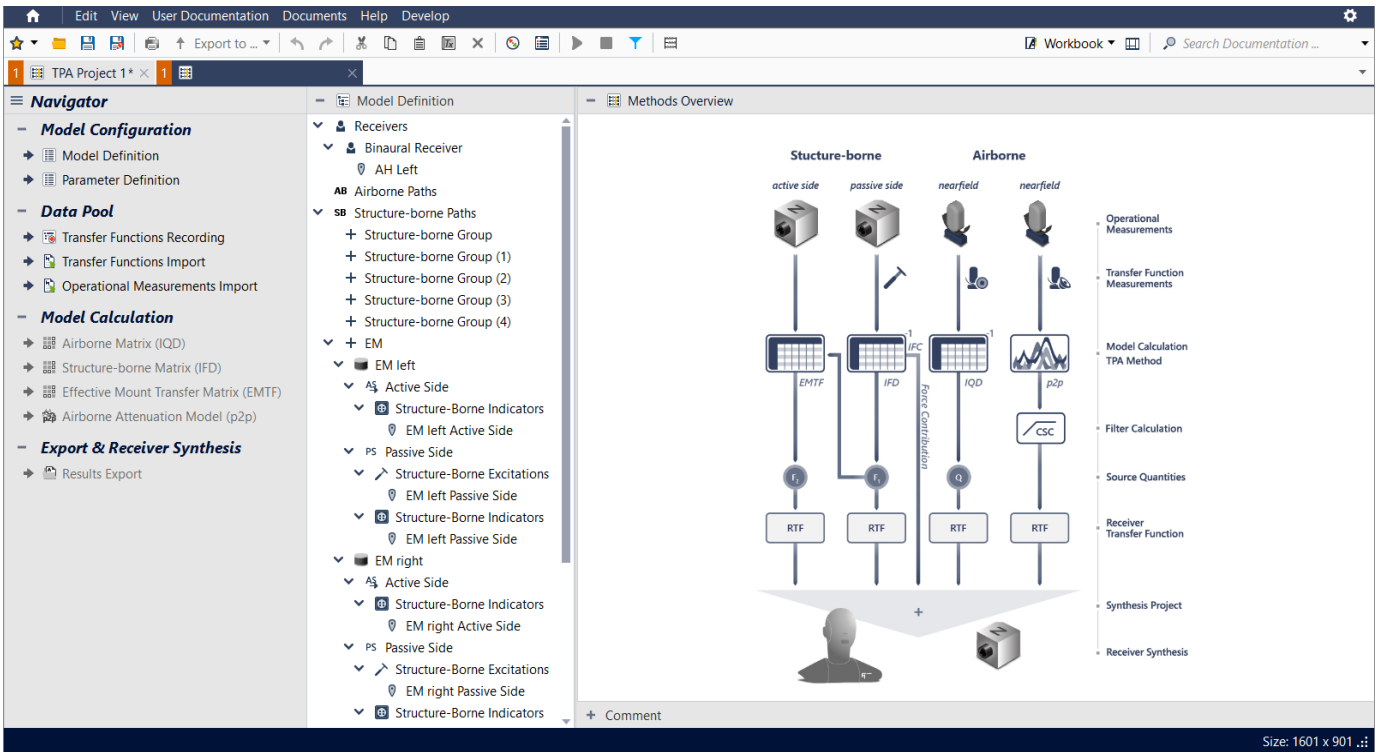
HEAD acoustics

DATA SHEET



ArtemiS SUITE
PRoject

Code 50620

APR 620 TPA Project

The TPA Project of ArtemiS SUITE is a fast and easy solution for building a transfer path model and calculating source characteristics and path contributions in time domain. The results can be used for further interactive analysis in Prognoise or to create input data for datasets which can be experienced in the NVH Simulator PreSense for virtual prototyping, troubleshooting, sound design, target definition, etc.

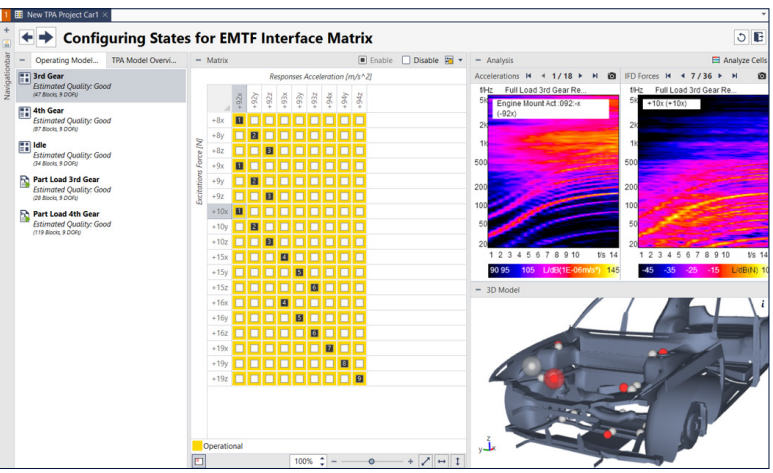
OVERVIEW

APR 620
TPA Project

Code 50620

To perform a transfer path analysis or to create data sets für PreSense and Prognoise, the TPA Project enables the vibro-acoustic characterization of measurement objects using transfer path synthesis. The TPA Project calculates the individual noise contributions of the paths from transfer functions and operational measurements and generates a vibro-acoustic model that describes the noise/vibration transmission.

For performing the required measurements, the TPA Data Acquisition (APR 610 is required) and the Recorder (APR 040 is required) are available.



KEY FEATURES

Transfer path analysis for airborne or structure-borne paths; the user is guided through the process step by step

- TPA model definition using the Measurement Point Library and it's optional 3D model for optimal visualization and orientation
- Supported methods:
  - Indirect force determination with matrix inversion (IFD)
  - Effective mount transfer functions (EMTF)
  - Airborne attenuation determination (p2p)
  - Indirect volume velocity (Q) determination (IQD)
- Calculating and displaying the analyses Transfer Function, Coherence, Impulse Response, and Excitation Spectrum
- Synthesizing path contributions in time domain for further analysis in ArtemiS SUITE or input data for NVH Simulator PreSense
- Source excitations (in-situ blocked forces and volume velocity)
- Creating ready-to-use Prognoise Projects for interactive analysis or advanced applications in Prognoise

APPLICATIONS

- Identifying the cause of disturbing noises/vibrations
- Easy distinction between source-related and transfer path-related problems
- Detailed benchmarking on component level
- Target definition on path level
- Virtual reality/virtual prototyping (PreSense)
- Source characterization: In-situ blocked forces (ISO 20207:2019) or volume velocity
- Hybrid TPA approach: combination of simulated transfer functions with measured excitations

DETAILS

TPA Project

Step by step, the TPA Project guides the user through the procedure. With the help of the Measurement Point Library, the 3D model, and the clear model tree, the entire TPA model can be constructed very quickly and clearly.

Users maintain a full overview even with larger models because all presentation options are interconnected. With a click on a measuring point in the 3D model, for example, the model tree displays the corresponding locations. This interconnection is also available for the matrix, which interacts automatically with the model tree and the 3D model.

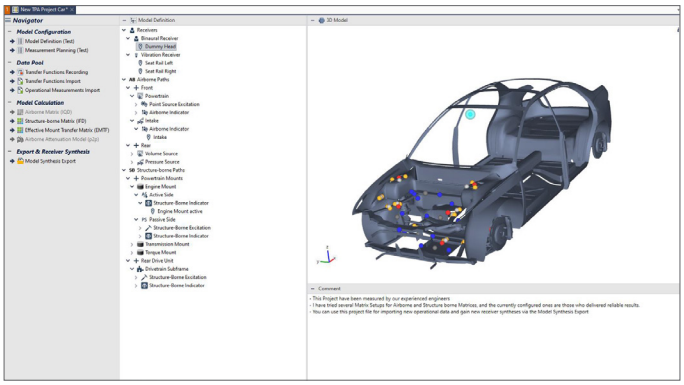
For the required measurements of the transfer functions, the TPA Data Acquisition Project (APR 610 is required) is available, which uses the TPA model for the configuration of the measurement setup.

TPA Data Acquisition is very easy to use and guides users through the setup and all measurement procedures. For the measurements, APR 610 utilizes the Recorder of ArtemiS SUITE (APR 040 is required), which can be seamlessly integrated into the process. The Measurement Point Library and the 3D model can be used here as well, so that all necessary tasks are performed quickly and safely.

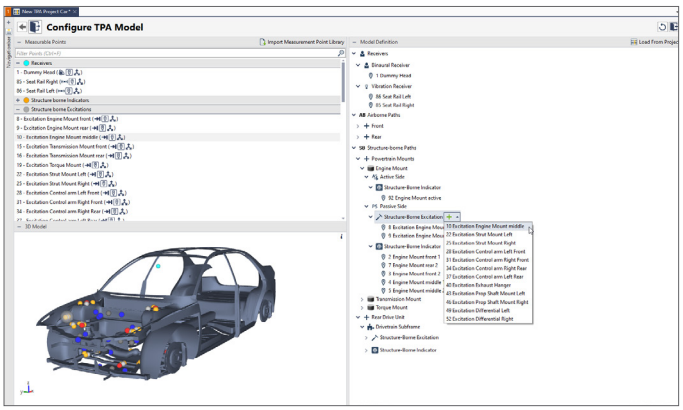
The measured transfer functions are automatically processed by the TPA Project for creating the TPA model.

For this purpose, the TPA Project provides four methods:

- For structure-borne sound components
  - Indirect force determination with matrix inversion (IFD)
  - Effective mount transfer functions (EMTF)
- For airborne sound components
  - Airborne attenuation determination (p2p)
  - Indirect volume velocity (Q) determination (IQD)



Clearly structured TPA Project



Model definition using the Measurement Point Library and the 3D model.

Matrix Configuration

All transfer functions (structure-borne transfer functions: inertances, vibro-acoustic/acoustic transfer functions; airborne transfer functions: acoustic impedance and acoustic transfer function) are calculated automatically. Subsequently, a matrix inversion of the inertances or of the acoustic impedances is calculated.

In addition to the transfer functions measured with the Recorder, further transfer functions and operational measurements can be imported if required. For analyzing the data, the TPA Project automatically calculates and displays the Transfer Function, the Coherence, the Impulse Response, the Excitation Spectrum from the receiver, for exmple, or the interance in diagrams.

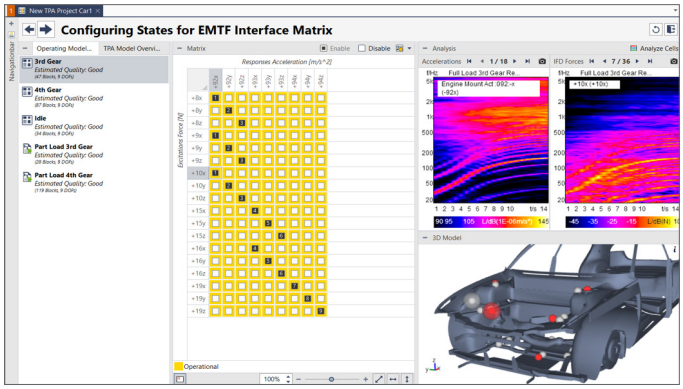
In order to avoid overestimation of the source characteristics (operational forces or volume sources), which can occur due to the inversion of ill-conditioned matrices, a mathematical regularization is possible. To improve the accuracy of the results, an overdetermination with more reference signals than source characteristiscs is possible. The synthesis of the operating forces from the accelerations measured during operation and the inverted inertance matrices is performed in the time domain. The same applies to the volume source signals.

In submatrices, subsystems can be considered and calculated independently from each other. The mathematical method of regularization allows to counteract small measurement errors that lead to very large errors in the path contributions. The degree of regularization can be selected depending on the frequency. This allows more reliable results with greater significance to be achieved.

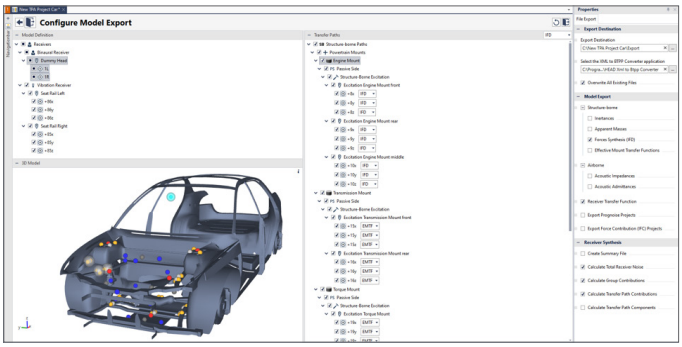
Once mounts have been defined in the TPA model and the acceleration on the active side has been measured in operation, effective mount transfer functions can be calculated. To this end, the correlation between the indirectly determined forces and the accelerations on the active side are evaluated.

The TPA Project provides several export options:

› Time signals of the path contributions for further analysis in ArtemiS SUITE or to create a TPA-based dataset which can be experienced in the NVH Simulator PreSesense (Code 7600)



Effective Mount Transfer Functions (EMTF) workflow



Model export

› In-situ blocked forces (ISO 20270:2019) and volume velocity for source characterization

› Transfer functions (Inertance, Apparent Mass, Receiver Transfer Function, Acoustic Admittance, Acoustic Impedance) for root cause analyses

› Ready-to-use Prognoise (Code 4914) Projects for interactive analyses and advanced applications like order resyntheses

Required: APR Framework (Code 50000)

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