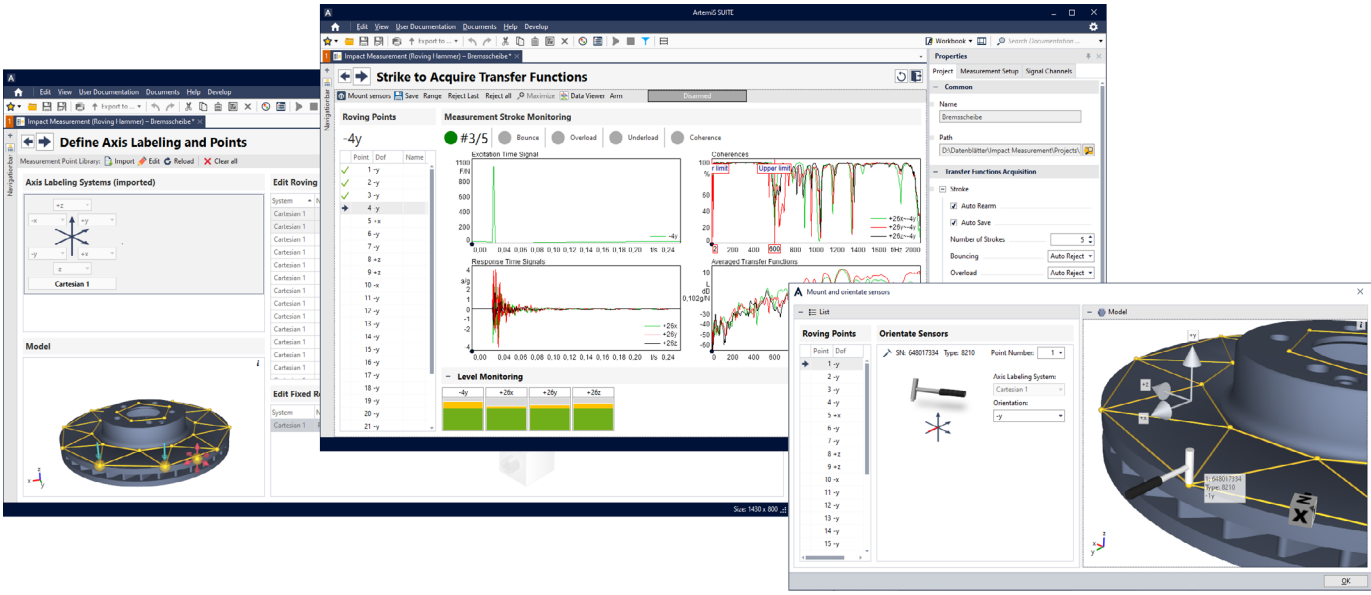
HEAD acoustics

DATA SHEET



ArtemiS SUITE
PRoject

Code 50430

APR 430
Impact Measurement

Impact Measurement of ArtemiS SUITE enables even unexperienced users to perform impact measurements (Roving Hammer / Roving Accelerometer) for structural analyses.

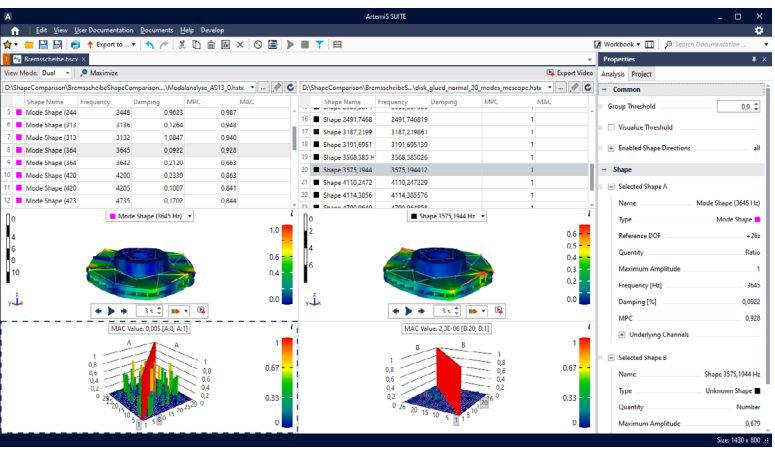
OVERVIEW

APR 430 Impact Measurement

Code 50430

Impact Measurement is a part of the ArtemiS SUITE Structural Analysis Package and enables impact hammer measurements (Roving Hammer / Roving Accelerometer) to perform structural analysis examinations.

Software assistants provide step-by-step guidance for standardized procedures and include automatic quality control functions with visual and acoustic feedback for certain steps. This makes it easy for even inexperienced users to achieve desired results with minimal effort and a low risk of errors. The results can then be processed using the Modal Analysis Project and the Shape Comparison Project.



KEY FEATURES

Guided workflow during impact hammer measurement for easy and robust operation

Methods

- "Roving hammer" method with fixed reference points
- „Roving accelerometer" method with fixed excitation points

Coordinate systems: cartesian, cylindrical, and spherical

Easy-to-use frontend and sensor configuration

Automatic configuration of the desired measurement parameters with a few test strikes

Acoustic and visual feedback to control the individual hammer strikes, to detect incorrect hammer strikes immediately

Optional reciprocity check / linearity check

Checking of coherence between the averaged strikes

Representation of the results, each in a separate diagram

- Time domain signal of the impact hammer
- Time domain signals of the reference points
- Coherence
- Transfer functions averaged over the individual hammer strikes

APPLICATIONS

Analyzing and comparison of shapes

Detailed observation of individual shapes

Transfer Function measurements and export (e.g., dynamic masses, dynamic stiffness, dynamic impedances)

Assistant-guided usage

With several automated features, the impact measurement function guides the user through the configuration and the measurement of the data required for a modal analysis.

Projects can be saved and can later be reloaded and re-used with all original settings.

Methods

The “Roving Hammer” method is ideal for small components and requires little preparation time.

The “Roving Accelerometer” method, where excitation with the impact hammer takes place at a fixed position and orientation, while the sensors are relocated for each measurement, is particularly suited for large, complex components.

Configuration

Depending on the shape of the measurement object, users can choose between cartesian, cylindrical and spherical coordinate systems. For measurement objects with a complex geometry, it is also possible to combine different coordinate systems in one measurement.

As an alternative to the manual procedure, a 3D model created with the Measurement Point Library (included in APR 000) can be imported. Using the 3D model, sensors can be automatically orientated to the surface of the model for minimizing the error rate.

Parameter acquisition

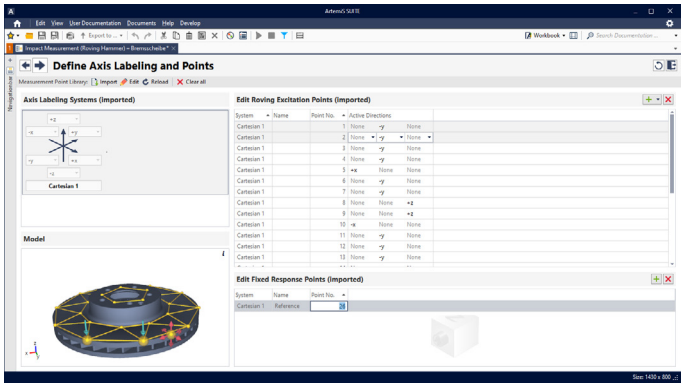
All that is needed to determine the required measurement parameters are some test strikes, from which the desired sampling rate, the window size and windowing function, the pre-triggers for the hammer, the threshold values for triggering the hammer and the appropriate measurement range will be determined. Each strike is followed by both visual and acoustic feedback on the quality of the strike.

Double impacts, signal clipping, and impacts with an insufficient signal level are detected automatically, and the ranges are adapted accordingly.

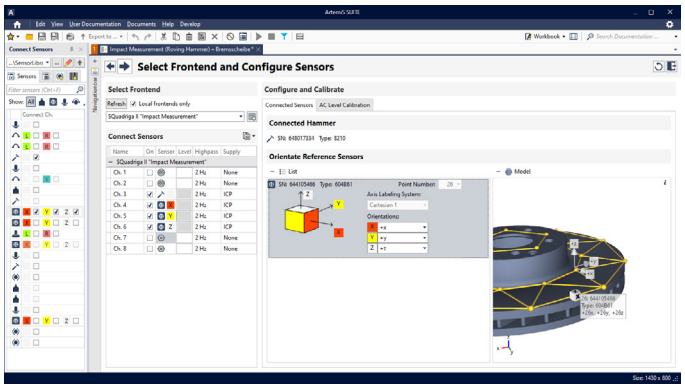
Users can turn off the automatic functions and do the configuration manually.

Reciprocity check

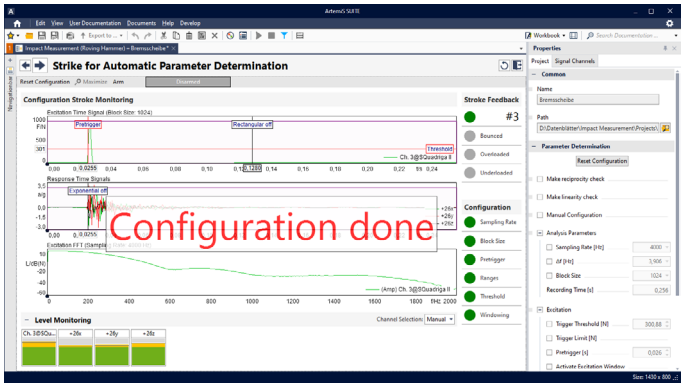
Using the optional reciprocity check, transfer functions are measured crosswise in both directions and the results are superimposed in the diagram.



The configuration and orientation of acceleration sensors is done quickly and safely thanks to easy handling and the use of common names and live visual feedback from the virtual geometrical model.



The frontend and sensor configuration can be used to select the frontend, to connect the desired sensors and to specify the orientation of the reference sensors. Again, the linked geometrical model can support the sensor configuration, enabling the user to visualize sensor placement.



During the automated acquisition of the measurement parameters, users get both acoustic and visual feedback (via colored LED icons) as well as information as to whether the strike was double, too strong or too weak.

Linearity check

Using the optional linearity check, users can compare between two sets of transfer functions with different excitation strength visually, in order to detect possible problems during the excitation.

Measurement

As with the previous steps, the software also guides the user, step by step, through the measurement of the transfer function.

The software displays which point is to be struck in which direction. Each strike is subjected to quality control. As during parameter acquisition, users get immediate feedback both visually and acoustically. The acoustic feedback enables the user to fully concentrate on the measurement points to be struck during the impact measurement, which enables a quick measurement without looking at the computer.

The quality control function checks for double strikes, too high or too low strike signals and coherence. If any of these criteria is violated, the strike is repeated.

Besides acoustic control, four diagrams also enable visual control of the results by displaying the time domain signals of the excitation and all defined reference points, the calculated coherences and the averaged transfer functions after each successful strike.

Analyzing during the measurements with the Modal Analysis Project

Using the Modal Analysis Project (APR 420 is required), the analysis of the recorded data can be performed by means of live coupling already during the measurement. Alternatively, impact measurements that have already been performed can also be analyzed offline there. Within the analysis, all necessary information are clearly displayed via various diagrams and animations.

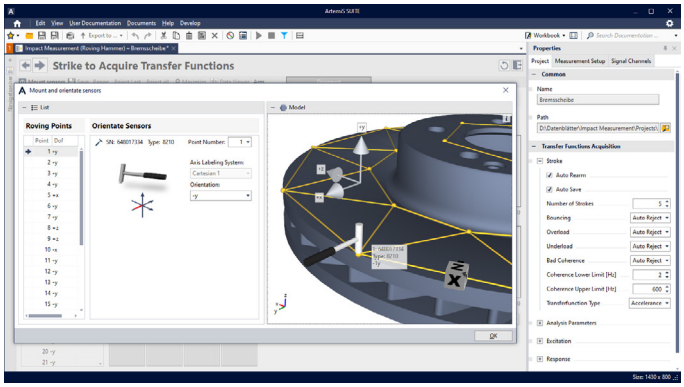
Comparing the deflection shapes with the Shape Comparison Project

Using the Shape Comparison Project (APR 410 is required), users can compare simulations with real measurements or assess components changes, for example.

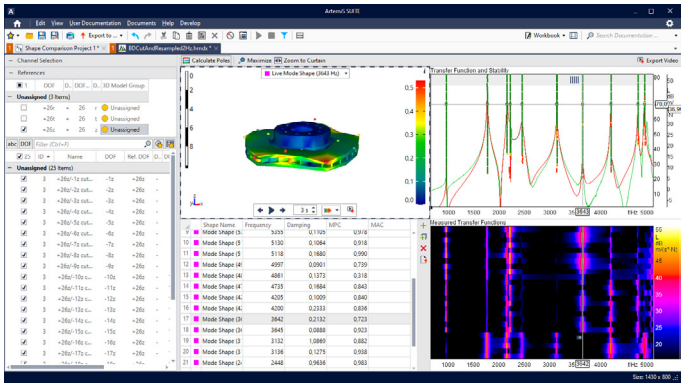
Report and export

The measured transfer functions can be viewed in a Data Viewer (included in APR 000) or in a Report (APR 020 is required).

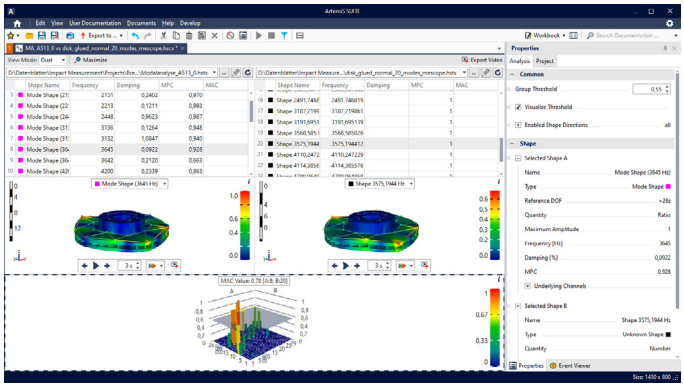
Furthermore, the results can be exported to Excel and to other licensed third-party formats, such as UFF (ASP 705 is required).



The measurement window provides four different diagrams, showing the time domain signal of the excitation, the time domain signals of all specified reference points, the coherence, and the transfer function.



With the Modal Analysis Project, the analysis of the recorded data can be performed by means of live coupling.



The Shape Comparison Project determines the MAC (Modal Assurance Criterion) value and provides information about the similarity of deflection shapes. This information can be used, for example, to assess the quality of a simulation.

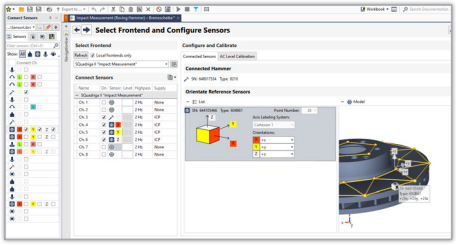
STRUCTURAL ANALYSIS

Impact Measurement is a part of a powerful and perfectly matched ArtemiS SUITE Structural Analysis Package that enables users to intuitively examine and understand the complex relationship between stimulus and structure.

MEASURING / PREPARING

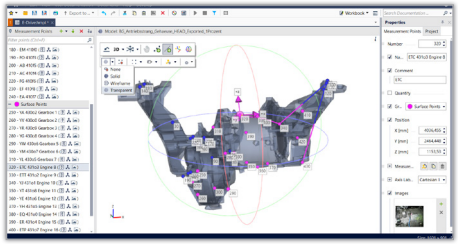
IMPACT MEASUREMENT (APR 430)

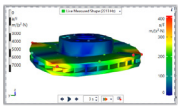
Impact Measurement enables structural analysis measurements using the methods Roving Hammer and Roving Accelerometer.



MEASUREMENT POINT LIBRARY (APR 000)

The Measurement Point Library can be used to create a 3D grid model and to import a corresponding CAD model very easy.

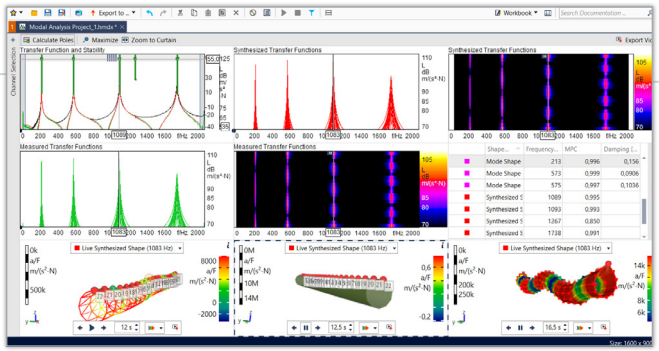




LIVE COUPLING (APR 430 & APR 420)

During the measurement, the analysis of the recorded data can be performed by means of live coupling in the Modal Analysis Project.

ANALYZING

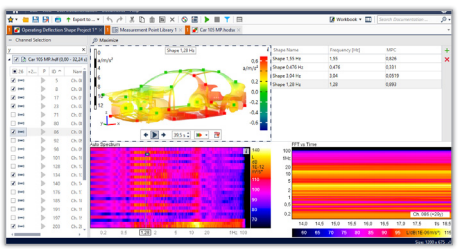


MODAL ANALYSIS PROJECT (APR 420)

The easy-to-use Modal Analysis Project enables easy recognition of interesting frequency ranges as well as the comparison, for example, with reference measurements. Alternatively, users can also validate simulation results in this way.

ODS PROJECT (APR 400)

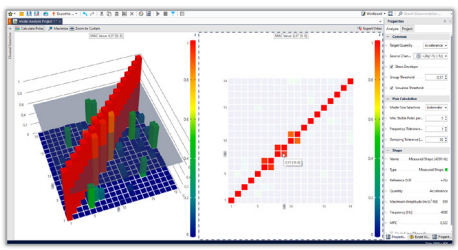
The ODS Project (Operating Deflection Shape) includes the Time Domain Animation Project (TDA) and can be used to animate and analyze structures in a defined stationary operating status as well as time-variant motions.



LIVE COUPLING A MAC MATRIX (APR 410 with APR 420 & APR 400)

SHAPE COMPARISON PROJECT (APR 410)

The Shape Comparison Project is used for analyzing and comparing deflection shapes.



RECOMMENDED HARDWARE

- HEAD acoustics offers suitable hardware for performing the impact measurements. Frontend configurations can be easily carried out with the Offline Frontend and later transferred to the hardware, supported by HEAD acoustics.
  - Mobile frontends with built-in battery
    - SQuadriga III (Code 3324)
      Mobile 8-channel recording and playback system
    - SQobold (Code 3302)
      Mobile 4-channel recording and playback system
    - SQuadriga II
  - Multi-channel frontend system
    - HEAD*lab* system (Code 3700)
    - *lab*COMPACT HEAD*lab* modules
- Additional hardware
  - Impact hammer
  - Accelerometers
  - PC / notebook / tablet (Windows)

RECOMMENDED SOFTWARE

- Modal Analysis Project (APR 420 is required)
- Shape Comparison Project (APR 410 is required)
- ODS Project (APR 400 is required)
- Report (APR 020 is required)
- UFF Conversion (ASP 705 is required)

Required: APR 000 Framework (Code 50000)

HEAD acoustics

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