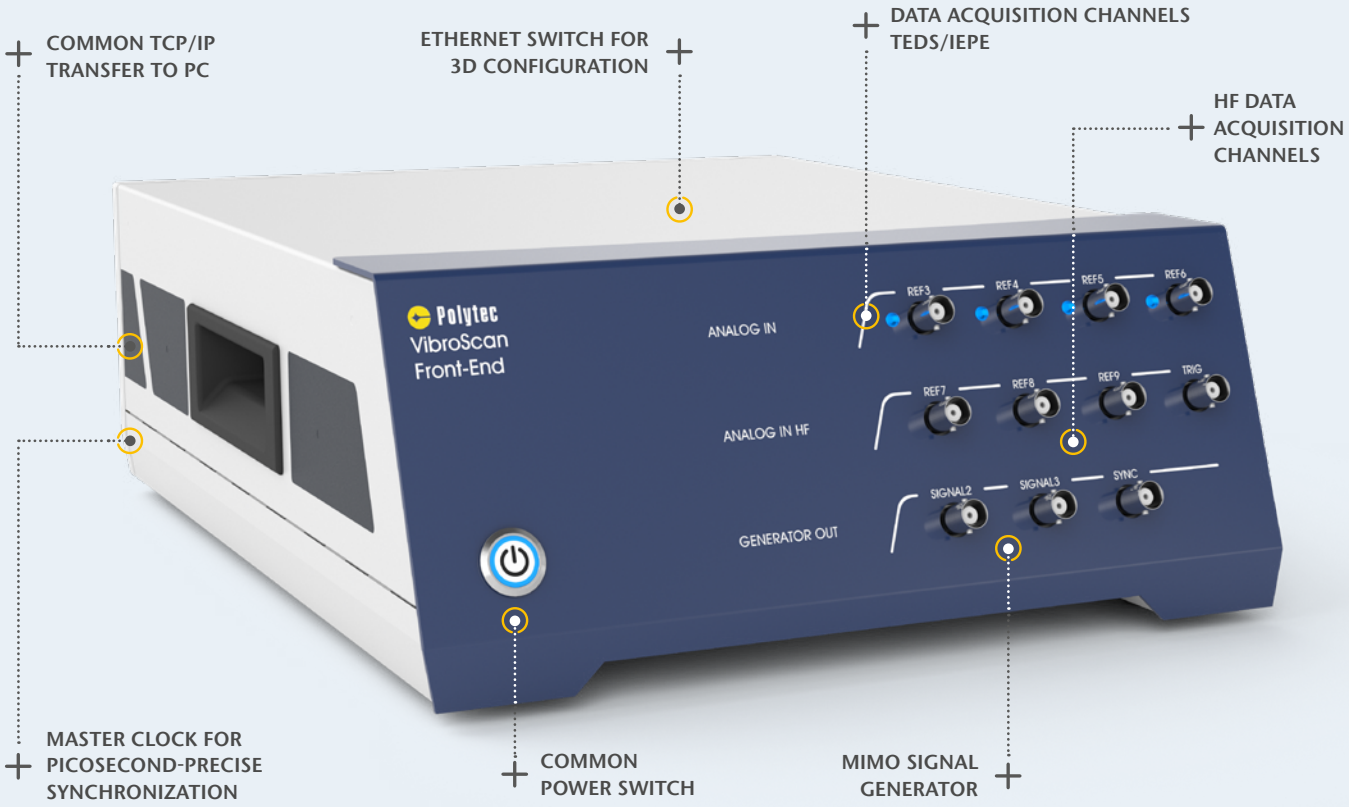
Automation info:

The StrainProcessor uses the built-in automation interfaces Polytec File Access of the PSV software. The interface is documented and is available to any user for their own post-processing or control applications.

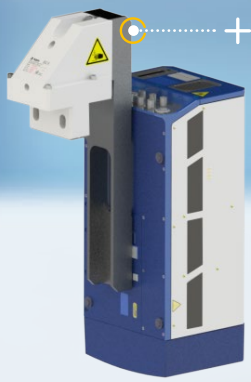
Accessories:
expand function and efficiency

VIBROSCAN FRONT-END – THE HUB

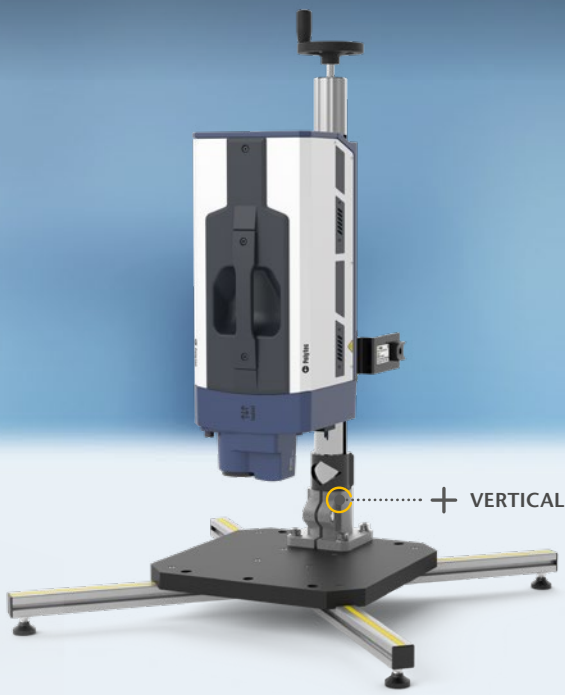
- DAQ - Extension: even more data acquisition channels up to 32 MHz
- Signal generators for MIMO measurements
- **The hub for 3D measurements:**
  ethernet switch and picosecond synchronization to all vibrometers



POSITIONING ACCESSORIES



+ VERTICAL HOLDER



+ VERTICAL STAND

+ 3D COMPACT TRIPOD

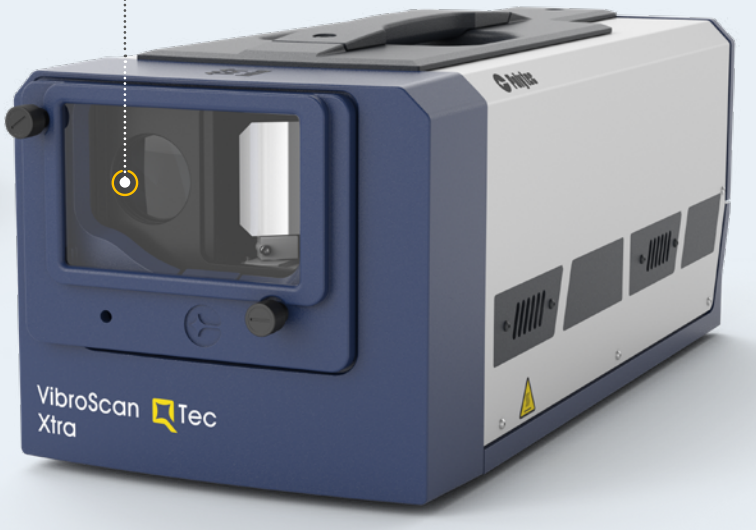
MOTORIZED
3D TRIPOD +

Application-specific accessories: to keep your work simple

OPTICS ACCESSORIES

COAXIAL UNIT AND MICRO SCAN LENSES

PROTECTIVE WINDOW



OPTICAL DEROTATOR FOR ROTATING PARTS

OTHER ACCESSORIES

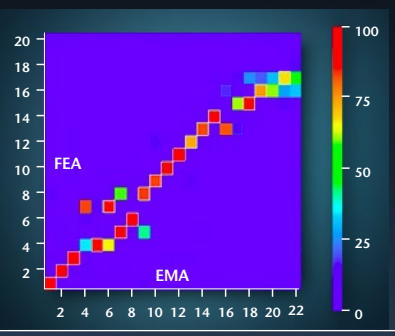
MOBILE WORKSTATION +

EXTERNAL SCANNER CONTROL +

AMPLIFIER FOR SIGNAL GENERATOR +

Further accessories can be found in our data sheets.

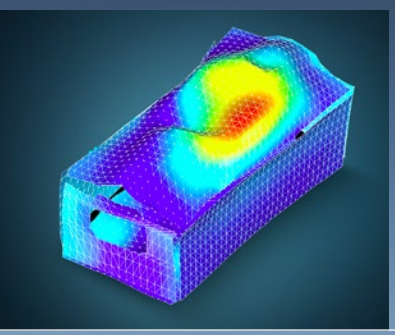
Efficient product development with your Polytec Scanning Vibrometer



Post-processing

If the comparison with the operating deflection shapes and the identified resonant frequencies is not sufficient, subsequent curve fitting e.g. with the PolyWave Post-Processing Suite** is the next step for model updating. You validate your durability models with high-resolution stress and strain distributions calculated from the raw data in the Polytec StrainProcessor**. Export interfaces open the way to your usual software tools.

06 POST-PROCESSING

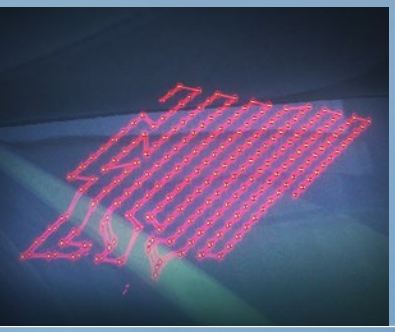


Visualize and evaluate

An initial assessment of the measurement results is provided by impressive frequency-selective 3D animations of the deflection shapes in false colors or with a photo-realistic object texture. Intelligent cursors are available for evaluation of the transfer functions and an initial assessment of the damping values. Coherence functions support the quality assurance. A wide range of mathematical functions for individual post-processing can be found in the Polytec SignalProcessor*.

VISUALIZE AND EVALUATE

05 SCAN AUTOMATICALLY



Automatic scanning

You start the measurement with a mouse click. The software controls the optimum focus during the measurement, so that even small deviations from CAE and real geometry are compensated for. The signal quality is evaluated at the same time. Several algorithms are available to derive the perfect signal from every measurement situation. You have time for other important tasks during the automatic measurement.

04

* optional ** depending on model and configuration

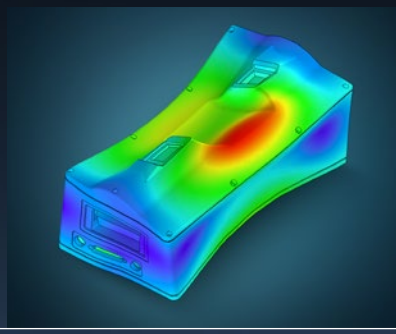
The VibroScan QTec provides you with an extremely powerful, easy-to-integrate platform to optimize your product development cycle, shorten time-to-market enormously and increase product quality. Open data interfaces integrate the scanning vibrometer seamlessly into your CAE workflow.

01

SIMULATE MODEL

Simulate model

The experimental modal test builds a bridge to reality. It provides the data necessary for validation and optimization of the simulation model.



02

DEFINE MODAL TEST

Define modal test

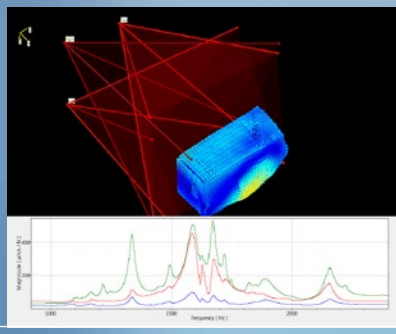
The CAE requirements determine the location and number of measurement points, which is virtually unlimited. The laser works like a mass-free, virtual sensor with a practically unlimited number of channels.
The alignment of the sensor and object coordinate system is already inherently provided by the import* of the FE model. Time-consuming sensor assembly and calibration are a thing of the past.

03

PARAMETERIZE MEASUREMENT

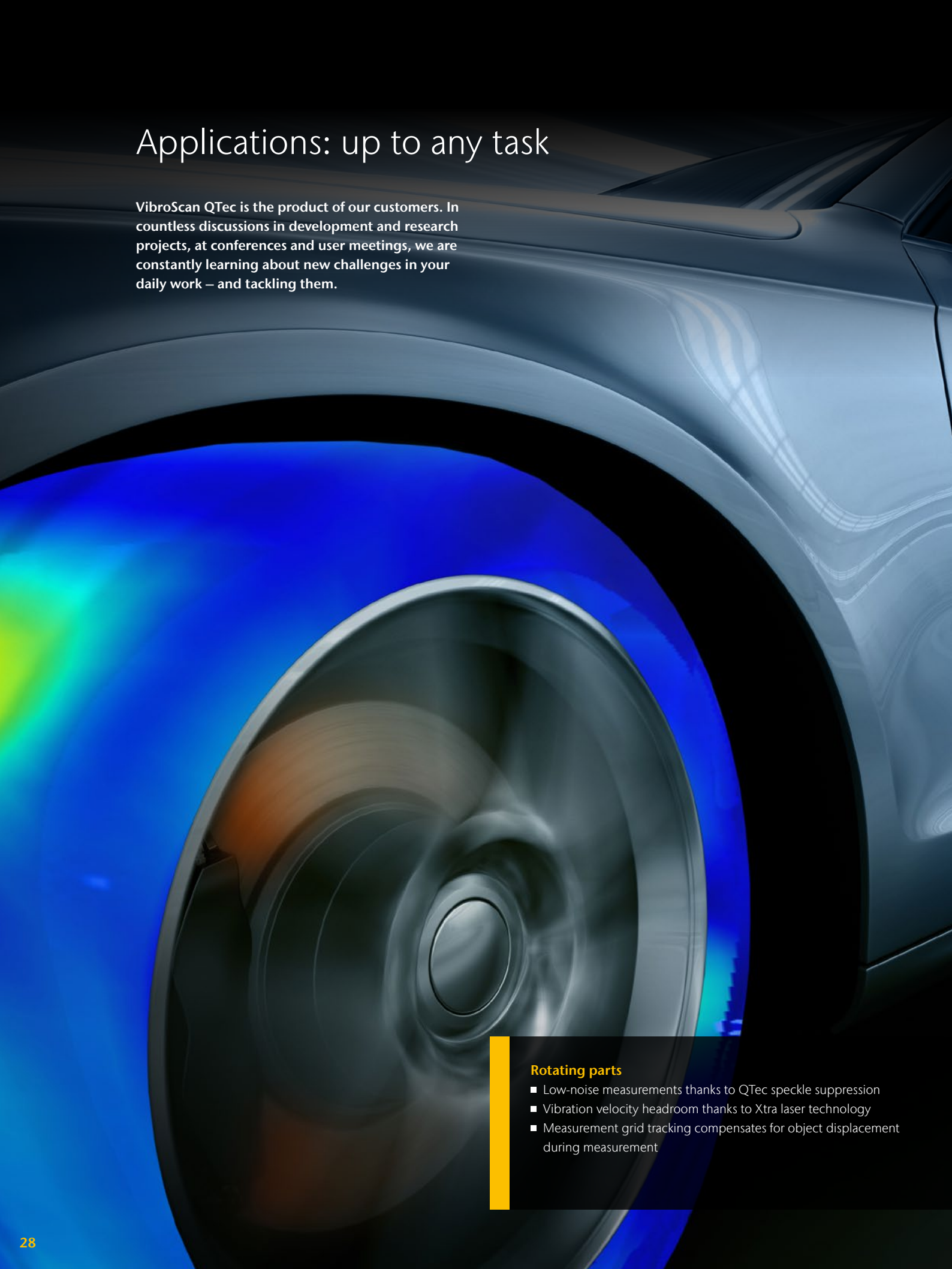
Parameterize measurement

The measurement parameters are only determined by your requirements. You specify the bandwidth, resolution and excitation that are relevant to the test via the software. MIMO* or customized force and exponential windows also make heavily damped and non-linear structures easy to control.



Applications: up to any task

VibroScan QTec is the product of our customers. In countless discussions in development and research projects, at conferences and user meetings, we are constantly learning about new challenges in your daily work – and tackling them.

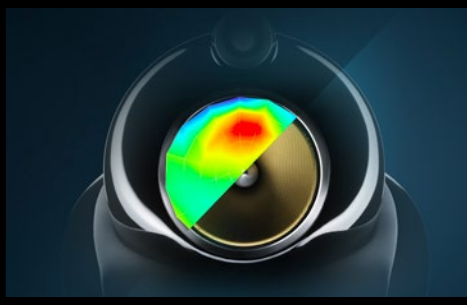


Rotating parts

- Low-noise measurements thanks to QTec speckle suppression
- Vibration velocity headroom thanks to Xtra laser technology
- Measurement grid tracking compensates for object displacement during measurement

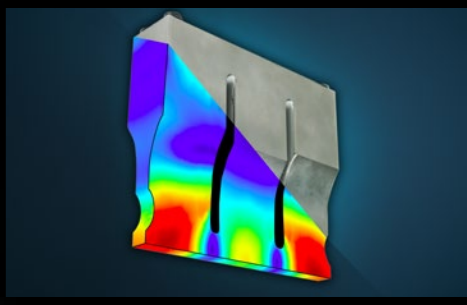
Acoustics & NVH

- High spatial resolution
- Clear visualization of acoustic hotspots
- QTec® for high amplitude resolution



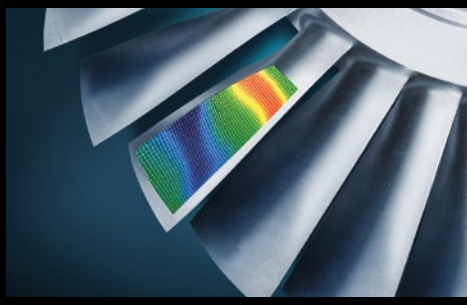
Ultrasound & non-destructive testing

- Always enough bandwidth
- Fast identification of defects thanks to high scanning speed
- 3D visualization in the time and frequency domain



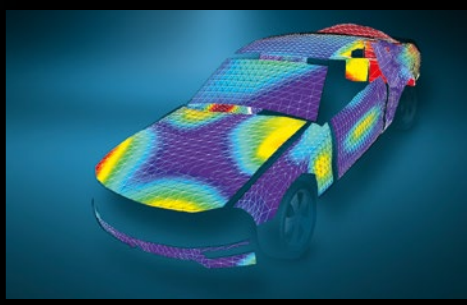
Stress & strain measurement

- Validation of durability calculations through FEM model import
- Spatial precision thanks to machine vision for µm-accurate 3D laser superimposition
- QTec® ensures high SNR and reliable results



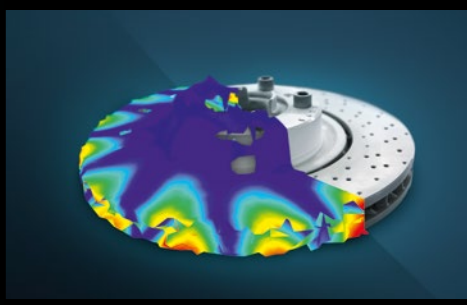
Experimental modal analysis

- MIMO setups for the excitation of all modes
- Enough SNR for unambiguous modal parameter extraction
- Fast model validation through closed CAE data chain



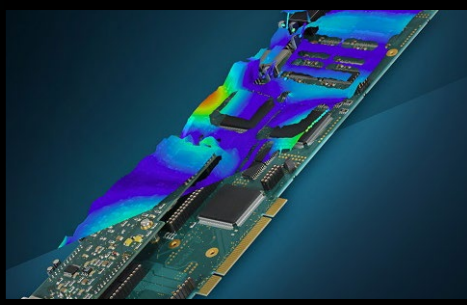
Operating deflection shape analysis

- High scanning speed
- Mobile use for worldwide troubleshooting
- Meaningful 3D animations



Electronic components

- Early identification of mechanical and acoustic weak points
- Clear results even from the finest bond wires thanks to VibroScan QTec Neo
- Measurements even during operation and at high voltages



Reach your goal faster with our PolyXpert services

Contract measurements & rentals

- Vibration measurement and structural analysis
- Experimental modal analysis
- System rental service
- Engineering services

Repair & calibration

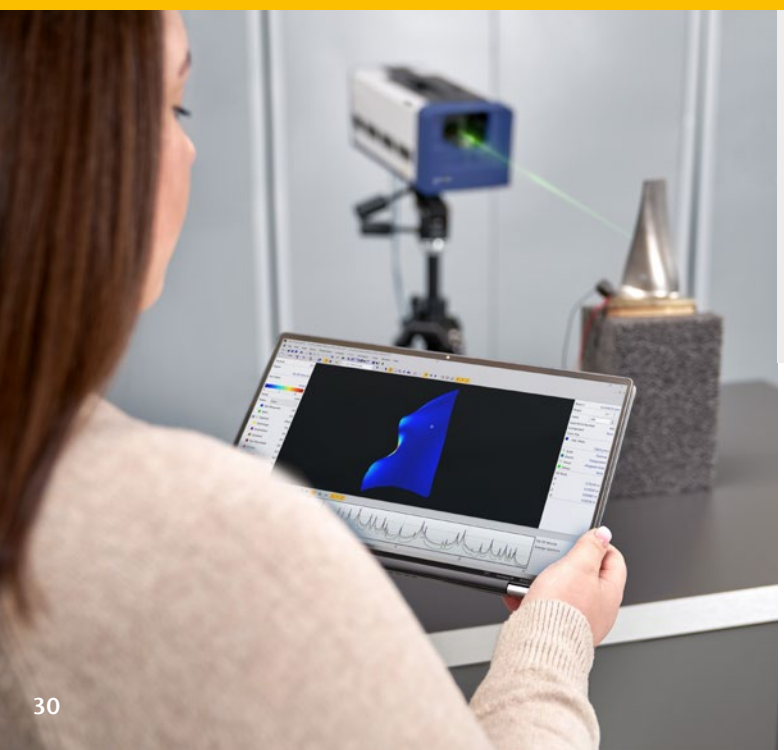
- Vibration measurement systems
- Length and speed sensors
- Surface profiler

Seminars & trainings

- Training courses
- Technology days
- Seminars and webinars
- User conferences and workshops

Hardware & software maintenance

- Upgrading
- Windows updates
- Support contracts



Renting instead of buying

Take advantage of our worldwide pool of rental devices. This allows you to benefit from the advantages of VibroScan QTec without lengthy budgeting.

You can find all of our PolyXpert services here.

We are your partner – worldwide

For more than 50 years and with over 400 employees worldwide, Polytec has been developing, producing and distributing optical measurement technology for research and industry. Our headquarters are located in Baden-Württemberg, Germany. We also have subsidiaries in the USA, England, France, Japan, Singapore and China as well as a worldwide network of reliable sales partners.

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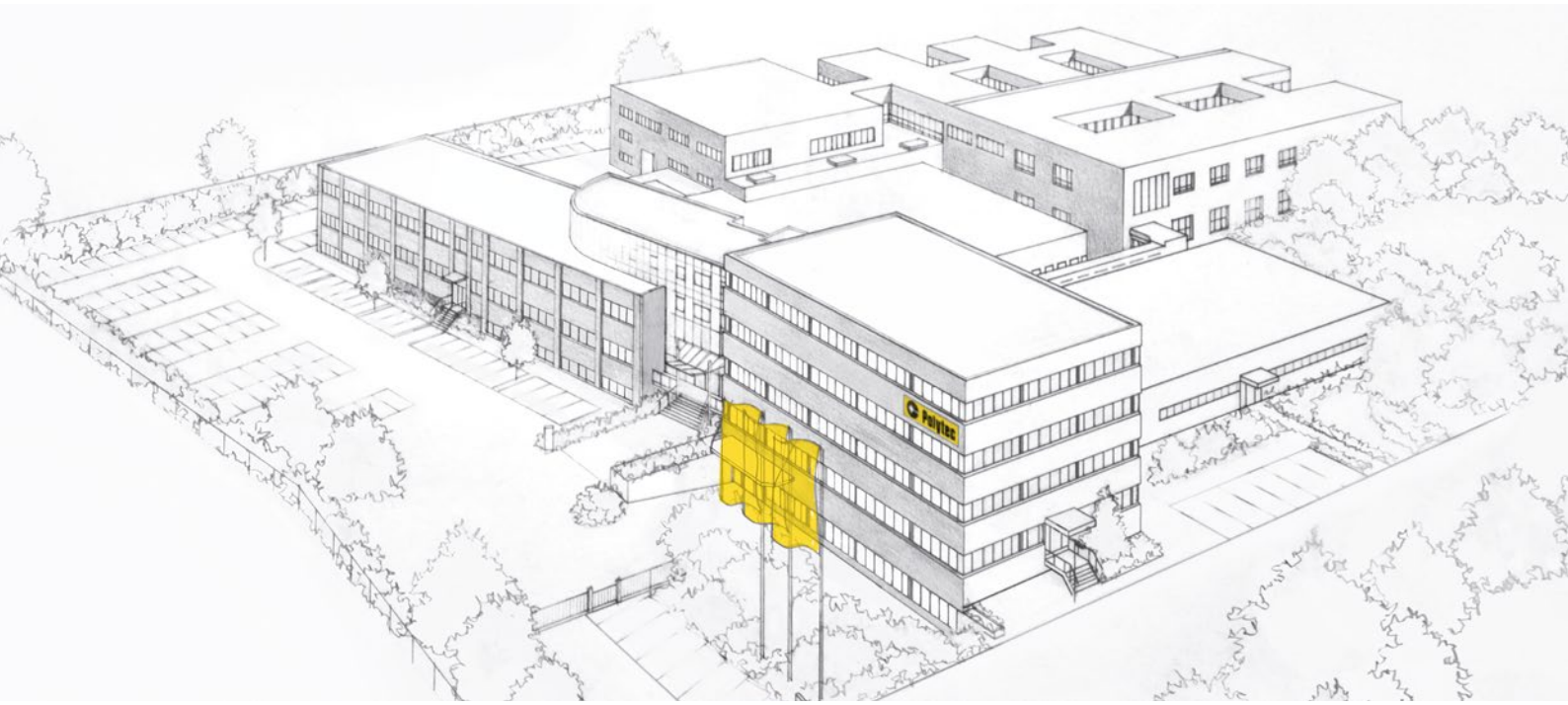

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2025/02 · Technical specifications are subject to change without notice.