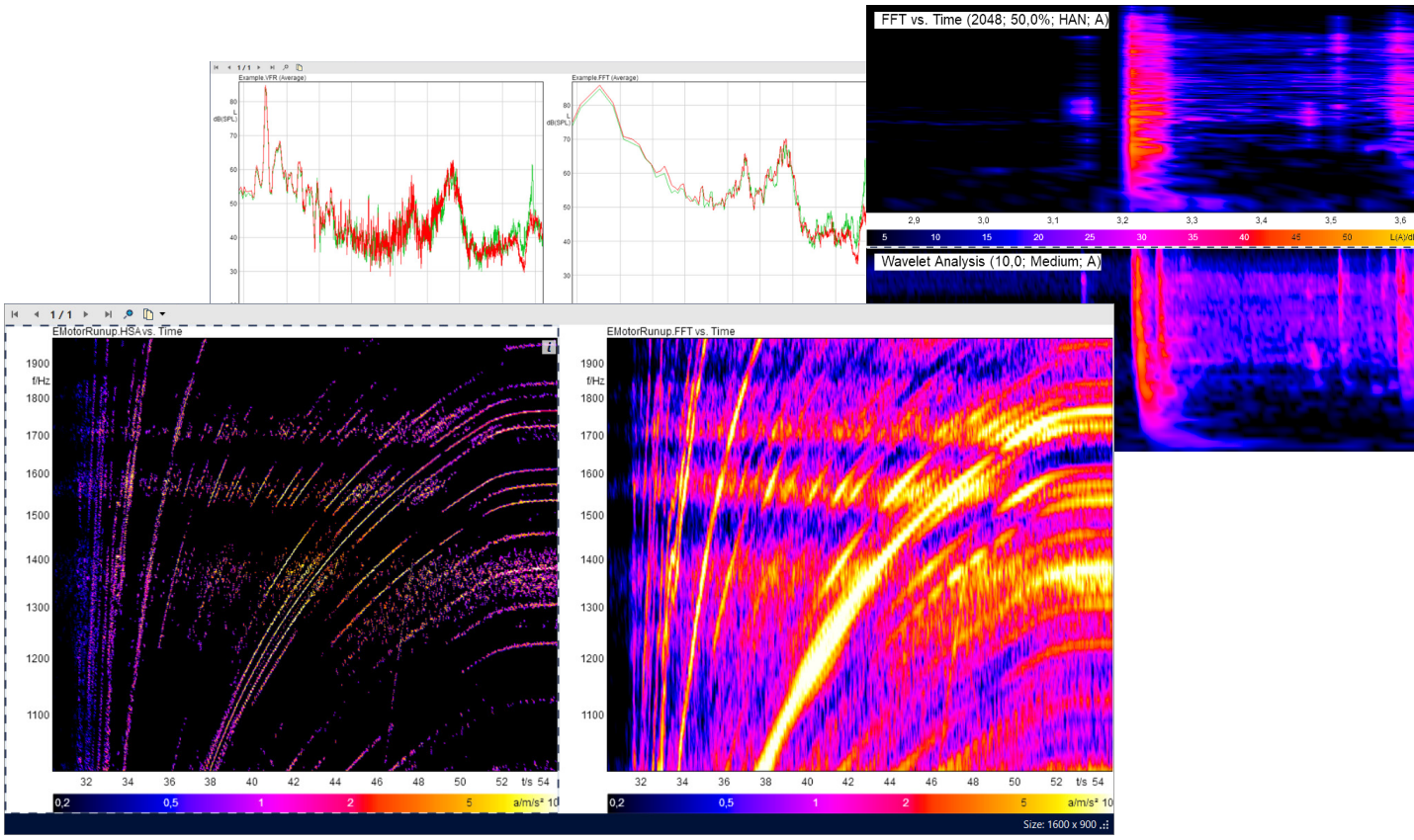
HEAD acoustics

DATA SHEET



ArtemiS SUITE
Signal Processing

Code 51003

ASP 003
Advanced Analysis

Advanced Analysis of ArtemiS SUITE provides advanced analyses, such as spectral analyses with high or variable frequency resolution, for use in Pool Projects, Automation Projects, Standardized Test Projects, and Metric Projects.

OVERVIEW

ASP 003
Advanced Analysis

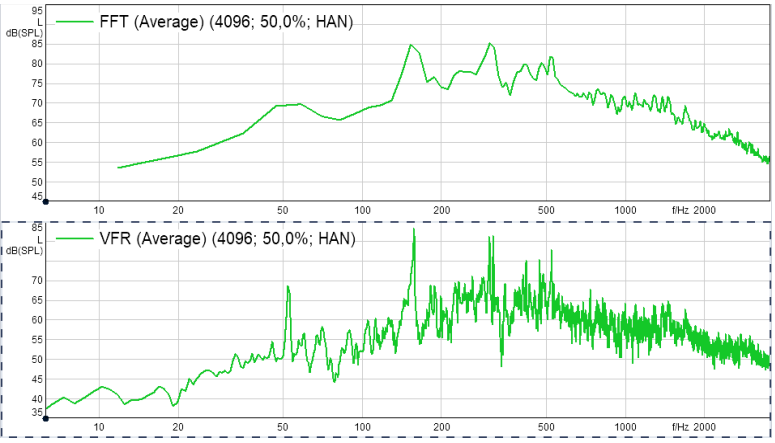
Code 51003

Advanced Analysis provides advanced and highly developed analysis methods.

The High-Resolution Spectral analysis (HSA) can be used, for example, to analyze tonal components in nonstationary signals, as it reduces the blurring effect of the window spectrum on the analysis result. In addition, it provides a significantly higher time and frequency resolution than an FFT.

The VFR analysis, analogous to human auditory perception, is particularly suitable for the analysis of low-frequency spectral components of an audio signal. The Wavelet analysis has proven particularly suitable for the analysis of short, transient signals such as the cycles of an internal combustion engine.

Furthermore, additional analyses are available for specific applications.



KEY FEATURES

Spectral analyses

- HSA vs. Time
- HSA (averaged)
- VFR vs. Time
- VFR (averaged)
- Wavelet

Additional analyses

- Gated DFT vs. Time
- Gated DFT (averaged)
- Cepstrum
- Cepstrum vs. Time
- Kurtosis vs. Time

The analyses can be used in Pool Projects (APR 010 is required), Automation Projects (APR 050 is required), Standardized Test Projects (APR 220 is required), and Metric Projects (APR 570 is required).

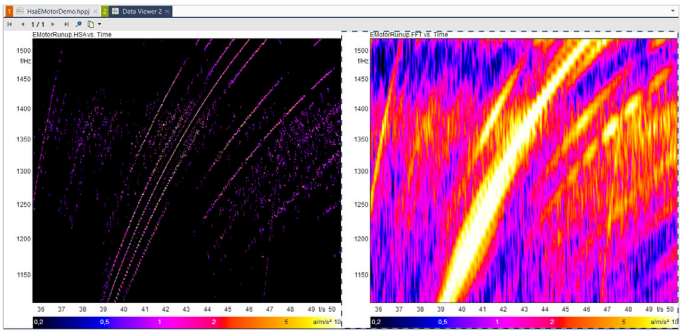
APPLICATIONS

- Wavelet and HSA analyses are particularly suitable for cases in which a spectrum contains short, transient, or tonal noise components.
- The VFR analysis is suitable for the analysis of low-frequency tonal noise components.

DETAILS

HSA vs. Time, HSA (Averaged)

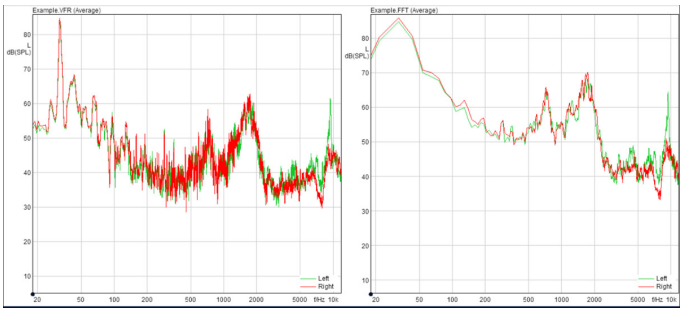
The HSA method (High-Resolution Spectral Analysis) is a specialized algorithm for signal evaluation that improves the analysis of tonal components in a signal. This applies in particular to short signal blocks, where the HSA provides substantial advantages over the conventional FFT analysis. Both frequency and level can be read very precisely, as the blurring caused by windowing is reduced.



HSA vs. Time *FFT vs. Time*

VFR vs. Time, VFR (Averaged)

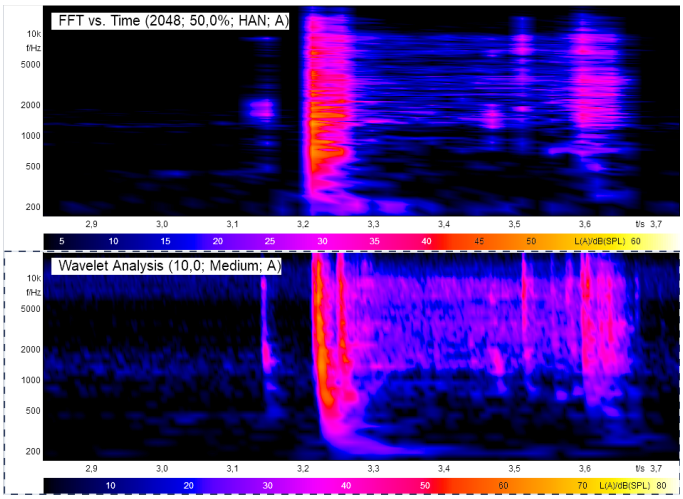
The VFR analysis (Variable Frequency Resolution analysis) is based on the FFT analysis but provides a variable frequency resolution, which may be more suitable than an FFT for analyzing low-frequency spectral components of a time signal. Whereas the FFT provides a spectral representation with constant frequency resolution across the entire frequency range considered, the VFR analysis more closely approximates human auditory perception and exhibits higher frequency resolution at lower frequencies.



VFR (averaged) *FFT (averaged)*

Wavelet

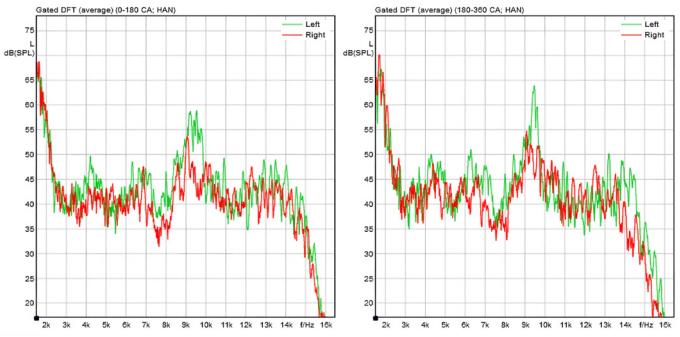
The Wavelet analysis is particularly suitable for the examination of short, transient signals. The term “transient” denotes a sound characterized by rapid, nonperiodic variations. Compared to the FFT, the Wavelet analysis is characterized by high frequency resolution at low frequencies and, at the same time, high time resolution at high frequencies.



FFT vs. Time, Wavelet

Gated DFT over Time, Gated DFT (Averaged)

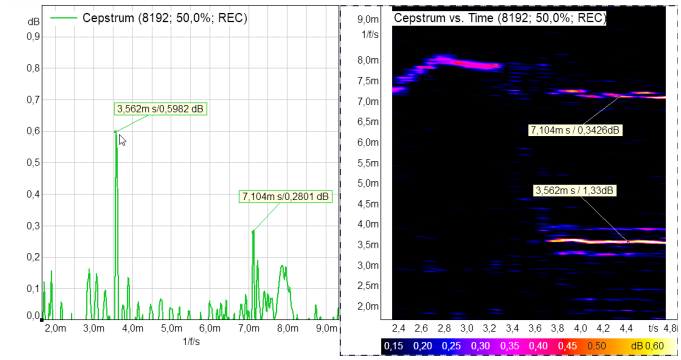
In the Gated DFT analysis, the time signal is first partitioned into periodic segments (windows), for example, in accordance with the cycle of a multi-cycle engine. Subsequently, the FFT is computed for those signal components that correspond to the same relative position within the cycle (e.g., always the second cylinder). The resulting spectra can then be plotted over time or represented as averages over multiple cycles.



The Gated DFT analysis clearly reveals the differences between the first and second cylinders of an engine.

Cepstrum, Cepstrum over Time

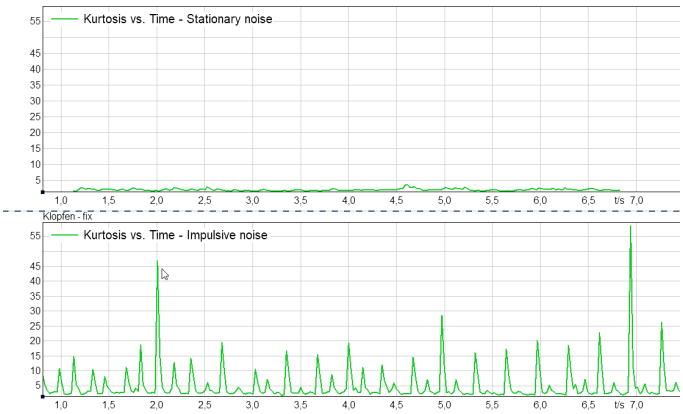
The Cepstrum analyses compute the "real cepstrum" of an input signal. For this purpose, the magnitude of the logarithmic spectrum is transformed, resulting in a symmetric real signal in the time domain. Only the positive portion of the signal is displayed. This enables the detection of echoes or other periodicities within a signal.



Cepstrum *Cepstrum vs. Time*

Kurtosis vs. Time

The Kurtosis analysis can be used as a measure for the impulsiveness of a signal. If a sufficiently large number of reference signals exhibits a corresponding correlation, the Kurtosis analysis can be used very effectively as a rapid criterion for classification, such as "good"/"bad" or "OK" / "not OK".



Kurtosis vs. Time

LICENSES AND OPTIONAL FEATURES

Requirements

Code	Product Name	Description
50000	APR 000 APR Framework	Basis of ArtemiS SUITE
51003	ASP 003 Advanced Analysis	Advanced Analyses (e.g., spectral analyses with high or variable frequency resolution for the examination of short, transient signals) for use in Pool Projects, Automation Projects, Standardized Test Projects, and Metric Projects
At least one of the central projects of ArtemiS SUITE—Pool Project, Automation Project, Standardized Test Project—or a Metrics Project is required and must be licensed.		

Optional Features

Code	Product Name	Description
50010	APR 010 Pool Project	Central project of ArtemiS SUITE: interactive operation, ease of use, data processing based on cross-product logic
50050	APR 050 Automation Project	Central project of ArtemiS SUITE: one-time definition of processing steps, automatic execution and reuse for all subsequent data
50220	APR 220 Standardized Test Project	Central project of ArtemiS SUITE: measurement of multiple operating conditions of objects using the Recorder, and examination of the measurements by various methods
50570	APR 570 Metric Project	Project of ArtemiS SUITE: creation of quality metrics by correlating listening test results with acoustic signal analyses
51004	ASP 004 Advanced Analysis vs. Control Channel	Analyses from ASP 003 as a function of reference quantities (RPM, force, ...)
5097	ASX 07 Local Processing Service (API)	ASX programming interface: execution of Automation Projects, e.g., in End-of-Line processes, on the basis of automation specifications (calculation jobs); installation of ArtemiS SUITE is not required
5092	ASX 02 Data Processing and Representation API	ASX programming interface: automated or interactive control of Pool Projects and Automation Projects, execution of Reports, exports, etc. using your software; installation of ArtemiS SUITE is required
Additional modules of ArtemiS SUITE (see the ArtemiS SUITE Overview data sheet)		

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