



# Vibration Analysis with WaveCam

Optical flow based time and frequency ODS



Highspeed cameras Chronos 1.4 and 2.1 with WaveCam software by gfai tech

## BENEFITS

- Use any camera to capture vibration data incl. phones
- Save setup-, measurement time and equipment cost
- Quick to learn, intuitive handling, easy configuration
- Intuitive execution and analysis of measurements
- Analyse data in time and frequency domain
- Vibration measurements during operation with sub-pixel-precision measurement resolution
- No preparation of the measured surface necessary
- Export deflection shapes in video
- Improved optical flow and artificial intelligence (AI) algorithms

## APPLICATIONS

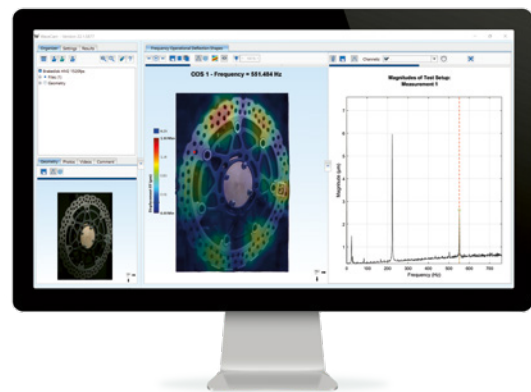
- Operating Deflection Shapes (ODS)
- Natural frequency investigation
- Quality assurance
- Research & development
- Troubleshooting, root-cause analysis
- Predictive maintenance
- Structural vibration
- Transient events

Our vibration analysis solution WaveCam is the perfect tool for non-contact and high-resolution vibration measurement for experts and beginners in the time and frequency domain. To get started, all you need is a camera and our software to process the data. Save the time to set up individual sensors, or measurement locations.

A frequency ODS can be performed with a single excitation in a wide range frequency range. The dispensation of consecutive excitation for different measurement positions saves measurement and test bench time respectively.

Depending on the frame rate of your camera, a minimum frame rate  $FPS = 2 \times f_{max}$  is required to capture the highest frequency of interest  $f_{max}$ . For maximum flexibility we recommend employing a Chronos highspeed camera exceeding 1000 fps. Vibration displacements  $< 0.1 \mu m$  are captured.

Every single pixel serves as an individual sensor allowing you to measure hundreds of thousands of positions simultaneously. Time waveforms and frequency data can be extracted for individual positions. Results were cross-validated with conventional methods namely laser Doppler vibrometer (LDV), accelerometer as well as acoustic holography. Display deflection shapes of structures during operation, manual, ambient or automated excitation e.g. using the WaveHit<sup>MAX</sup> as well as transient events. Various options to display the data, facilitate interpretation and export vivid and conclusive results.



Software WaveCam – Frequency ODS module



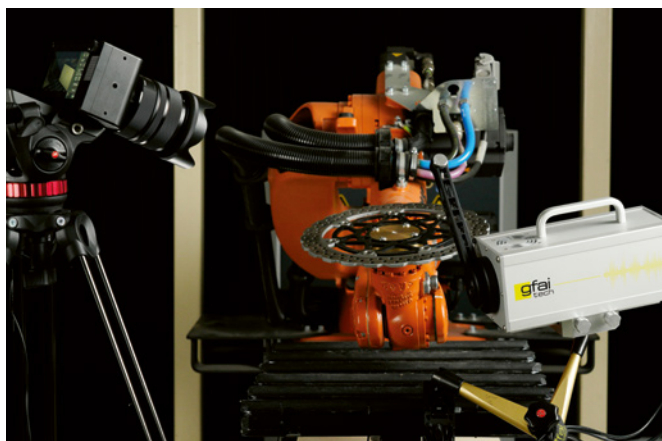
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## SPECIFICATIONS FOR SOFTWARE:

Vibration measurement data extraction requires uncompressed video files that can be recorded with all available high-speed cameras as well as smartphone cameras. We recommend using a high-speed camera by Chronos.

### Supported video file formats for data extraction

<b>asf</b>	ASF File
<b>asx</b>	ASX File
<b>avi</b>	AVI File
<b>m4v</b>	MPEG-4 Video
<b>mov</b>	QuickTime movie
<b>mp4</b>	MPEG-4
<b>mpg</b>	MPEG-1
<b>wmv</b>	Windows Media Video
<b>dng (folder)</b>	CinemaDNG



Automated excitation of a brake disk with WaveHit<sup>MAX</sup>

## SPECIFICATIONS FOR CHRONOS HIGHSPEED-CAMERA 1.4

<b>Maximum resolution</b>	1280 x 1024 px
<b>Framerate</b>	1 - 40 kfps (at reduced resolution)
<b>Record time (depending on memory)</b>	4.13 s (8 GB) 8.26 s (16 GB) 16.52 s (32 GB)
<b>Battery run time</b>	1.5 h recording with on-site replaceable EN-EL4a battery
<b>Lens mount</b>	CS/C-mount (recommended)
<b>Display</b>	5" 800 x 480 capacitive touchscreen
<b>Enclosure</b>	Anodized CNC machined aluminum
<b>Cooling</b>	Active cooling, variable-speed fan (fan-off option supported)
<b>Dimensions</b>	155 mm x 96 mm x 67.3 mm (6.11" x 3.78" x 2.65") without lens
<b>Weight</b>	1,06 kg (2,34 lbs) without lens

### BATTERY

<b>Type</b>	EN-EL4a
<b>Maximum run time</b>	1.5 hours recording
<b>Charge time</b>	2 hours (0 – 80 %) with in-camera charger

### INPUT/OUTPUT

<b>Power input</b>	17 – 20 V 40 W (5.5 / 2.5 mm barrel jack, positive tip)
<b>Network</b>	Gigabit Ethernet
<b>Trigger</b>	Two trigger inputs/frame strobe outputs (BNC and AUX)
<b>Trigger</b>	Electrically isolated trigger input (AUX connector)

