imc WAVE

Spectral Analysis • Structural Analysis • Order Tracking

Software for sound and vibration analysis with imc measurement systems

imc WAVE at a glance

- Analysis platform for sound & vibration testing with imc measurement systems
- Analyzers based on standardized test routines:
  - **imc WAVE Spectrum Analyzer:**
    for sound and vibration measurements according to standards:
    IEC 61672:2003 (sound level meter)
    IEC 61260 (band filter for octaves and thirds)
  - **imc WAVE Structural Analyzer:**
    for structural examinations and modal analysis
  - **imc WAVE Order Tracking Analyzer:**
    for measurements on rotating machinery & components

NVH and beyond:
- Acoustics in the context of a universal measuring system
- Additonal synchronized data acquisition of signals such as force, pressure, strain, temperature, GPS, etc. - for analyses and correlations
- CAN vehicle bus integration

In pursuit of noise & vibrations

Productive testing with the imc WAVE software solution

In modern product development, acoustical aspects are playing an increasingly larger role: mechanical vibrations are minimized and noise and interference are not allowed to exceed certain legal standards. Thus, machinery and vehicles are subjected to sound and vibration testing by manufacturers. imc WAVE is the ideal platform for testing in accordance with the standards, as well as in develoment environments that aim towards improving comfort and optimizing functionality. For example, more than 400 sources are contributing to sound in a vehicle. They have to be defined and measured by the manufacturer because acoustics play an important role when it comes to driving enjoyment and functionality.

imc WAVE:
Workstation for Acoustic & Vibration Engineering
With imc WAVE, you are provided with a powerful software platform for noise and vibration analysis.

Various analyzers cover a wide range of applications: from acoustical inspections during road tests, structural analyses on the test bench, up to vibration testing.

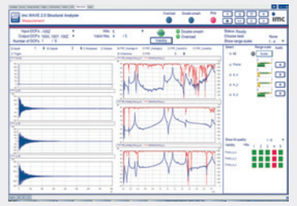
Wholistic testing approach: more than NVH
In the development arena, acquisition and correlation of additional measurement values are often required in order to analyze root causes and dependencies between the acoustic parameters and operational states. With imc WAVE, temperature, strain or GPS can be recorded and signals and information from CAN vehicle buses are directly integrated. This follows a wholistic testing approach, because after all, vehicles and machinery are increasingly being tested in their entirety. Analyses are carried out in real time: all recorded signals are directly calculated to meaningful result values and are evaluated according to relevant standards.

Spectrum Analyzer

- Sound power-level testing
- Octave & 1/3-octave analysis
- Frequency and time weighting
- Vibration weighting
- FFT analysis

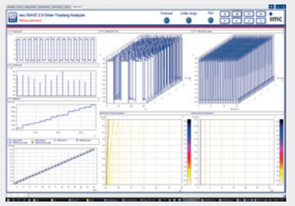
Structural Analyzer

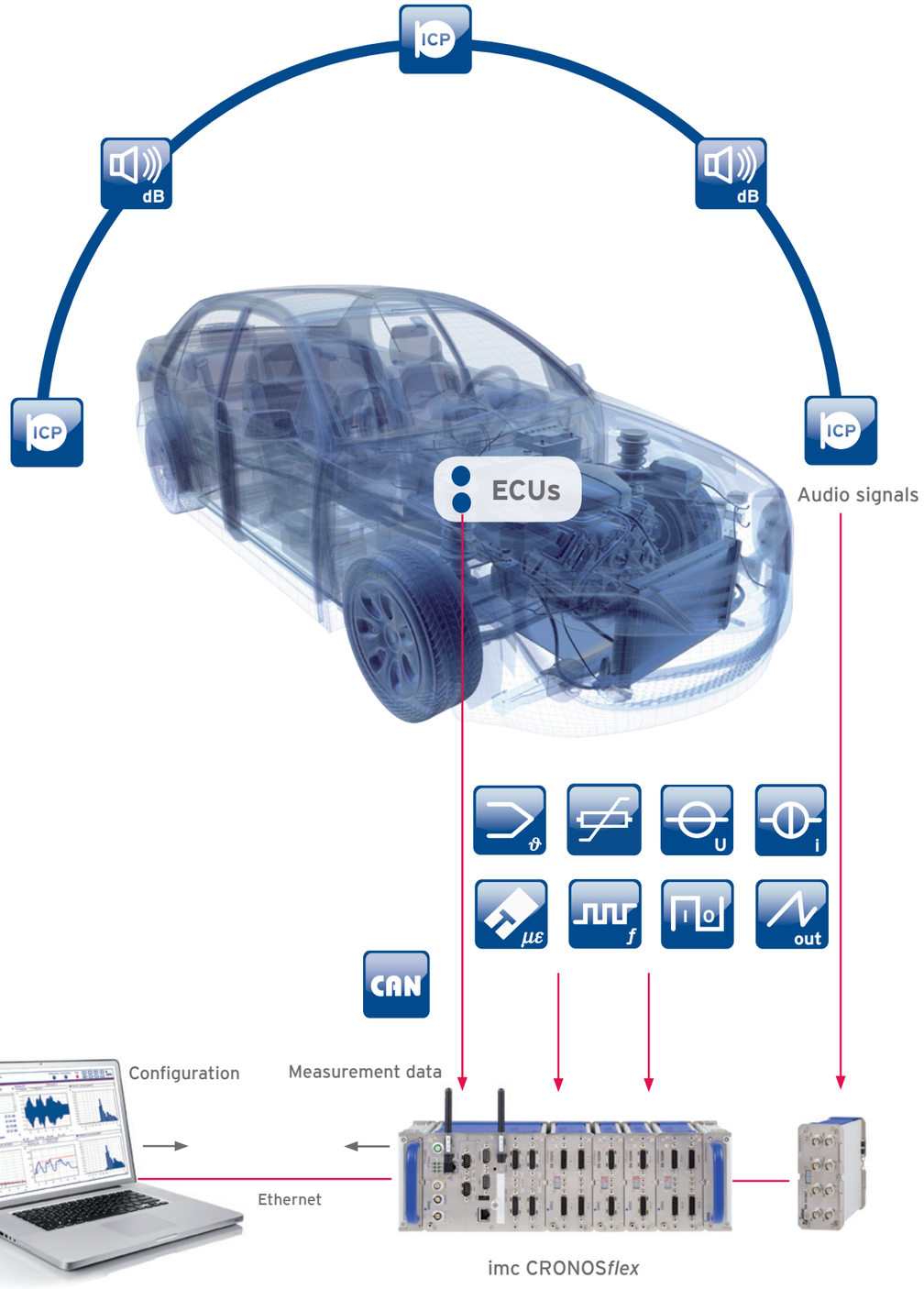
- Calculation of transfer functions (magnitude and phase)
- Coherences
- Auto-spectra & DOFs
- Export to Excel or modal analysis software ME' Scope™



Order Tracking Analyzer

- Order tracking spectra based on measured RPM
- Noise & vibration levels vs. RPM (various classifications)
- Transfer functions vs. time and angle





In Practice

Optimize vehicle interior acoustics

When buying a new car, most customers consider interior noise comfort an important factor. Therefore, vehicle manufacturers must perform a comprehensive series of tests and measurements – both on the test bench and on the road. One such test, for example, is to drive the vehicle under full and partial load. In addition to the comfort-relevant measurement data, operational status information is acquired via CAN or analog sensors and correlated to the acoustics performance.

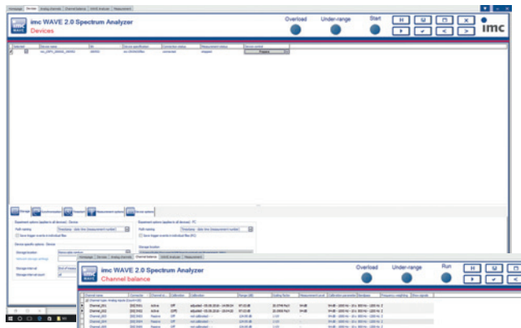
Structural analysis with imc WAVE

With the imc WAVE Structural Analyzer, mechanical structures can be examined with regard to resonances. In this situation, a defined force signal is injected into the structure and the subsequent response of the structure can be measured using accelerometers. The simultaneous assessment of all of the signals allows to derive the transfer function which fully describes the vibration behavior of the structure. For further processing, the imc FAMOS signal analysis software is available, as well as interfacing to modal analysis software, e.g., ME' Scope™.

Acoustic emissions testing on machinery

To minimize noise impact on humans, in working environments or in public, there are a number of laws and regulations put into place in which noise level limits and testing methods are described. Acoustic emissions are tested to evaluate how loud the sound is at a certain location. The sound level meter is suited for standardized evaluation and certification, as well as for product optimization in the development process. It is fully compliant to the IEC 61672 standard.

Operating concept
With imc WAVE, you can quickly and easily solve a wide variety of tasks in sound and vibration analysis. The well guided work flow will lead you step by step through the parameter settings for your specific application. From the device configuration through microphone calibration procedures up to starting the measurement, imc WAVE offers a simple operating concept.



Measurement device selection
The setup dialog presents the appropriate device selection for the task – for example, selecting an imc C-SERIES or imc CRONOS*flex* with audio or universal amplifiers.

Channel configuration
Depending on the application and device used, channels can be set up individually, e.g., for the particular microphone or sensor type being used.

Calibration
In this step, the microphone can be calibrated, if required , e.g., for certified spectral analysis results.

Measurement and documentation
Example octave & 1/3-octave analysis
Whether it's a standardized default display or customized visualization, graphic panels offer extensive opportunities for presentations and reports.

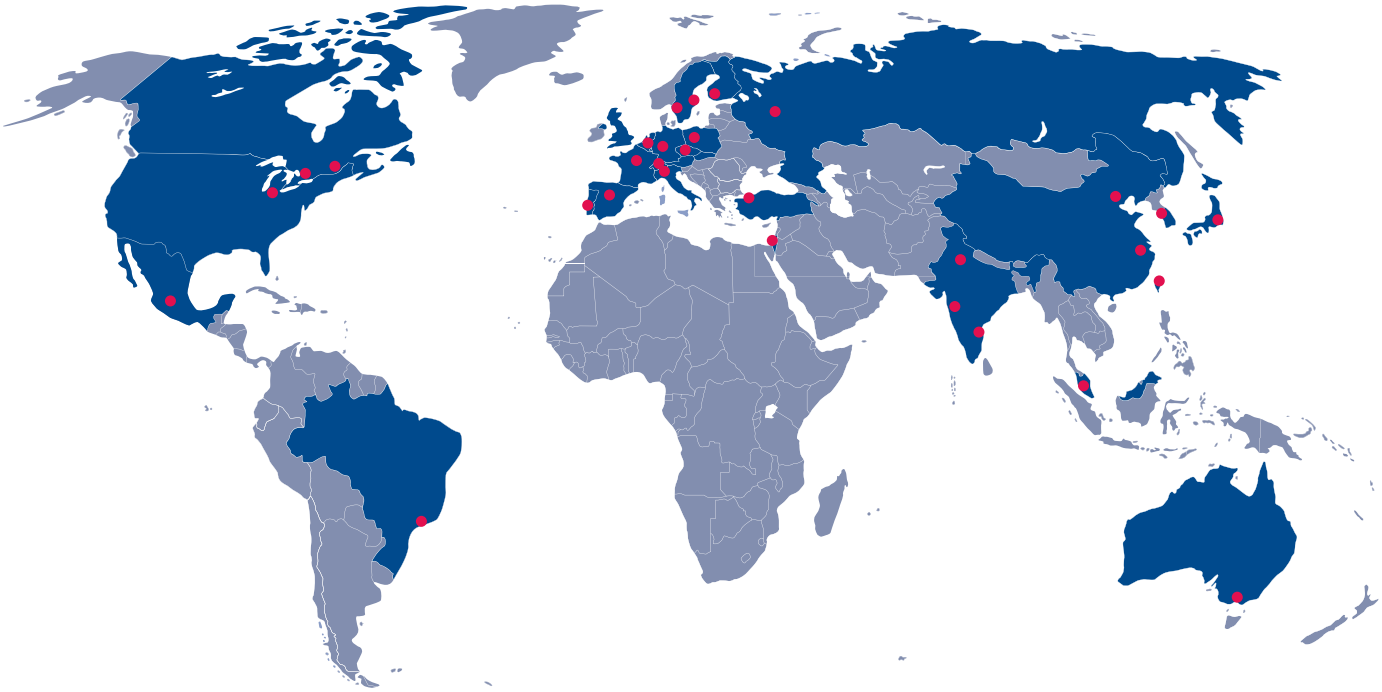
imc WAVE: Product Overview

Features and functions of the packages offered

Package	Function	Required licences			
		imc WAVE	imc WAVE SpectralAnalysis	imc WAVE StructuralAnalysis	imc WAVE OrderTracking
imc WAVE	**Applications**				
imc WAVE Spectrum Analyzer	Sound level meter (IEC 61672-2003), Octave & 1/3-octave analysis (IEC 61260), Frequency weighting (Z, A, B, C), Time weighting (Fast, Slow, Impuls, Peak), FFT analysis	●	●		
imc WAVE Structural Analyzer	Transfer functions (magnitude and phase), Coherences Auto-spectra & DOFs Export to Excel, Export to modal analysis software ME' Scope™	●		●	
imc WAVE Order Tracking Analyzer	RPM spectra Order tracking spectra	●			●
imc WAVE complete package	Includes all three analyzers as a complete package	●	●	●	●

Benefit from our international network

www.imc-tm.com/partner



imc Test & Measurement GmbH
Voltastraße 5
D-13355 Berlin

Tel.: +49 (0)30 - 46 70 90 0
Fax: +49 (0)30 - 463 15 76
hotline@imc-tm.de
www.imc-tm.de