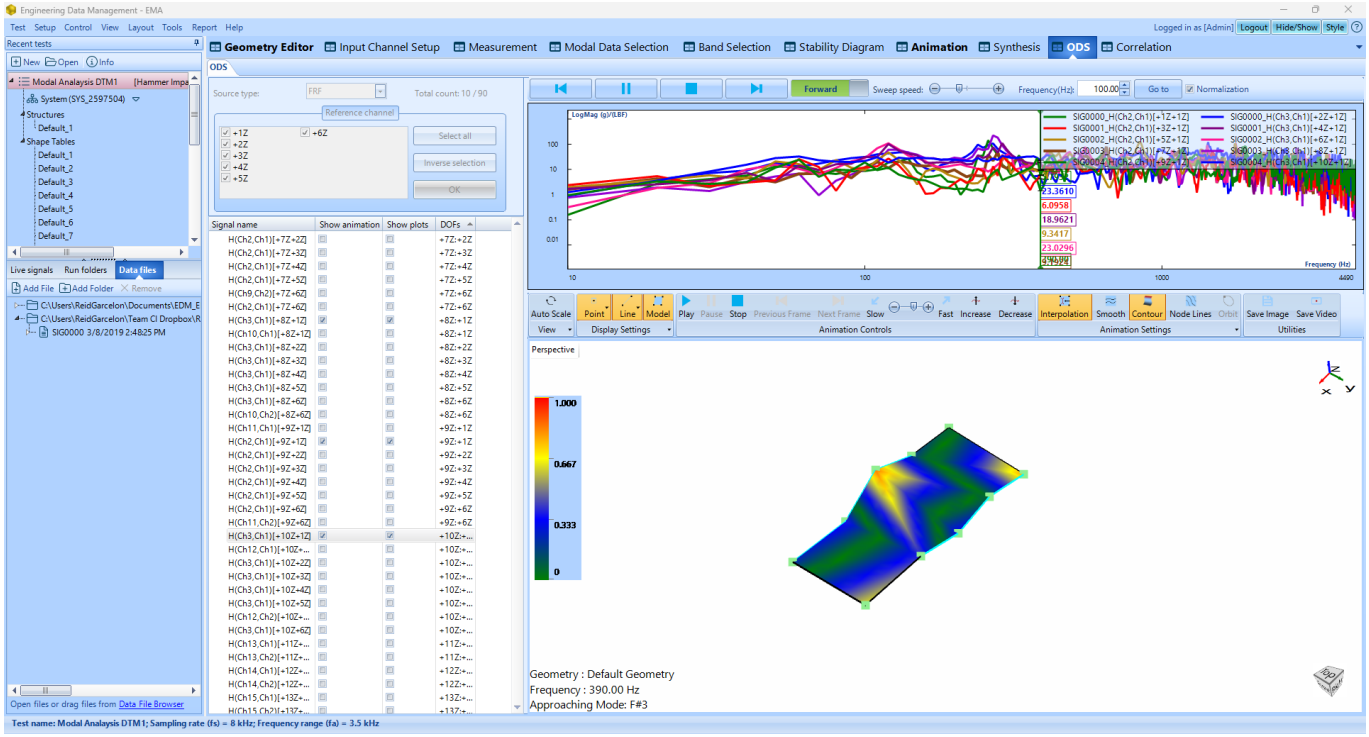
EMA Operational Deflection Shape (ODS)

The **ODS** tab animates how the structure actually moves, directly from the measured signals. You do not need to calculate modes first. Each signal is linked to a point and direction on the geometry model (its DOF), and EDM moves each point by the amount that was measured there.

You can animate the structure in two ways:

- **Over time** (time signals)- The model moves the way it moved during the measurement, sample by sample.
- **At a frequency** (FRFs)- The model shows the deflection pattern at one frequency, for example at a resonance peak.

An ODS is different from a mode shape. A mode shape is a property of the structure that is calculated by curve fitting (see the Animation page). An ODS shows the real motion under the actual operating or test conditions, which can include several modes at once and forced (non-resonant) motion.



Signal list- the signals that can be animated, and which ones are shown.

Chart- the selected signals, with a cursor that marks the time or frequency being animated, and the playback controls.

Geometry view- the 3D model, deflected according to the signals at the cursor position.

Note: You need a geometry model to animate. Create or import it in the **Geometry** tab first. The DOFs of the signals must use the point numbers and directions of the geometry.

Adding Signals

You can add signals to the ODS tab in these ways:

Automatically after a test- Signals saved during an EMA test are added when the test stops.

Open to ODS- Right-click saved signals or recordings in the signal tree, or records in the **Testing Plan**, and click **Open to ODS**.

Testing plan import- When you import a testing plan that has linked records, their signals are added too.

If a signal with the same name is already in the list, EDM asks *"Signals with the same name have been detected. Do you want to overwrite?"* Click **Yes** to replace the old signal, or **No** to keep it and skip the new one.

NOTE: Operational Modal Analysis (OMA) tests use cross-power spectra (CPS) and time signals. Other EMA tests use FRFs and time signals.

Source Type

Source type- Selects which kind of signal to animate. Only the types that are in the list are shown:

Source type	Signals	Animates
Time	Time histories with a fixed time step	Motion over time
Block	Time signals without a fixed time step	Motion over time
FRF	Frequency response functions	Deflection at one frequency
CPS	Cross-power spectra (OMA tests only, in place of FRF)	Deflection at one frequency

Total count shows the number of signals checked for animation and the total number of signals in the list.

Signal List

Each row in the list is one signal:

Column	Description
Signal name	The name of the signal.
Show animation	Select this to use the signal in the 3D animation.
Show plots	Select this to show the signal on the chart. At least one animated signal is always shown on the chart.
DOFs	The point and direction of the signal, for example +2Z or +2Z : -1Z (response : reference). Click the cell to edit it.

Rules for animated signals:

- All the signals selected for **Show animation** must have the same block size, the same

frequency or time resolution, and the same unit as the first selected signal. If a signal does not match, EDM shows *"Cannot add the signal into current animation."*
- Two animated signals cannot have the same DOF. If they do, EDM shows *"Checked signals can not have the same of DOF"*.
- When signals are added, EDM does not select the ones that do not match the others or whose DOF is already used.

Editing a DOF- A DOF must have the format +2X (response only) or +2X:-1Y (response : reference): a sign, a point number, and one direction letter. If the format is not valid, EDM shows *"Invalid input"* and keeps the old value. A new DOF is used in the 3D view the next time you play or step the animation.

Right-Click Menu (Signal List)

Select All Signals- Selects **Show animation** for all the signals.

Inverse Selection- Swaps the selected and cleared signals.

Remove Signal- Removes the highlighted signals from the list.

Remove All Signals- Removes all the signals from the list.

Switch DOFs- (FRF and CPS only) Swaps the response and reference in every DOF, for example +2Z:-1Z becomes -1Z:+2Z.

NOTE: Remove Signal and **Remove All Signals** do not ask for confirmation.

Reference Channel

(FRF and CPS only) When the FRFs were measured with more than one reference, the **Reference channel** list shows each reference DOF. Choose the references to show, then click **OK**:

Select all- Selects all the references.

Inverse selection- Swaps the selected and cleared references.

OK- Applies the selection. The signal list then shows only the signals that use the selected references.

TIP: For a clear ODS from FRFs, animate signals from one reference at a time.

Playing the Animation

A vertical cursor on the chart marks the time or frequency that is shown in the 3D view. Drag the cursor to show the deflection at a different position.

Play or pause animation- Moves the cursor along the chart one point at a time, and updates the 3D view at each point. Click it again to pause. The animation stops at the end of the signal. The signal list cannot be changed while the animation is playing.

Stop animation- Stops the animation and moves the cursor back to the start.

Move back / Move forward- Moves the cursor one point at a time.

Sweep speed- Sets how fast the cursor moves when playing, from 1 (slowest, about 5 seconds per point) to 10 (fastest).

Normalization- (FRF and CPS only) Scales the deflection at each frequency so that the largest motion is the same size. This keeps the animation visible at frequencies where the response is small. Clear it to see the true relative size of the motion at different frequencies.

Frequency(Hz) / Go to- (FRF and CPS only) Type a frequency and click **Go to** to move the cursor to it, for example to a resonance peak.

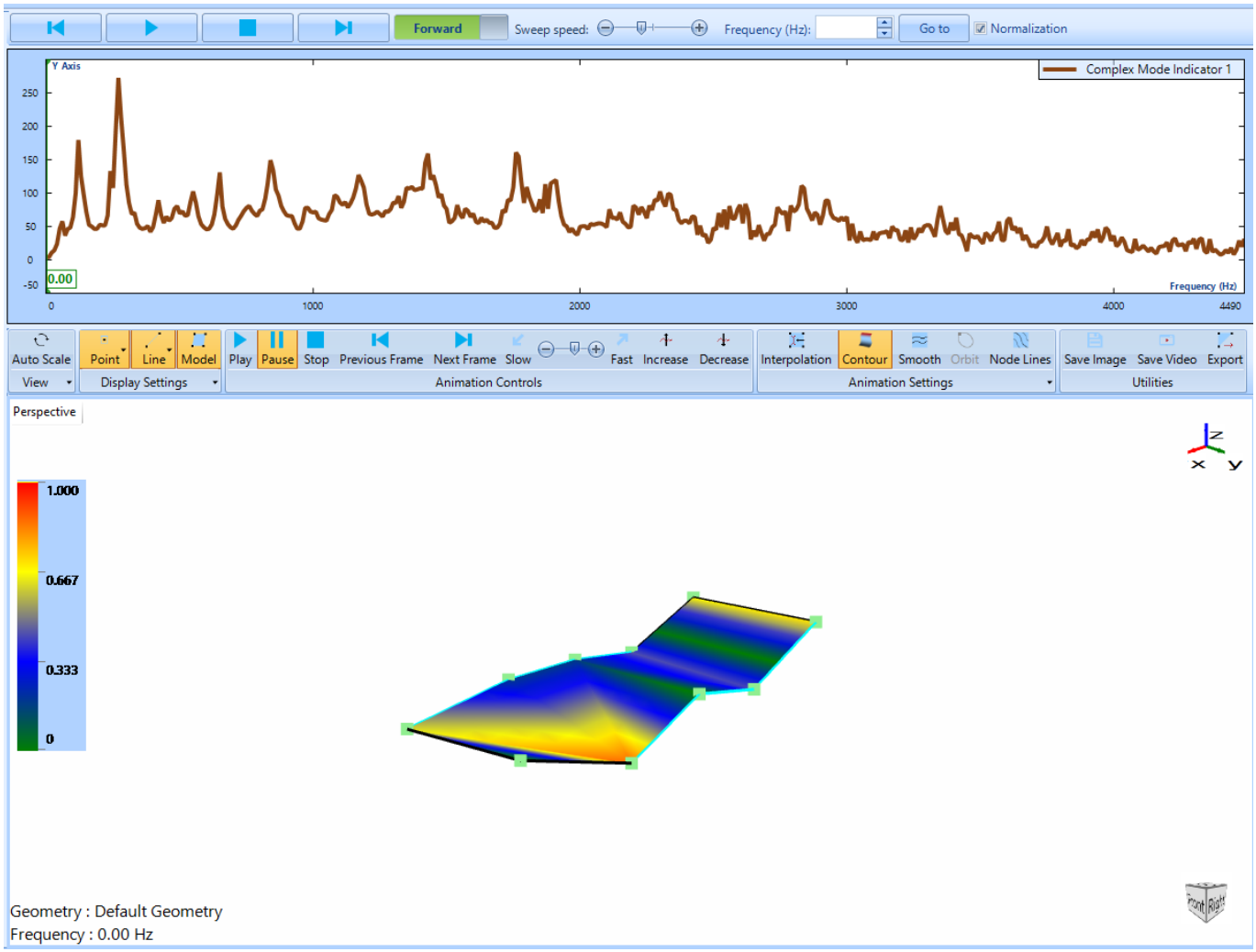
TIP: To see the ODS at a resonance, use **Go to** with the frequency of a peak in the FRF. If a shape has been calculated, compare the ODS with the mode shape at the same frequency in the **Animation** tab.

NOTE: In Time and Block modes, EDM may adjust the playback speed automatically when the signals are loaded, based on the number of signals. Move the **Sweep speed** slider to set the speed again.

Chart Options

Right-click the chart to change how the signals are displayed, for example the axis scales or the display format.

Display MIF- (FRF and CPS only, while the animation is not playing) Replaces the curves on the chart with a mode indicator function calculated from the animated signals: **Complex MIF**, **Real MIF**, **Imaginary Sum**, or **Multivariate MIF**. Use the MIF to find the frequencies of the modes, then use **Go to** to animate them. See the Band Selection page for the differences between the MIF types.



NOTE: Changing the display format of the chart does not change the 3D animation.

FAQs

Why does the model not move?- Check that **Show animation** is selected for some signals, and that their DOFs use point numbers that exist in the geometry.

Why can't I select Show animation for a signal?- The signal does not match the signals that are already selected (block size, resolution, or unit), or another selected signal has the same DOF.

Why is the Reference channel list unavailable?- It is used only for FRF and CPS signals. Change the **Source type** to **FRF** or **CPS**.

Why are the Normalization, Frequency and Go to options unavailable?- They are used only for FRF and CPS signals.

What is the difference between ODS and Animation?- ODS animates the measured motion directly. Animation shows the mode shapes calculated by modal analysis.

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