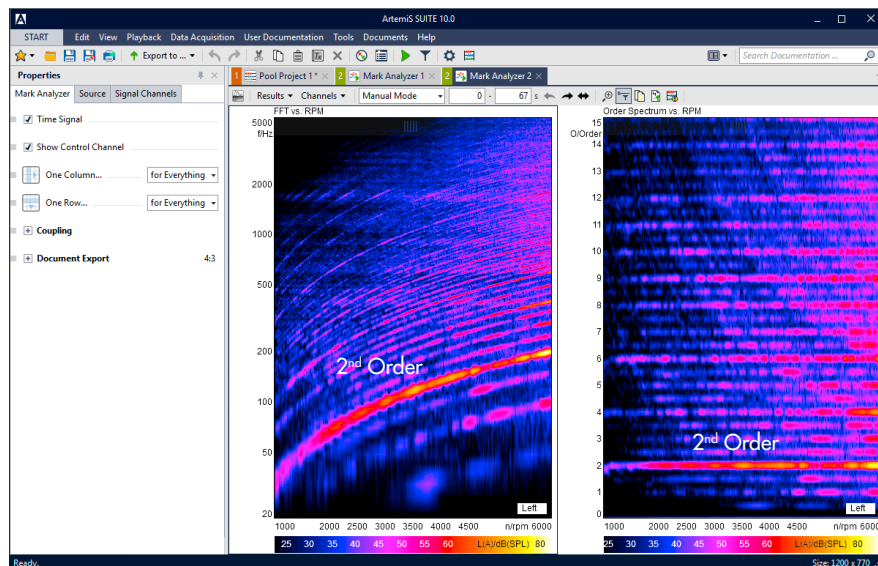


**ArtemiS SUITE Signature Analysis Module (Code 5013)**

Expansion module for the analysis of signals versus a range of different reference quantities and for the calculation of order spectra



**Overview**

For the investigation of the noise and vibration characteristics of vehicles and machines the engine speed is very important as well as other parameters like temperature, pressure etc. The Signature Analysis Module can be used to accomplish most analyses available in the ArtemiS SUITE not only as a function of the time, but also on other reference quantities (RPM, temperature, pressure, crank angle etc.).

Furthermore, order spectra (average value / peak value) of the input signal can be calculated with different methods: Using the method "variable DFT length" the window length of the analysis varies with the engine speed. Using the method "RPM-synchronous resampling" sampling is performed in equidistant rotation angle steps (resampling of the signal). Using the method "time domain average" signal sections are averaged vs. rotation angle with identical phasing in time domain (based on RPM-synchronous resampling).

**Features**

- Expansion module for the analysis of signals versus a range of different reference quantities and for the calculation of order spectra
- Analyses vs. RPM, speed, pressure, temperature, crank angle and other reference quantities. The reference quantity can be recorded as an analog quantity or can be derived from a digital pulse sequence.
- Order Spectrum (peak hold) for generating the peak value from all calculated short-time spectra (one for each signal segment)
- Calculation methods:
  - Variable DFT length
  - RPM-synchronous resampling
  - Time domain average
- 3rd Octave Spectrum / Octave Spectrum vs. RPM (based on an FFT analysis)
- Reference Quantity vs. Time
- Time Signal vs. rotation
- Gated Time Cuts / Gated Time Cuts (average)
- Harmonic Distortion vs. RPM

**Requirements**

- ArtemiS SUITE Basic Framework (Code 5000)
- ArtemiS SUITE Basic Analysis Module (Code 5001)

**Scope of Supply**

- License file
  - ArtemiS SUITE Signature Analysis Module (Code 5013)

## Technical Data

### Order Spectrum / Order Spectrum (peak hold)

Window Function: Rectangle / Hanning / Hamming / Blackman / Bartlet / Kaiser-Bessel 8 - 16 / Flat-top / Gauss 8, 16, 32

Spectral Weighting: None / A / B / C / D / G / Wd / Wk / Wh etc. Weighting

Amplitude Scaling: RMS / Peak

Frequency Offset (Hz): Selectable

Spectral Resolution (Ord): 0.01 - 1

Spectral Range [Order]: Minimal Order - Maximal Order

Width: Off / Order / Frequency / Frequency Factor / Bark

Order Algorithm: Variable DFT Size / RPM-sync. Resampling / Time Domain Averaging

Phase: Off / Ref channel (1 - n) / Ref order / Ref to pulse

Average Mode: Average vs. RPM / Average vs. Time

Step Size: 0.001 - 1000 rpm / 1 - 9999.9 ms

### 1/n Octave Spectrum (FFT) vs. RPM

Band Resolution: Octave / 3rd Octave / 1/6 - 1/96 Octave

Row: A / B

Spectral Weighting: None / A / B / C / D / G / Wd / Wk / Wh etc. Weighting / Equal Loudness

Band Border Frequency: Nominal / Octave / Decade

Spectrum Size: 16 - 2<sup>23</sup> Samples

Window Function: Rectangle / Hanning / Hamming / Blackman / Bartlet / Kaiser-Bessel 8 - 16 / Flat-top / Gauss 8, 16, 32

Step Size [rpm, ...]: Selectable

### Reference Quantity vs. Time

Displays the content of the pulse channel (e.g. RPM) against time

### Time Signal vs. Rotation

Samples per rotation: Selectable

Signal Representation: Time Signal / Envelope / RMS Signal

Rotations to integrate: Selectable

Time Axis: Reference RPM selectable

Add Tolerance Scheme: Display of tolerance curves with tolerance test of the analysis result

### Gated Time Cuts / Gated Time Cuts (average)

Trigger: First Used Impulse / Number of Rotations per DFT

Analysis Window Definition: By Time / By Crank Angle (CA)

### Harmonic Distortion vs. RPM

Spectrum Size: 256 - 2<sup>23</sup> Samples

Step Size [rpm, ...]: Selectable

Slope: Auto Detect / Falling / Rising

Frequency Range [Hz]: Selectable

Reference: First Harmonic / Signal Power / All Harmonics

Results: THD / THD+N / S/N / Sum of Harmonics / Single Harmonic

### Available for all Analyses

Representation Settings: Individual scaling of the axes in the analysis result

Add Tolerance Scheme: Display of tolerance curves with tolerance test of the analysis result

Cuts: Extracting of 2D curves from the three dimensional spectrum (Cut Mode: First Abscissa / Second Abscissa / Free selectable cuts)

### Single Values

Available for all 2D analyses as well as for 3D analyses that have been reduced to two-dimensional curves using cuts.

Only Single Values

as Result: Selectable

Abscissa Range: Selectable

Options: Average / Sum / Min / Max / Percentile

Definition of threshold values for whose compliance the determined single values shall be tested for.

Quantity: Selectable

Unit: Selectable

### Extensions ASM 13 & ASM ...

The Signature Analysis Module extends the functionality of other modules. The following analyses are available in the combination of the Signature Analysis Module with other modules:

#### ASM 13 & ASM 12

Articulation Index vs. RPM  
Fluctuation Strength vs. RPM  
Loudness vs. RPM  
Order Loudness vs. RPM  
Order Loudness vs. Time  
Order Roughness vs. RPM  
Order Roughness vs. Time  
Sharpness vs. RPM  
Specific Fluctuation Strength vs. RPM  
Specific Loudness vs. RPM  
Specific Order Loudness vs. Time  
Specific Order Loudness vs. RPM  
Specific Order Roughness vs. RPM  
Specific Order Roughness vs. Time  
Specific Prominence Ratio vs. RPM  
Speech Intelligibility Index vs. RPM

#### ASM 13 & ASM 14

1/n Octave Spectrum (Filter) vs. RPM

#### ASM 13 & ASM 15

Auto Correlation vs. RPM  
Auto Spectrum vs. RPM  
Coherence vs. RPM  
Cross Correlation vs. RPM  
Cross Spectrum vs. RPM  
Impulse Response vs. RPM  
Transfer Function vs. RPM

#### ASM 13 & ASM 16

Tonality (Hearing Model) vs. RPM  
HSA vs. RPM  
Impulsiveness (Hearing Model) vs. RPM  
Roughness (Hearing Model) vs. RPM  
Specific Tonality (Hearing Model) vs. RPM  
Specific Impulsiveness (Hearing Model) vs. RPM  
Specific Roughness (Hearing Model) vs. RPM

#### ASM 13 & ASM 17

Cepstrum vs. RPM  
Degree of Modulation vs. RPM  
Kurtosis vs. RPM  
Modulation Frequency vs. RPM  
Modulation Spectrum vs. RPM  
Tonality DIN 45681 vs. RPM  
Tone to Noise Ratio vs. RPM  
VFR vs. RPM