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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One ecosystem –
many possibilities
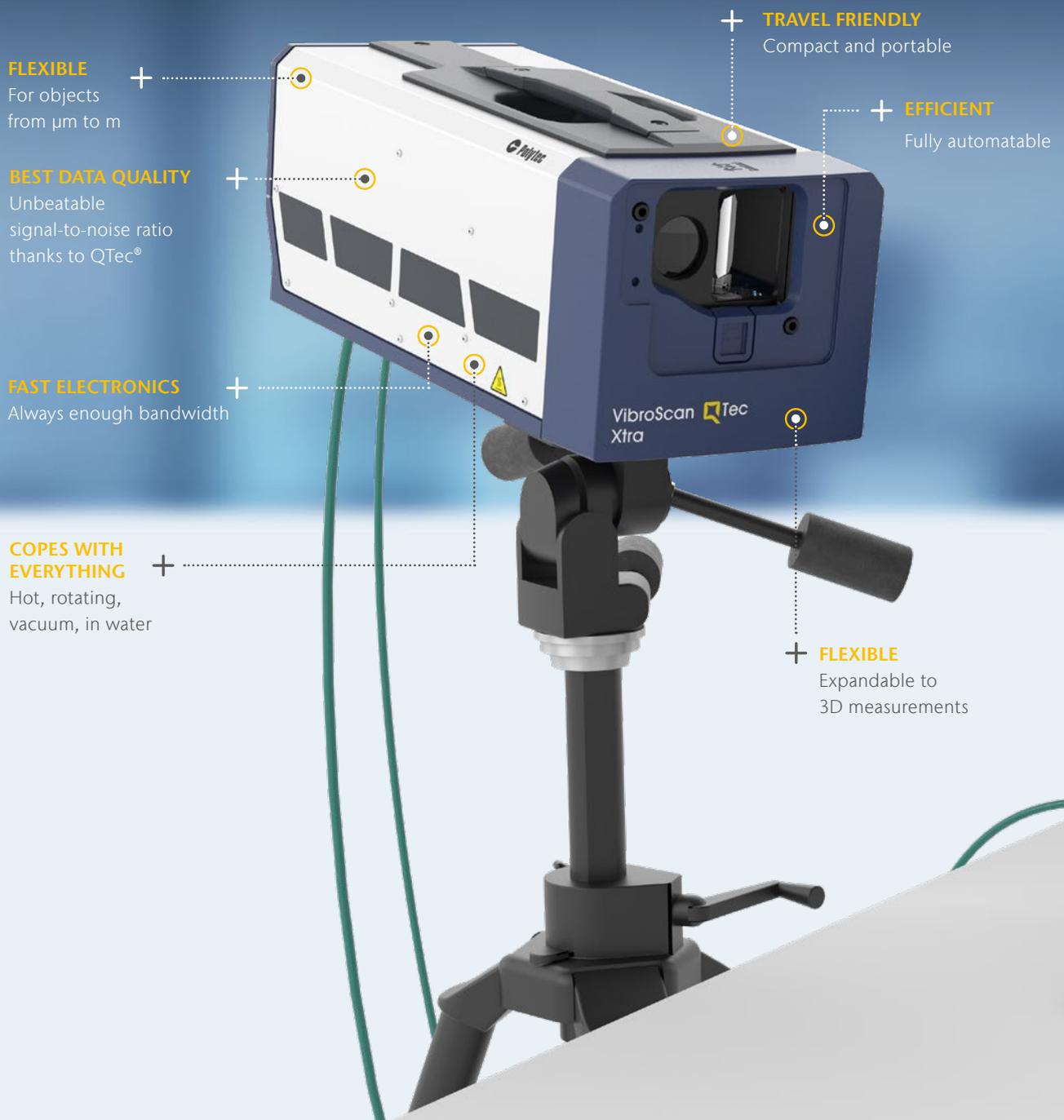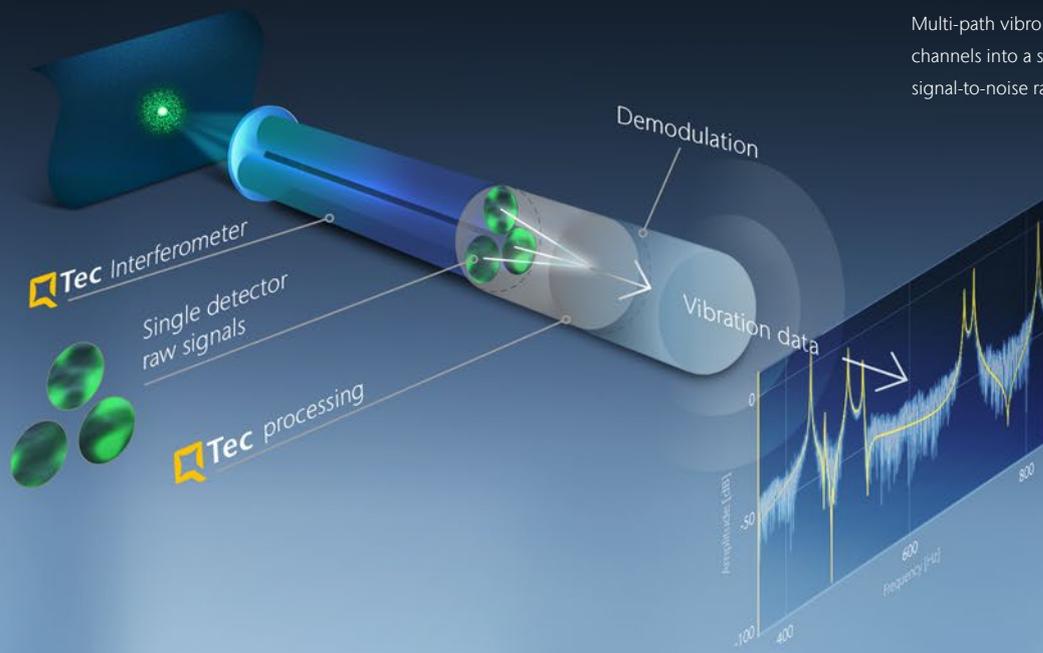
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Up to any task

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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

VibroScan QTec
Xtra

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

Demodulation

Tec Interferometer

Single detector
raw signals

Tec processing

Vibration data
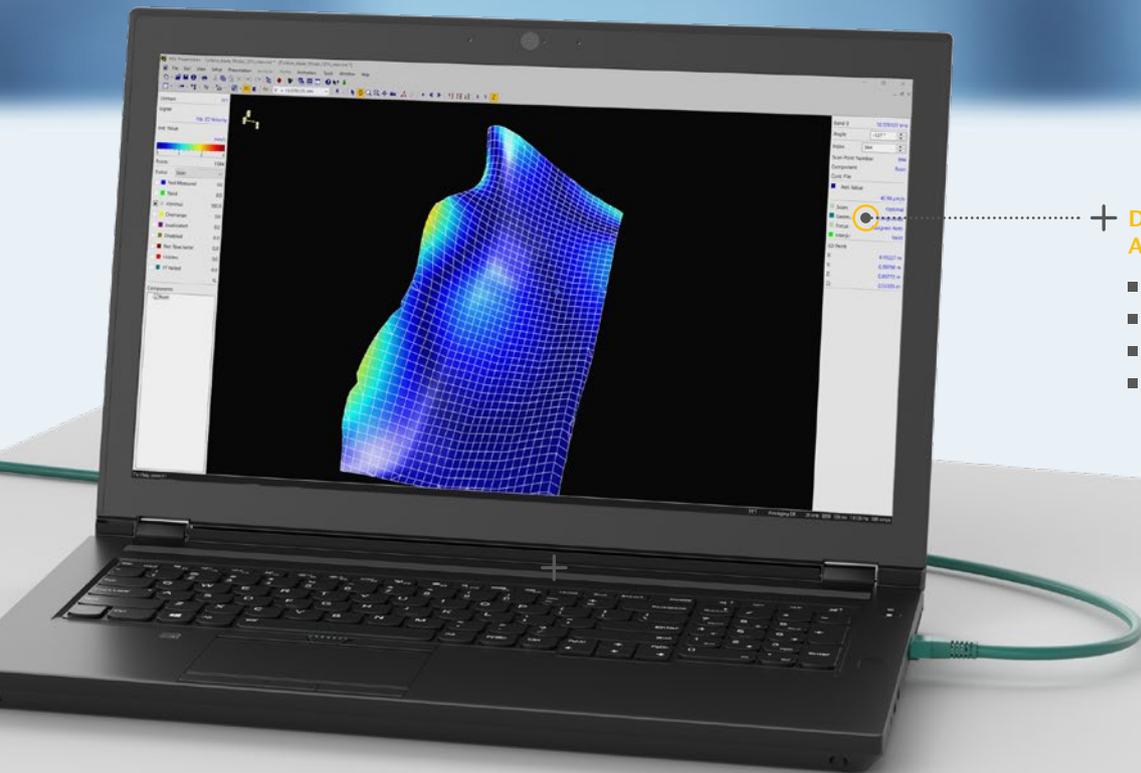
DATA ACQUISITION AND ANALYSIS SOFTWARE

- **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®

!

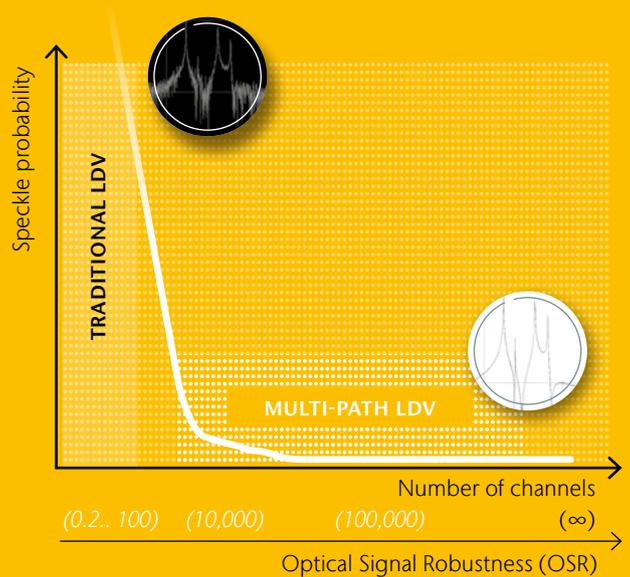## Why does QTec® provide better data?

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.

DETECTOR 1

DETECTOR 2

DETECTOR 3
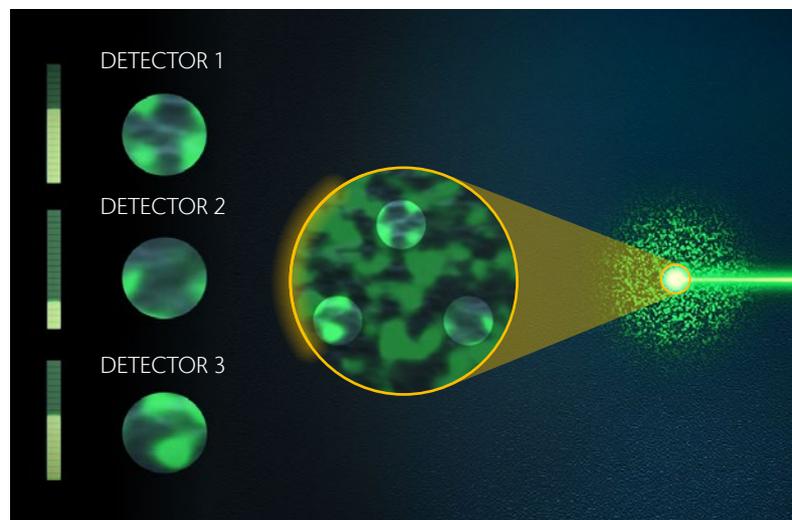
What is OSR?

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.

Speckle probability

TRADITIONAL LDV

MULTI-PATH LDV

Number of channels

(0.2.. 100)   (10,000)   (100,000)   (∞)

Optical Signal Robustness (OSR)

VibroScan –
the QTec vibrometer

SIGNAL LEVEL AND
3D MEASURING HEAD
DESIGNATOR

INDUSTRIAL GRADE
PUSH-PULL ETHERNET

45°C OPTION

CLOCK
SYNCHRONIZATION

CE/UL/PSE
CERTIFIED
POWER SUPPLY

POWER

DATA
ACQUISITION
CHANNELS
(TEDS/IEPE)

EXTERNAL SCANNER
CONTROL FOR
TRACKING AND CSLDV

HD-VIDEO RAW
SIGNAL STREAMING

MACHINE VISON
FOR SETUP

3D GEOMETRY SCANNER

QTEC MULTI-PATH OPTICS

HIGH DYNAMIC
GALVO SCANNER

CLOSE-UP INTERFACE

INTEGRATED DUST PROTECTION

ANALOG DATA
OUTPUT FOR
CUSTOM PROCESSING

SIGNAL GENERATOR
AND SYNCHRONIZATION

HF TACHO IN

VibroScan QTec
Xtra

!

- 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

◨Tec

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.

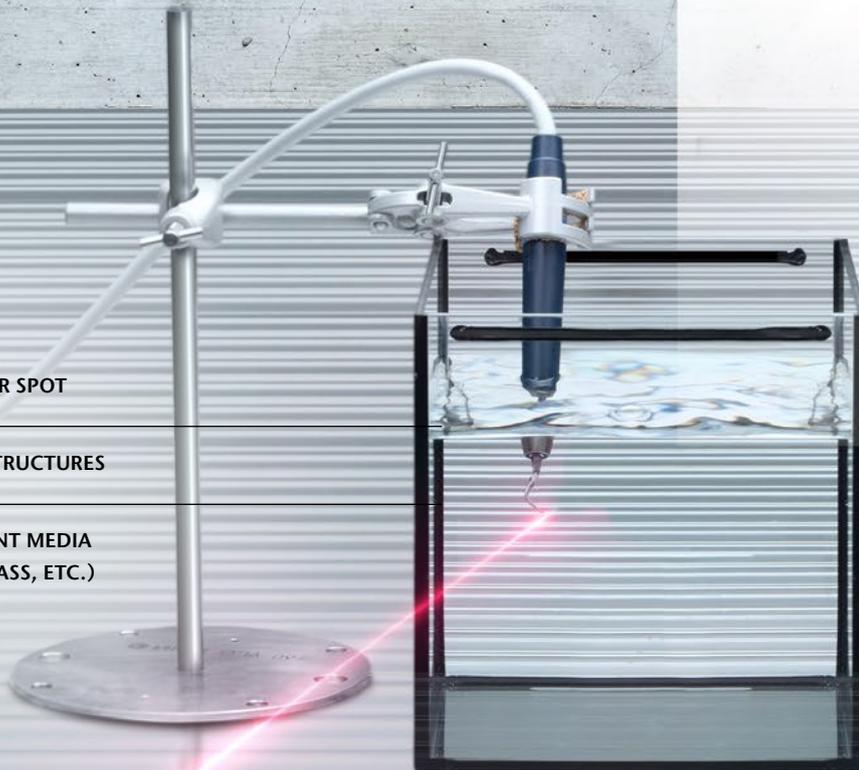(nm/s)   (µm/s)

Modal analysis

Durability

Acoustics

SMALL LASER SPOT

DELICATE STRUCTURES

TRANSPARENT MEDIA
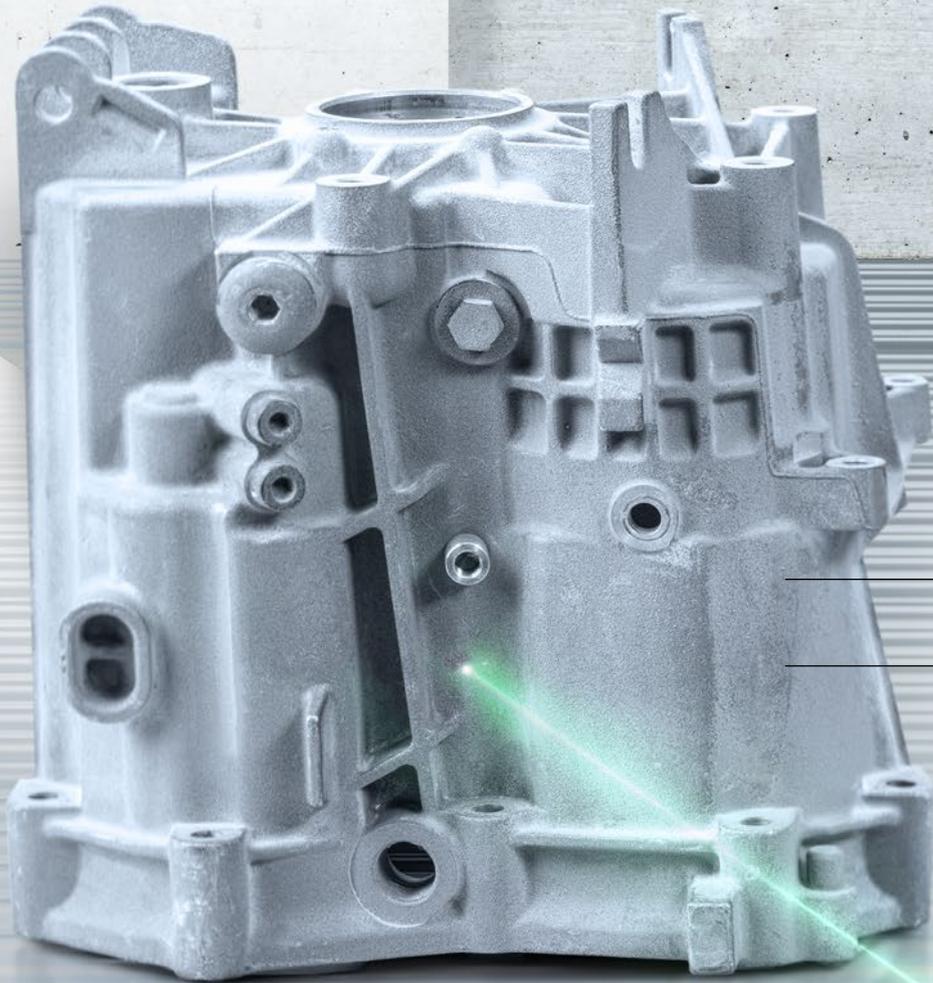(WATER, GLASS, ETC.)

(mm/s)   *(m/s)*

Operational NVH

Ultrasonics

▢Tec

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**

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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

VibroFlex

VibroScan Tec

SCANNING VIBROMETER

VibroScan Front-end

VibroScan Tec Xtra 3D

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.
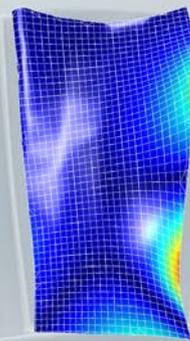
3D is as easy as 1D

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.

Automatic Alignment

P_n

$V_{x, y,}$

3X
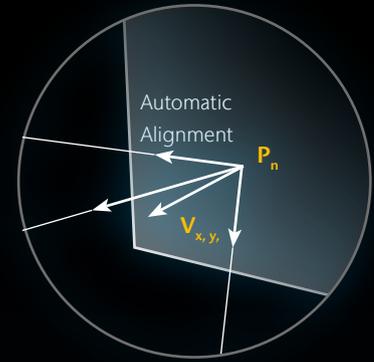
Software:
strong internally – open to the outside world

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.
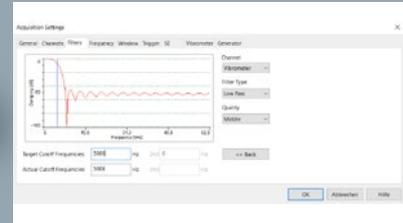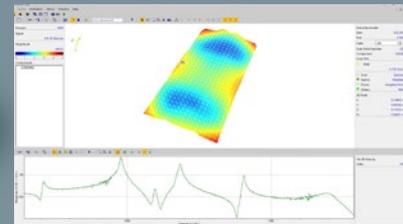
YOU NETWORK
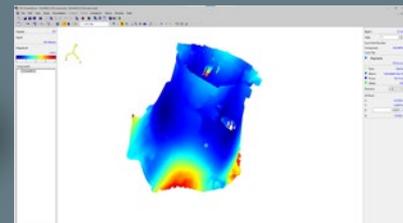

YOU CLICK

KI
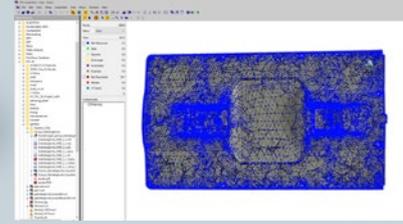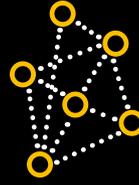
YOU MEASURE

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.
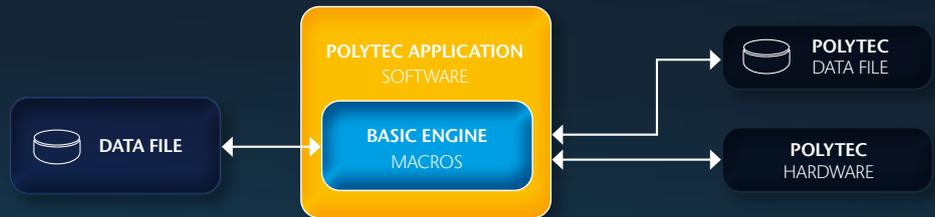

Open source drivers
Operating system-independent automation

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.
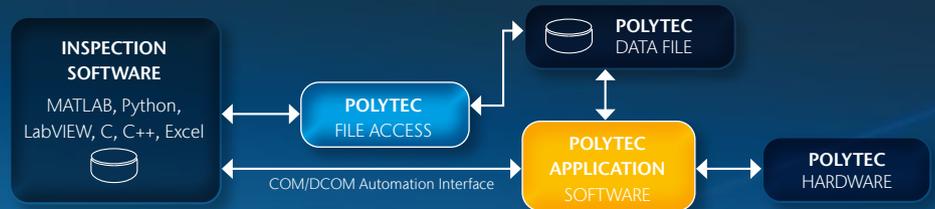
Basic Engine

Benefits from the integrated macro language

DATA FILE	POLYTEC APPLICATION SOFTWARE
	BASIC ENGINE MACROS

POLYTEC DATA FILE

POLYTEC HARDWARE

COM/DCOM Automation Interface

Control of the Polytec system software by external programs

INSPECTION SOFTWARE
MATLAB, Python, LabVIEW, C, C++, Excel

POLYTEC FILE ACCESS

POLYTEC DATA FILE

POLYTEC APPLICATION SOFTWARE

POLYTEC HARDWARE

COM/DCOM Automation Interface

Polytec Device Communication

Direct integration of the measuring system into external programs

INSPECTION SOFTWARE
MATLAB, Python, LabVIEW, C, C++

POLYTEC DEVICE COMMUNICATION DRIVER

Control, Data

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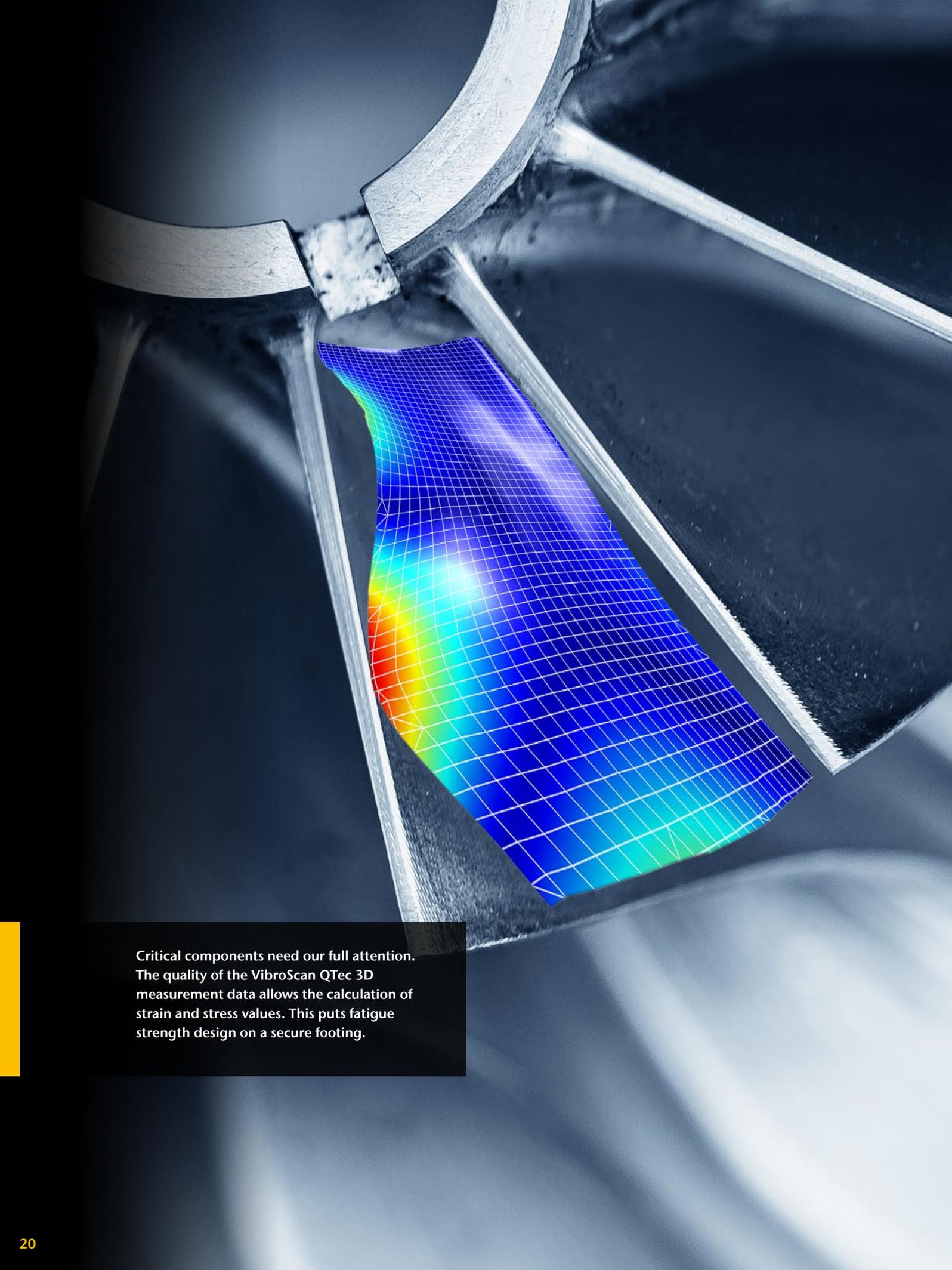
Critical components need our full attention. The quality of the VibroScan QTec 3D measurement data allows the calculation of strain and stress values. This puts fatigue strength design on a secure footing.