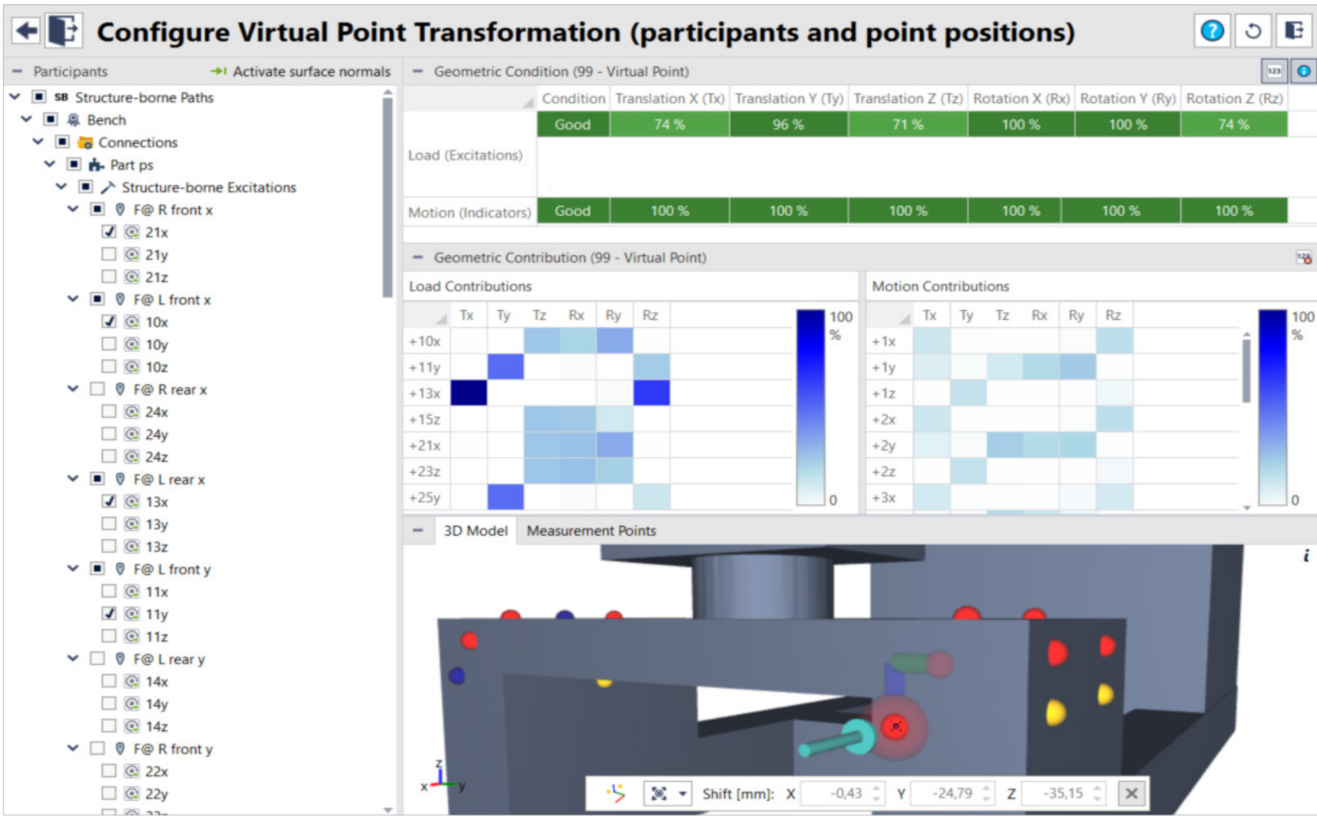
HEAD acoustics

DATA SHEET



ArtemiS SUITE
Signal Processing

Code 51601

ASP 601 Virtual Point Transformation

Virtual Point Transformation of ArtemiS SUITE is seamlessly integrated into our TPA Project (APR 620) and provides the option of calculating forces and moments or translational and rotational accelerations at points that cannot be physically measured.

OVERVIEW

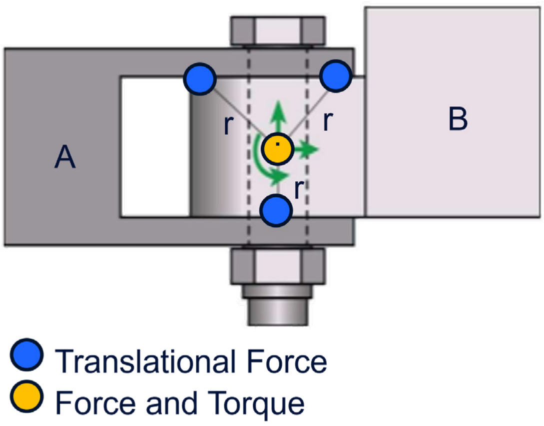
ASP 601 Virtual Point Transformation

Code 51601

Virtual Point Transformation is an optional extension of ArtemiS SUITE for the TPA Project. It enables virtual measurement points to be created on components or assemblies and the resulting forces, moments, as well as rotational and translational accelerations to be calculated at points where sensors, hammers, or shakers cannot be used.

With regard to hybrid models, virtual points can be used to link numerical simulation models and real measurement results.

Virtual Point Transformation provides a clear user interface that guides you step-by-step through the entire process. There are also various quality assurance steps available, thus reducing the need for expert knowledge.



KEY FEATURES

Calculating forces and moments at physically unmeasurable points on the basis of measurements

Seamless integration into the TPA Project

Assistant-guided modeling of the virtual points using the Measurement Point Library (included in APR Framework) and 3D models

Immediate validity check of the virtual points and simple optimization

Automatic calculation of the transformation matrix

Display of the quality of modeling

- Evaluation of the geometric condition
- Consistency analyses for load and motion
- Assessment of the overall consistency
- Analysis of the qualities of the six degrees of freedom (translational and rotational)

Simple procedure for optimizing the quality of the virtual poins with immediate feedback

Variably adjustable export options

APPLICATIONS

- Hybrid approach with the TPA: linking between simulations and measurements
- Compact data exchange by aggregating spatially distributed forces in a single point
- Calculation of translational and rotational sensitivities

DETAILS

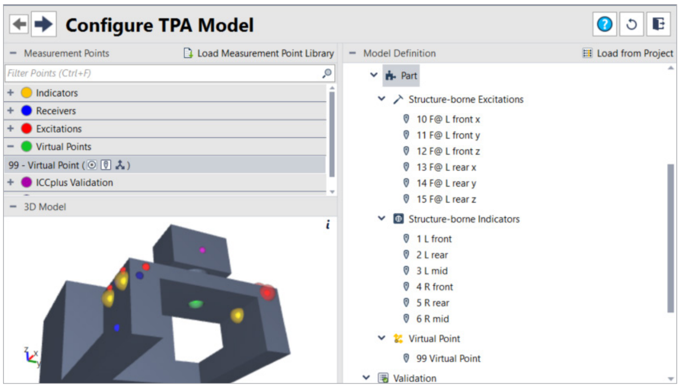
Virtual Point Transformation (VPT)

Based on the geometric positions of spatially distributed force application points or acceleration measurement points respectively, the VPT enables translational and rotational forces or accelerations to be determined at one point.

The user interface is clearly structured, and you can use the Measurement Point Library (included in APR Framework), the model tree, and a 3D model to create and configure virtual points without the need for in-depth expert knowledge.

Dividing the TPA Project into several steps provides orientation and guides you through the procedure step-by-step. The VPT is integrated into the TPA Project at several points:

- Model definition
- Configuration of the virtual points
- Quality analysis – including intuitive optimization of the virtual points
- Export

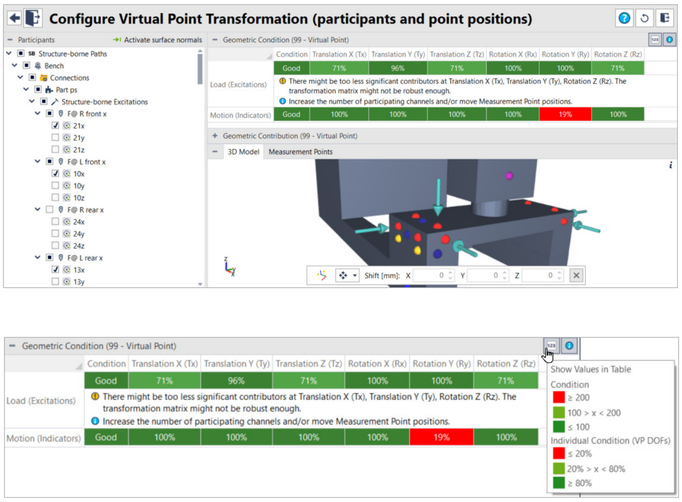


Model definition

Model Definition

In this step, you define the interface between the source and the receiver structure. This and the subsequent steps of the TPA Project require a Measurement Point Library and, optionally, a 3D model. Whereas the measurement points for force application points are required to have "force" as their quantity and the measurement points of the structure-borne noise indicators are required to have "acceleration" as their quantity, a virtual point is characterized by "force and torque" and/or "acceleration and angular acceleration" as its quantity.

The process is facilitated by an automatic check: you are alerted by the TPA Project if the number, quality, or positions of the measurement points are insufficient and need to be supplemented or changed to ensure the validity of the virtual points.



Review of the model definition

Configuration

In this step, the participating force and acceleration channels are configured.

The TPA Project automatically creates the transformation matrix and calculates the condition. To provide orientation and give you an overview of the quality of the modeling, the TPA Project displays a color-coded table showing the quality of the forces and accelerations as well as the percentage quality of the individual degrees of freedom.

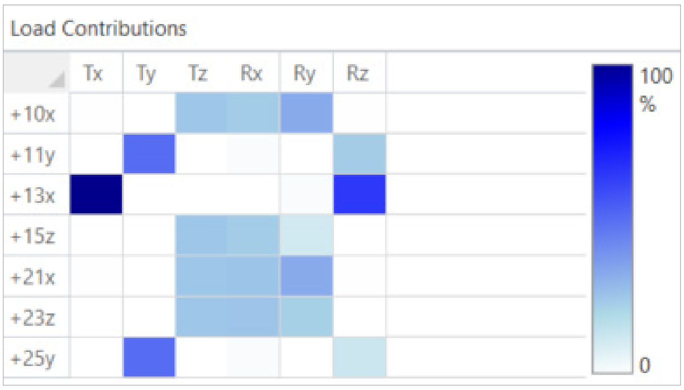
For each virtual point, the six degrees of freedom (translation in the X, Y, and Z directions as well as rotation around the X, Y, and Z directions) are displayed both in color (from red to green, i.e., from bad to good) and with percentage values. As an alternative, the table also displays the numerical values of the individual conditions.

Using the graphical support provided by the 3D model and the table, you can optimize the quality of your virtual points with just a few measures. In order to obtain a good configuration for both the geometric condition and the individual degrees of freedom, you can intuitively figure out whether the geometric conditions are improved by adding/removing the participating channels. Another option is to move the measurement points in the 3D model in order to find the optimal positions.

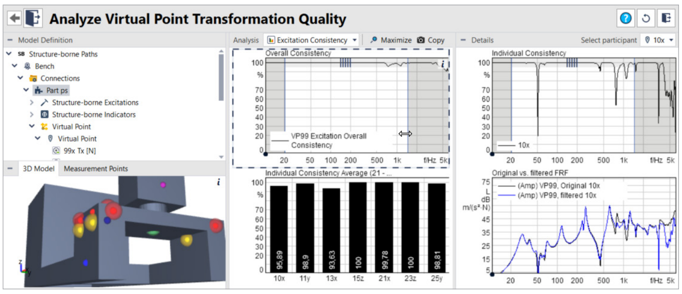
The geometric contributions are shown in a table serving as a guide to help you determine which participant contributes to the respective degree of freedom of a virtual point. The respective contribution level is visualized by the intensity of the color blue.

This enables you to both identify redundant channels and check the ruggedness, since the transformation matrix is prone to errors if the degrees of freedom of a virtual point primarily have only one strong contribution channel.

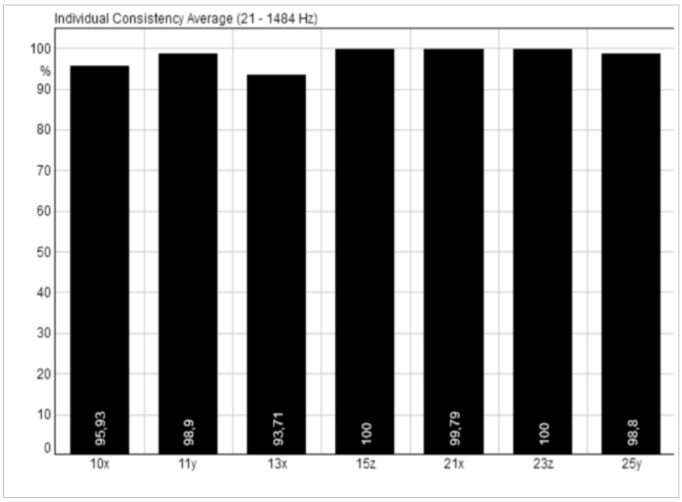
The result of all the adjustments and changes you make is immediately visualized in color in the evaluation table, i.e., you receive immediate feedback and can proceed without delay.



Geometric contributions: review of the contribution level of the degrees of freedom



Model tree, 3D model, and quality analyses



Quality analysis: averaged consistency

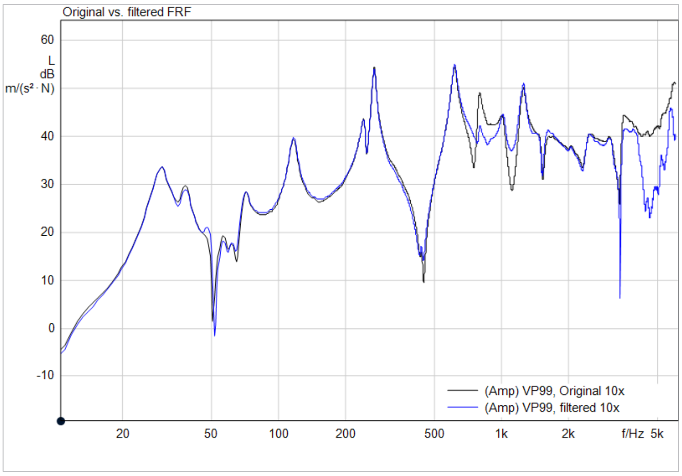
Quality Analysis

In addition to the geometric condition and the geometric contributions, the consistency (validity of the stiffness assumption) can also be analyzed. Depending on which quantities were assigned to the virtual point, either excitation consistency and/or indicator consistency can be selected.

The overall consistency of the VPT is displayed as a percentage value over frequency. This enables you to see at a glance in which frequency range the stiffness assumption is valid. The diagram can be used to configure the frequency range over which the individual consistency is to be averaged.

The averaged individual consistency is shown in a bar diagram below the overall consistency.

The individual consistency of individual channels over the frequency range is displayed in the "Details" section in the upper diagram. The data basis of the individual consistency is shown below in the Original vs. Filtered Transfer Function diagram. The deviation between the two curves gives the individual consistency.



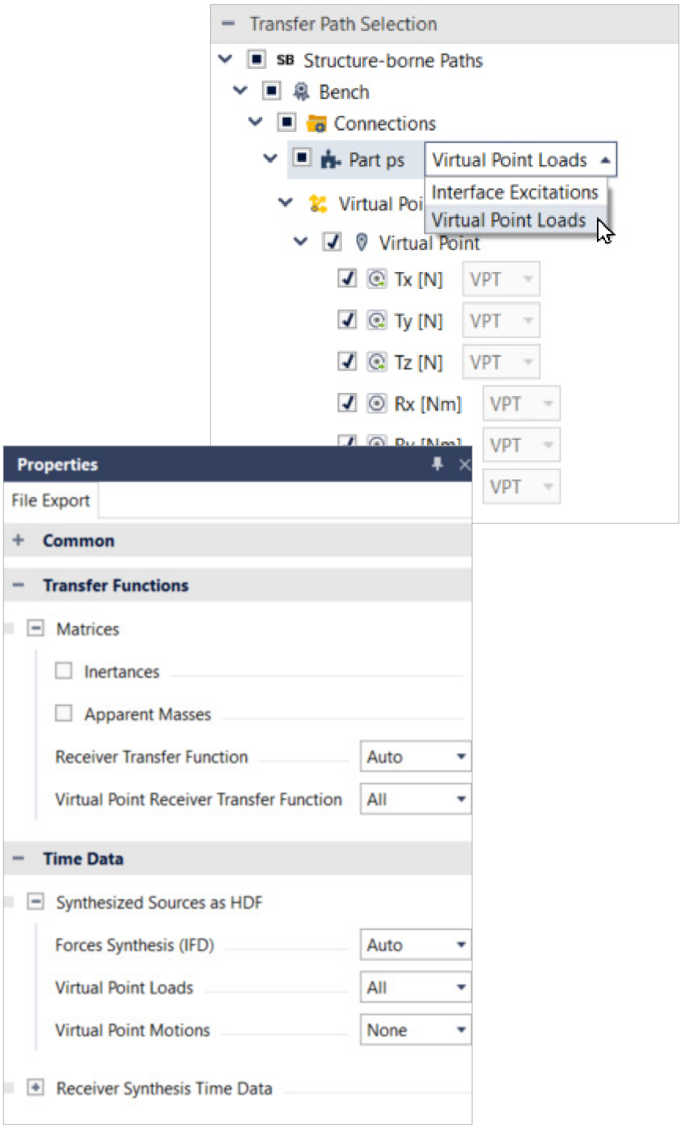
Original vs. filtered transfer function

Export

All model elements relevant for the export and the associated transfer paths are displayed in a clearly arranged tree structure. Here you can select the data or points to be exported: all data or only selected data, only the actually measured points or only the virtual points.

For the virtual points, you can also select whether the virtual point loads, i.e., the moments and forces for virtual points, are to be exported. The same applies to the virtual point motions.

If required, you also have the option of exporting all TPA data or all possible syntheses for each operating measurement to a separate HDF file and using it for further analyses.



Export options

LICENSES AND OPTIONS

General Requirements

Code	Product Name	Description
50000	APR 000 APR Framework	Basis of ArtemiS SUITE
50620	APR 620 TPA Project	Performing a transfer path analysis and creating data sets for PreSense and Prognoise
51601	ASP 601 Virtual Point Transformation	Assistant-guided determination of optimal positions for measurement points

Options (Recommended)

Code	Product Name	Description
50040	APR 040 Recorder	Universal Recorder of ArtemiS SUITE for all types of measurements
50610	APR 610 TPA Data Acquisition	Measuring the transfer functions required for a TPA Project using the Recorder of ArtemiS SUITE
4914	Prognoise	Software for Binaural Transfer Path Synthesis
7600	PreSense	Interactive simulator for NVH assessments

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