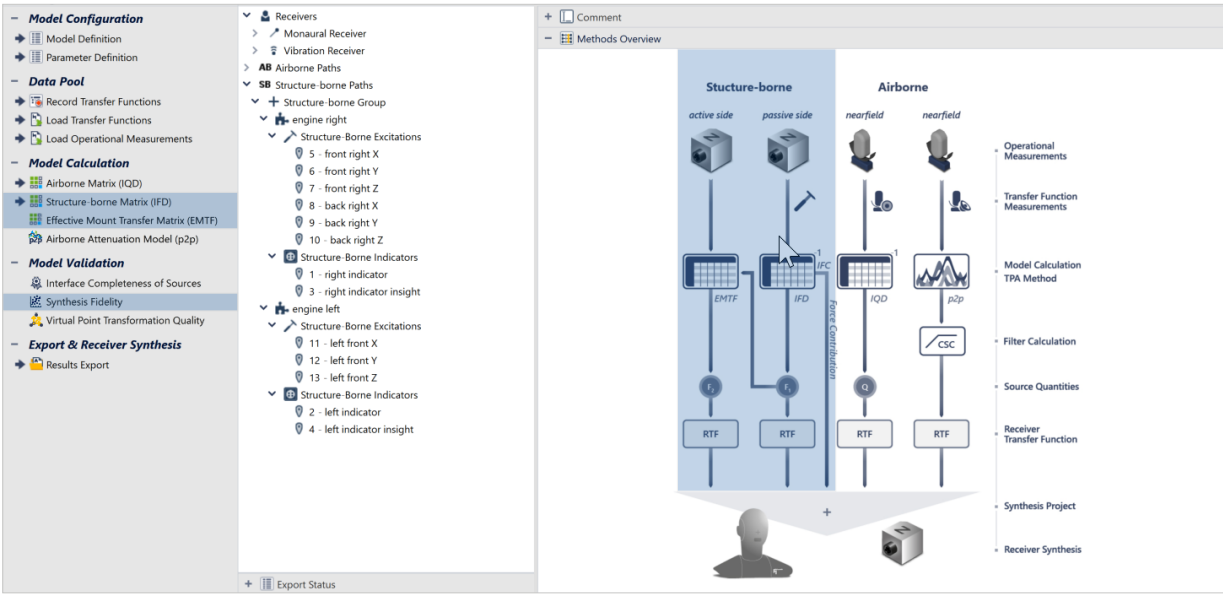
HEAD acoustics

DATA SHEET



ArtemiS SUITE
Signal Processing

Code 51602

ASP 602 TPA – Structure-Borne Analysis

TPA – Structure-Borne Analysis is part of the TPA package in ArtemiS SUITE and provides functionality for calculating the Effective Mount Transfer Matrix (EMTF), quantifying indirectly acting structure-borne sound contributions (IFC), and validating the model calculation based on the measured structure-borne sound.

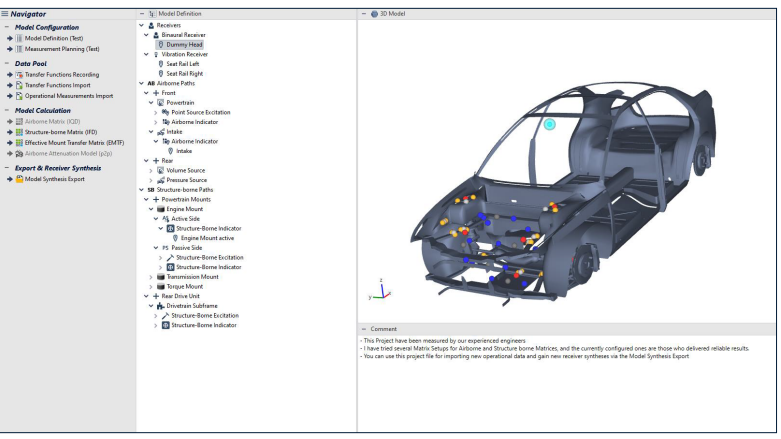
OVERVIEW

ASP 602
TPA – Structure-Borne Analysis

Code 51602

TPA – Structure-Borne Analysis is an optional extension to the TPA Project, enabling the application of the EMTF matrix to determine both the Effective Mount Transfer Function and the IFC method (Indirect Force Contribution) to quantify indirectly acting structure-borne sound components.

Furthermore, TPA – Structure-Borne Analysis supports the execution of structure-borne sound validation measurements to evaluate the quality of the TPA model as well as validation measurements intended to optimize the mapping accuracy of the synthesis.



KEY FEATURES

Extension to the TPA Project (APR 600 is required) for model creation and model validation of structure-borne sound components

Supported methods for model calculation:

› Determination of the Effective Mount Transfer Function (EMTF)

› Quantification of indirectly acting structure-borne sound components (Indirect Force Contribution, IFC)

Model validation

› Execution of structure-borne sound measurements for model validation

APPLICATIONS

› Precise, path-specific characterization and analysis of individual structure-borne sound transfer paths

› Description of mount characteristics

› Optimization of sound syntheses

› Deeper understanding of the relationships between transfer mechanisms among components, etc.

› Reliable evaluation of TPA model quality

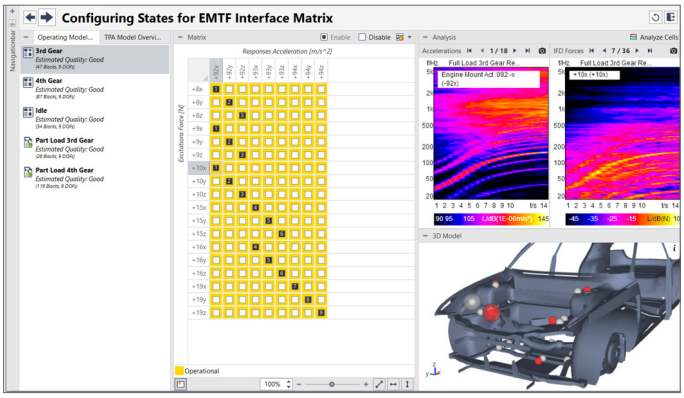
DETAILS

Model Calculation

EMTF Matrix

The determination of the Effective Mount Transfer Function (EMTF) does not constitute an independent method; rather, it augments the IFD method (Indirect Force Determination; APR 600 is required) by providing a systematic description of indirect force determination for mounted sources. The EMTF method is based on synthesizing the operational forces in accordance with the indirect force determination procedure for the respective operational measurement selected.

In addition to the quantities acquired for the IFD method, the EMTF method also requires the operational accelerations measured on the active side. Both methods are integrated into a structured transfer function matrix. The EMTF matrix enables both the inversion for determining the forces and the analysis of individual source contributions to the resulting overall noise.

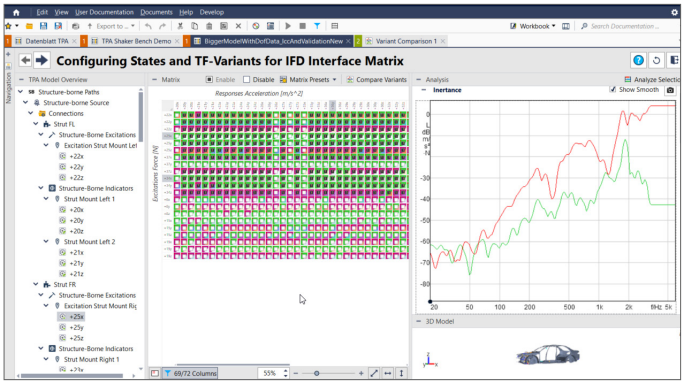


Effective Mount Transfer Matrix (EMTF)

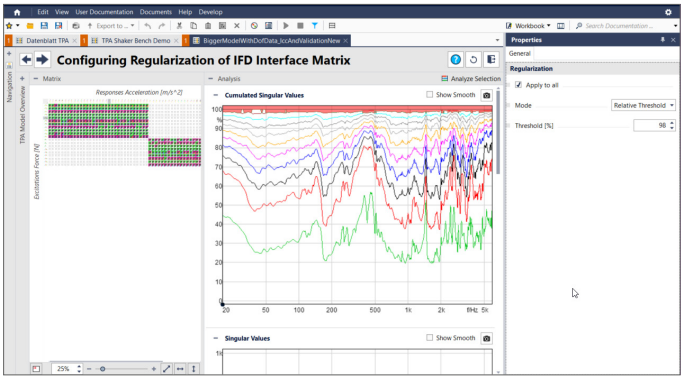
IFC Method

The IFC method analyzes the composition of the excitation forces determined as part of the force reconstruction. This method does not constitute an independent method; rather, it is based on the IFD method and serves primarily to provide a deeper understanding of the underlying system of equations.

The IFC method aims to identify the dominant sound and vibration sources, especially in situations where direct force measurement is not feasible or practical. The method first reconstructs the effective operational forces based on the measured vibration responses and the known transfer functions (FRFs) between the force-application points and measurement points.



IFD method: Comparison of the inertances

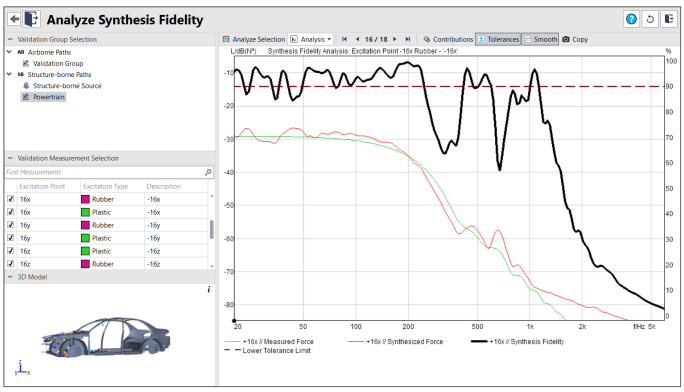


IFD method: Matrix regularization

Model Validation

In this step, validation measurements are used to verify whether the TPA model responds correctly to unknown excitations at the source interface. The mapping quality is evaluated by comparing a measured excitation (structure-borne sound) and the synthesized excitation, which is calculated on the basis of the defined model structure. The analysis thus provides a frequency-dependent quality criterion that describes the reproduction accuracy of the TPA model for previously unknown excitations.

If the mapping quality does not comply with the requirements of the TPA model, refining the interface matrix, optimizing the applied transfer functions, and modifying the matrix regularizations may all help improve the synthesis accuracy.



Evaluating the synthesis accuracy using the individual structure-borne sound paths

LICENSES

Required

Code	Product Name	Description
50000	APR 000 APR Framework	Basis of ArtemiS SUITE
51602	ASP 602 TPA – Structure-Borne Analysis	Calculating the Effective Mount Transfer Matrix (EMTF) and the procedure for quantifying indirectly acting structure-borne sound contributions (IFC)
50600	APR 600 TPA Project	Performing transfer path analyses

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