

Laserscan Vibrometry



Areas of application

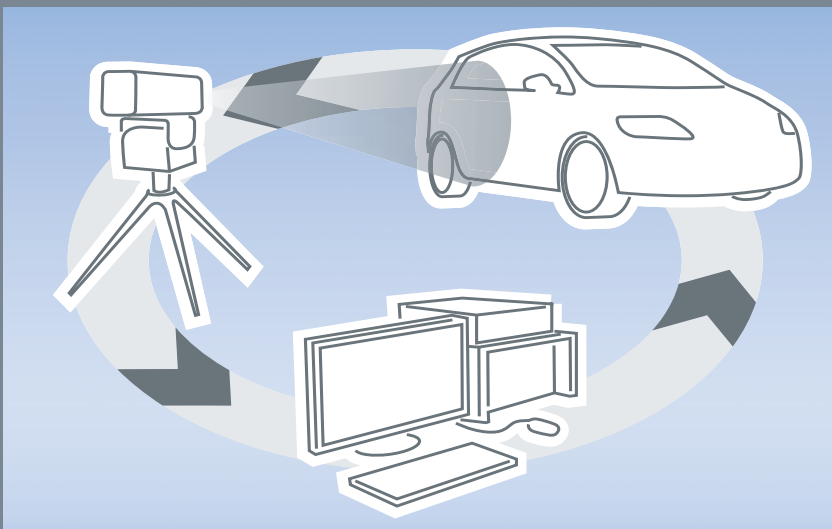
Laserscan vibrometry is used as a tool for non-contact vibration measurement and, in addition to time and spectral data, also delivers animated video pictures. The technique is ideal for measuring the vibration of large components (e.g. vehicle body parts). The photograph above shows a full-vehicle measurement.

Excitation

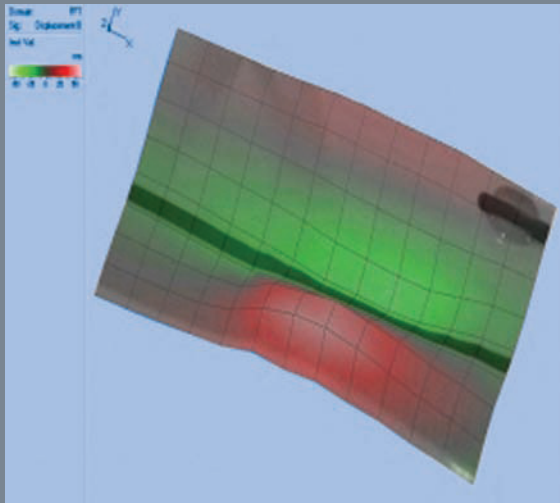
Excitation is produced with an electrodynamic vibration generator or by using a pulse hammer. In addition, it is possible to analyze self-excited operating vibration, e.g. while the engine is idling.

Measurement System

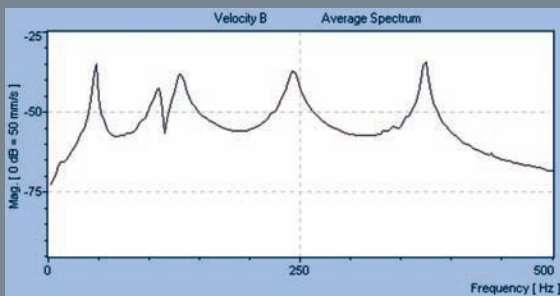
- ▶ Measurement computer (standard PC)
- ▶ Laser scanner, including video camera
- ▶ Scanner controller
- ▶ Video control desk
- ▶ Function generator
- ▶ Power amplifier
- ▶ Electrodynamic vibration generator



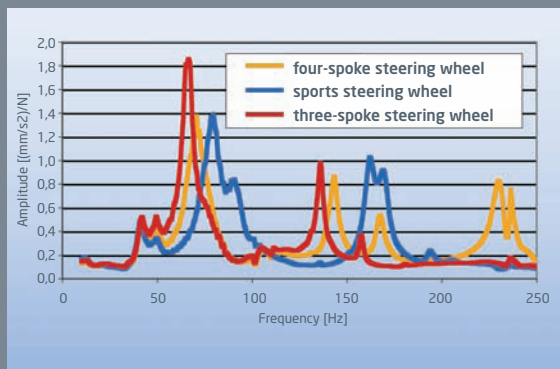
Principle of laserscan vibrometry



Vibration form of a door at 312 Hz



Frequency spectrum



Frequency spectrum at idle

Advantages of Laserscan Vibrometry

- ▶ Fast, simple measurement setup
- ▶ Fast recording of data measured
- ▶ Measurement grid (1 to 512 x 512 points) easy to change in any way you choose
- ▶ No influence on the object being measured
- ▶ Any measurement surfaces (even window panes)
- ▶ Measurement on moving parts (rotation)
- ▶ No calibration necessary before measurement
- ▶ Measurement of very small structures (laser = 42µm)
- ▶ Measurement results (FFT) can be displayed in real time
- ▶ Graphic 3D animation of self-excitation
- ▶ Inaccessible areas can be measured using mirrors to divert the laser beam

Reference Projects

- ▶ Instrument panel: measurement in various vehicle types and makes
- ▶ Steering wheels: determination of natural frequencies and vibration forms
- ▶ Vehicle body: examination and acoustic optimization of underbody structures
- ▶ Measurement of vehicle body parts, verifying modifications on module carriers
- ▶ Speakers: identifying the effect of speaker mounts on door lining vibration behavior
- ▶ Sensors: measuring the natural frequencies of mounts for upfront crash sensors

Example: Measuring Comfort at Idle

- ▶ Laserscan vibrometry on steering-wheel rim at idle
- ▶ With automatic transmission, also with driving position engaged with brake on
- ▶ Measurement of vibration velocities, accelerations
- ▶ Measurement of steering-wheel natural frequency