DIGITAL INDUSTRIES SOFTWARE

Simcenter Anovis Software for industrial testing

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Product Information Sheet

Summary

ANOVIS - Acoustic Noise and VIbration Signal analyzer is a comprehensive system for analysis and rating of noise and vibration signals at the production line.

Simcenter Anovis Resonance Testing provides a comprehensive solution for 100% quality testing of components using Acoustic Resonance Testing (ART) technology. ART is a technique for non-destructive component testing. This method is attractive due the possibility to carry out a quick and automated testing by evaluating the mere physical component parameters at relatively low investment and operation costs. ART evaluates the natural vibrations of a component. Natural vibrations are unique physical characteristics that describe in their totality the complete component volume regarding material, structure, and geometry. Two equal components must obligatorily show the same natural vibration behavior. If this behavior differs, the components show physical deviations that can be relevant to quality.

BENEFITS

- Reliable 100% testing: each produced component, entire component volume
- Objective quality rating based on noise or vibration
- Reliable detection of part defects in the production line
- Seamless integration into the production environment
- The system is adjusted manually by setting thresholds for defined resonance parameters.

Testing aims to identify specific quality defects or combinations of such like:

- discontinuities (cracks, cavities),
- inhomogeneity (density, structure, stability)
- defects in workmanship (geometry, missing process steps, wrong process parameters).

The Simcenter Anovis noise and vibration testing technology provides numerous technical opportunities, including:

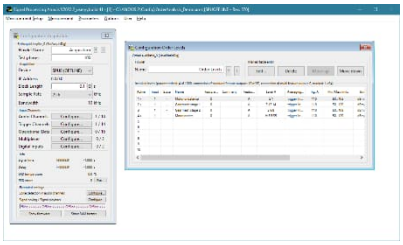
- delivering an objective and reproducible test method,
- detecting defects by physical parameters which have influence on the resonance behavior, and thus are related directly to stiffness and stability.

The main economic benefits include:

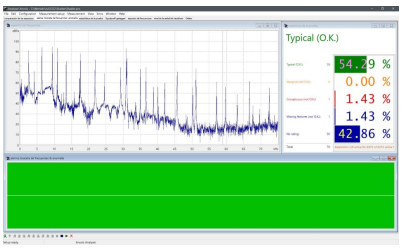
- objective monitoring of the factory-specific quality standard,
- avoidance of returns and customer complaints leading to greater trust, and
- increased efficiency thanks to automated defect detection.

Anovis Resonance Testing

Components
Simcenter Anovis Signal Processing Software to load and operate measurement setups designed with the Simcenter Anovis Lab Software or with Simcenter Anovis Non-destructive Testing itself



Simcenter Anovis Analyzer software with full functionality to present the test results in different ways.



Additionally, functionality for off-line and on-line statistics as well as off-line data visualization is included.

Test Bench Connect that provides an interface and additional functionality especially designed for automatic component testing.

Signal Processing and Metric calculation

The following signal processing modules are included in Simcenter Anovis Lite (in alphabetical order):

Calib: Manual and automatic calibration of time signal including sensor definition

Differentiator: Differentiation of time signal

Envelope: Calculation of a time signal envelope

FreqAnalysis: FFT-Analysis of a time equidistant signal including windowing and optional a-weighting, FFT length 64 to 32768

FreqLevelAvrg/FreqLeveRatio: Calculation of frequency levels (single, harmonic, range, overall, user, sideband metrics and combinations thereof)

FreqLevelTrackVsTime: Calculation of frequency level tracks vs. time (single, harmonic, range, overall, user and combinations thereof)

FreqLevelTrackVsRef: Calculation of frequency level tracks vs. arbitrary reference (single, harmonic, range, overall, user and combinations thereof)

FreqSonagramVsTime Calculation of frequency-time sonagrams

FreqSonagramVsTimeWithRpm: Calculation of triggered frequency-time sonagrams with additional revolution speed processing

FreqSpec: Calculation of a free running or triggered frequency spectrum (auto-spectrum, peak-hold, power cepstrum modulation spectrum)

FrequencyFeatures: Identification of resonance features in an averaged frequency spectrum (auto-spectrum in dB)

ImpactControl: Flowlet to control excitation by hammer or sliding device

Integrator: Integration of time signal

MathAbs: Absolut value calculation of any input data

MathClip: Range limiting (clipping) of any input data

MathFunc: Calculation of abs, sqr or sqrt of any input data

Message2Data: Synchronization of trigger messages and data channels

ResonanceScale: Calculation of the auto spectrum with optional resonance normalization

ResultBuf: Collecting and storing of result buffers resp. making data buffers available for display

SignalGen: Generation of test signals for evaluation of flowlet output

SpectrumAveraging: Calculation of averaged spectra with optional tolerance vector rating

SpectrumAveragingBasic: Calculation of averaged spectra

SrdAcquis: Connector for all types of standard Anovis signal recording devices (SRD)

ThirdOctaveSpectrum: Calculation of third octave spectra from time signals

TimeSignalAnalysis: Metric calculation from time signal including rating (min, max, mean, RMS, power, peak, range, crest, median, std, kurtosis, excess, skewness)

TimeSignalFeatures: Metric calculation from a signal vector vs. time (min, max, mean, std, maxpos, minpos, emean, esum, sum, crest, cnt, area-min/max/total, l-area-min/max/total)

TimeSignalProfile: Signal profile vs. time with min-max-reduction and optional percentile calculation

TriggerAudioExtTrig: Trigger module to generate trigger messages based on external triggers, signal events and phases

TriggerPulseSplitter: Splitting of a trigger/tacho signal

TriggerTime: Special flowlet to display the trigger timings

VarWriter: Collects data buffers to be displayed in the Anovis Analyzer without rating and saving as result file

VectorCombine: Calculates combination of asynchronous calculated data vectors (Min, max, mean, diff, sum, emean, esum)

VectorFeatures: Metric calculation from a signal vector (min, max, mean, std, maxpos, minpos, emean, esum, sum, crest, cnt, area-min/max/total, l-area-min/max/total)

WavAcquis: Connector for Windows sound devices (for educational purposes only)

Visualization

Results created from the Simcenter Anovis Signal Processing Software can be displayed in the available viewers. The viewers contain comprehensive functionality to show single measurement results, like zoom, cursors, markers etc. The following data viewers are included in Simcenter Anovis Lite (in alphabetical order:

Alarm signs: Visualization of one or more metrics as color field in green/red/orange depending on the result including supplementary information about the displayed data.

Bar vector: Visualization of third octave spectra as bars including supplementary information about the displayed data and the test run.

Bitmap: Displays a user defined bitmap

Digits: Visualization of one or more metrics as digit in blue/red depending on the result including supplementary information about the displayed data.

Level meter: Visualization of signal levels and metrics as bar graph with limits

Lines: Visualization of vectors as line including supplementary information about the displayed data and the test run with optional tolerance window.

On-Line-Statistics: Visualization of one or more metrics as trend and histogram including assessment limits including supplementary information and statistics about the displayed data.

Table: Visualization of one or more metrics as chart with icons in green/red/orange depending on the result including supplementary information about the displayed data.

Lists: Visualization of text output provided by several flowlets as list. I.e., on-line classification results

Scrolling Sonagram/Sonagram: Visualization of 3D results like time-frequency representations of spectral data, Campbell diagrams, order sonagrams etc.

Analysis: Simultaneous visualization of a large number of measurements in the form of a set of curves. The measurements can be divided into different classes, which supports the analysis of deviations and the definition of metrics, as well as the definition of tolerance curves.

Off-line statistics: Simultaneous visualization of a large number of metrics from different measurements as trend and histogram with supplementary information. The measurements can be divided into different classes, which supports the analysis of deviations and the definition of limits for the metrics.

Variables: Integration of control elements like buttons, spin buttons and strings for interaction with the measurement setup.