

**ArtemiS SUITE
 Shape Comparison Module**

Expansion module for analyzing and comparing of deflection shapes

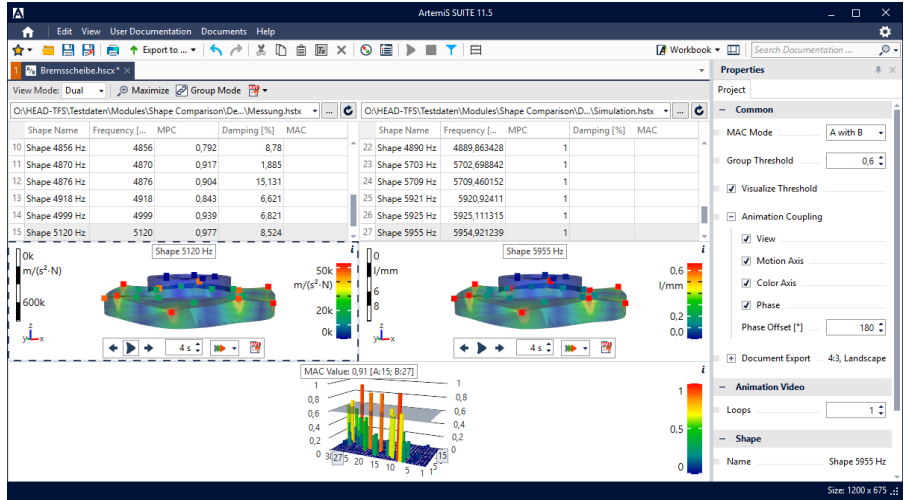
Overview

The Shape Comparison Project can be used for analyzing and comparing deflection shapes. Using this tool, users are able to compare simulations with real measurements, to evaluate component modifications, and much more.

The automatically determined MAC value (Modal Assurance Criterion) allows users to receive information about the similarity of deflection shapes immediately. This information can be used, for example, to assess the quality of a simulation. The group mode is a special feature, which summarizes all similar forms of vibration from both tables, at the push of a button.

Individually configurable 3D bar diagrams are available to display the MAC values. The height of the columns and their colors represent the MAC values.

The animation allows users to observe selected deflection shapes. The dual view mode provides a direct comparison of modal shapes. While comparing shapes, both animations can be coupled. A parameter phase offset is available to compensate according differences.



Features

Applications

- Analyzing and comparing of deflection shapes
- Detailed observation of individual deflection shapes
- Group mode to combine all suitable deflection shapes in a table
- Individual group threshold adjustable

Supported file formats

- Shape Tables, determined by means of the Operating Deflection Shape Project (ASM 40) and the Modal Analysis Project (ASM 42)
- Punch, ANSYS, Abaqus, PERMAS, and UFF files, as well as ME'scope projects

User interface

- Clearly arranged user interface for maximum control and overview (cockpit feeling)

Detection matching deflection shapes (Shape Table)

- Shape Table with specific information and automatically determined MAC index (Modal Assurance Criterion)
- Selecting reference deflection shapes for automatic detection of all matching (similar or identical) deflection shapes

Visual comparison of deflection shapes (MAC matrix)

- Displaying the MAC values of modal Shape Tables in a 3D bar diagram or 2D display
- Dual operating mode for displaying two Shape Tables

3D animation representation

- Animation of the deflection shapes in the model
- Animation coupling (dual view mode)
- Zooming, turning and tilting a model during animation
- Individual control of playback speed and the scaling of the deflection
- Export of results
 - AVI (video)
 - PowerPoint, PDF, image (PNG, JPEG, TIFF, GIF)

Shape Comparison Project

For optimization of components or examination of simulations in comparison to real measurements, deflection shapes have to be analyzed.

For this, the MAC value can be used. The MAC value provides information about differences and similarities, in conjunction with the animation of the deflection shapes.

Shape Table and MAC index

Using the Shape Table, users receive the MAC values for each deflection shape in addition to the frequency, the MPC value (Modal Phase Collinearity), and the damping. A characteristic value between 0 and 1 is calculated, with a MAC value of 1 being very similar and 0 being very unlike. All deflection shapes that are similar to the reference deflection shape (value close to 1) are automatically identified.

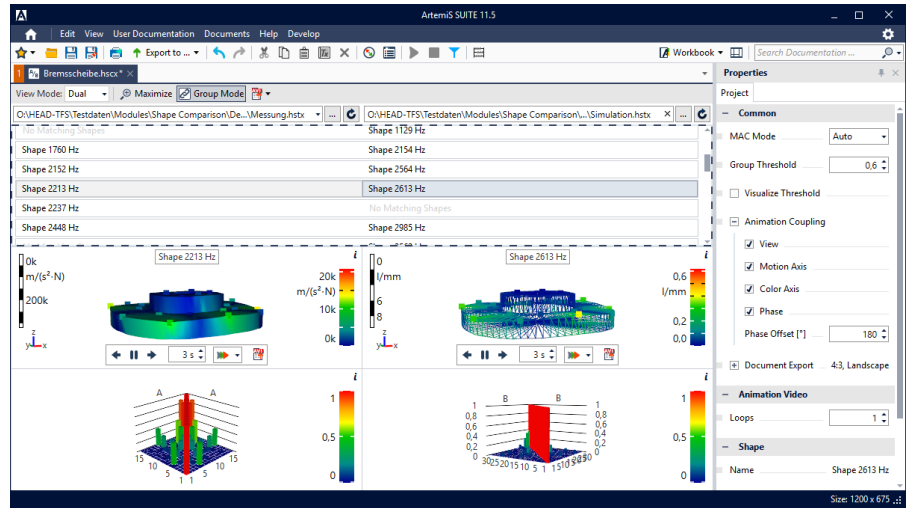
MAC Matrix (3D bar diagram)

By default, the bar diagram shows the MAC values of all possible comparisons between the deflection shapes. The MAC values are represented by the height of the bars and their color. Via the context menu, different color representations are available whereby the selected color scale is shown on the right side.

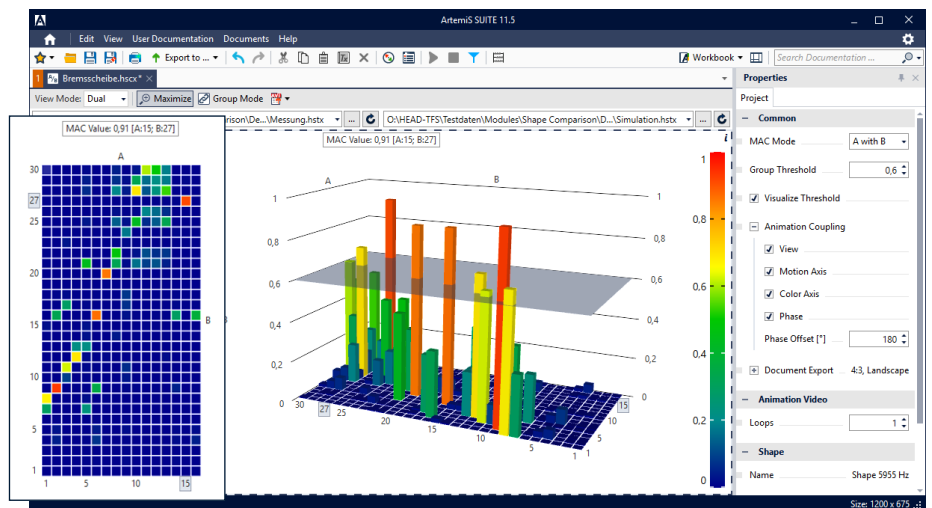
To calculate the MAC matrix between the two Shape Tables, at least one common measurement point must be included.

3D animation representation

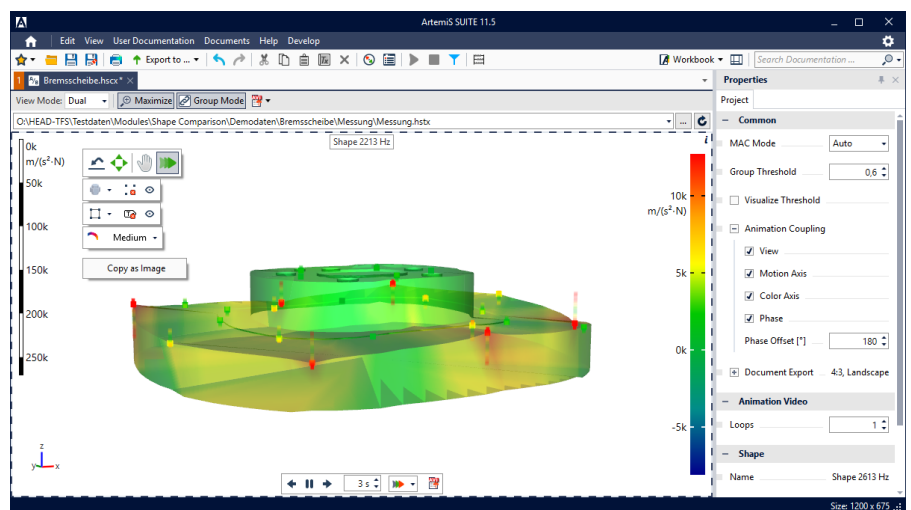
The animation shows oscillation patterns of the object and enables a more detailed examination. A sine oscillation is used for animation, whereby the position of each measurement point results from its amplitude and phase shift at the selected frequency. Animation speed and the scaling of the deflection can individually be adjusted.



In group mode, all deflection shapes that have a MAC value above the set group threshold are automatically summarized from various tables in a common table. In this way, real measurements (table on the left) can be compared quickly and meaningfully with simulations (table on the right).



In the properties tool window of the bar diagram, users activate the threshold option. As a result, the group threshold value is superimposed as partially transparent layer, which enables relevant MAC values to be grouped optically. A 2D view is optionally available.



Using the 3D animation display, users select in which way the data are visualized. Scaling and colors of the measurement points can be set individually using the two scales on the left and on the right. In addition, the course of the movement of each measurement point can be visualized in the form of a fading trace.

Scope of Supply

- License file:
ArtemiS SUITE Shape Comparison
Module (Code 5041)

Requirements: Modules

- ArtemiS SUITE Basic Framework
(Code 5000)

Recommended: Modules

- ArtemiS SUITE Operating Deflection
Shape Analysis Module
(Code 5040)
- ArtemiS SUITE Modal Analysis
Module (Code 5042)

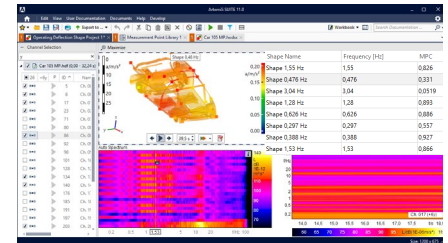
Requirements: Files

- Shape Tables (*.hstx)
- Operating Deflection Shape
Projects (*.hodsx)
- Modal Analysis Projects (*.hmdx)
 - For working with HSTX, HODSX,
and HMDX files, users have to
consider, that the Measurement
Point Library referenced in each
case has to exist at the original
location. It is required as it con-
tains the coordinates of the point
numbers for the representation
and animation as corresponding
three-dimensional Model.
- Punch files (*.pch)
- ANSYS files (*.out)
- Abaqus files (*.dat)
 - for the creation of a compatible
DAT file, the line *NODE PRINT,
NSET=<Set Name> COORD,
U has to be contained in the INP
input file
- PERMAS files (*.dato.gz)
- UFF files (*.uff, *.unv)
- ME'scope projects (*.vtpri)

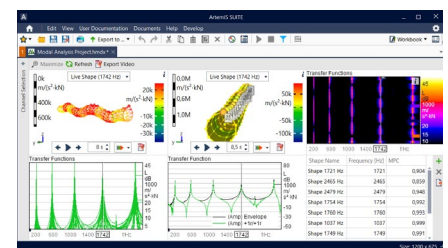
ArtemiS SUITE Tools

- Shape Tables

The Operating Deflection Shape
(ODS) Analysis Project (included in
ASM 40) and the Modal Analysis
Project (included in ASM 42) can be
used to create Shape Tables.



Operating Deflection Shape Project (ASM 40)



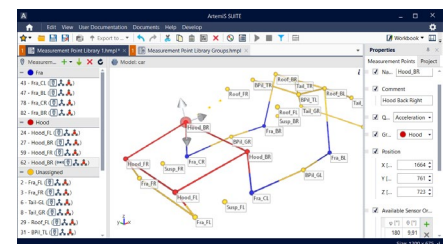
Modal Analysis Project (ASM 42)

- Measurement Point Library

The Measurement Point Library
(included in ASM 00) enables users
to create the grid models required for
ASM 40 and ASM 42. Thus, planning
and performing of real measurements
can be simplified considerably.

It is very easy to construct grid
models. Users select measurement
points, enter the coordinates and
connect the points with lines to a
model. For visual control, zooming,
turning, and tilting etc. the model is
possible at any time.

If a CAD model of the measurement
object is also available, it can be
imported.



Measurement Point Library ASM 00)