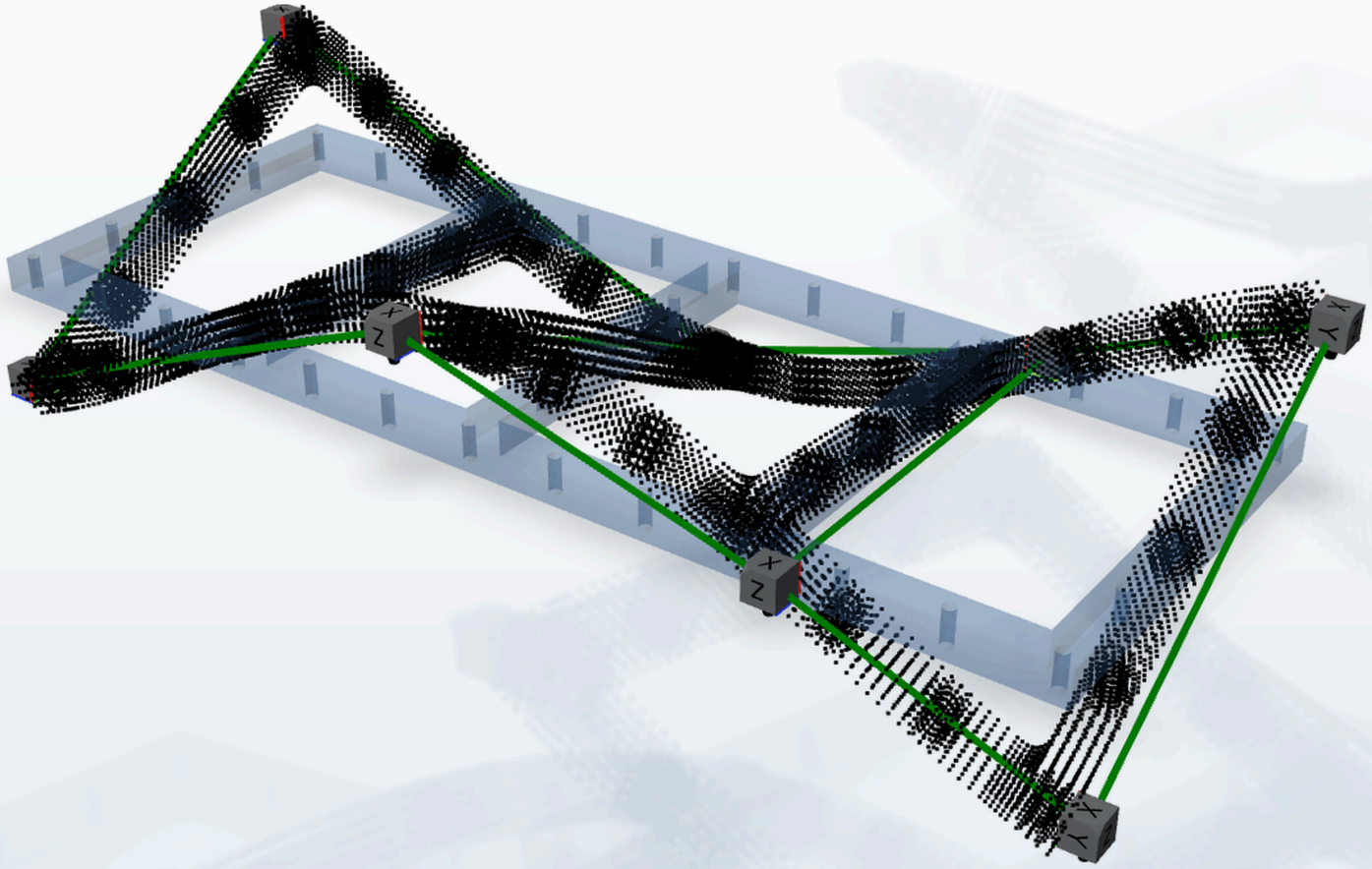


VIBES.technology
engineering good vibrations

MODAL ANALYSIS

Study and validate structures

VALIDATE SIMULATION WITH MEASURED MODES

Modal analysis shows how a structure vibrates: its natural frequencies, damping ratios and mode shapes. DIRAC extracts these from measured FRFs, in a fit that colleagues can reproduce and check. You then compare the results directly with your FE model, in the same project. CAE engineers see where their model is accurate. Teams can base design decisions on validated models, with fewer prototypes and fewer iterations between test and simulation.



...Re-measurements do not occur: real-time feedback, supported by powerful data quality metrics. Intuitive operation and the best interface as far as I know."

- VIBES customer, **NVH engineer at a Japanese OEM** -

COMMON CHALLENGES

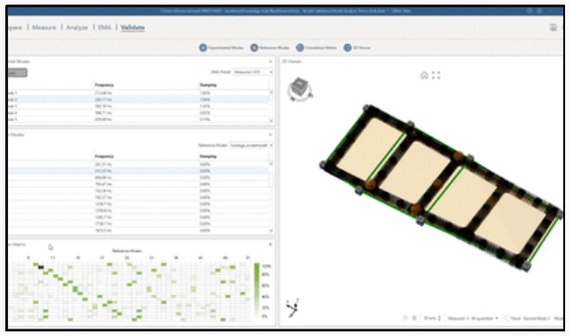
How do you know your FE model is right?

An FE model rests on assumptions about materials, joints and boundary conditions. Without a test to compare with, its predicted natural frequencies and mode shapes can be wrong, and you cannot tell.

How do you find where a structure resonates?

Without its natural frequencies and mode shapes, you cannot tell at which frequencies a structure will vibrate strongly, or where a design change will have effect.

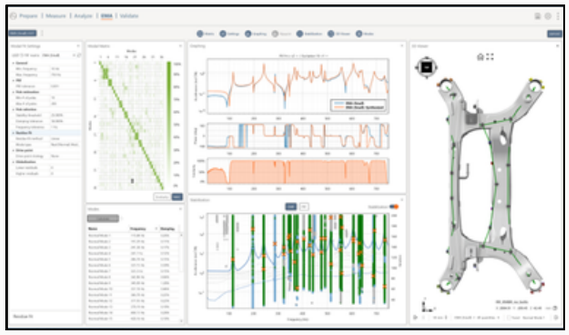
THE WORKFLOWS



EXPERIMENTAL MODAL ANALYSIS

The workflow extracts natural frequencies, damping ratios and mode shapes from measured FRFs. Every choice in the modal model fit stays visible, so colleagues can reproduce and check it. The model flows straight into model validation, without exporting or reformatting data.

Poles are estimated with the Least Squares Complex Frequency-domain (LSCF) method on a Polyreference Frequency-domain (PRF) matrix. DIRAC sets the fit parameters automatically, and you can adjust them. Poles are selected on a stabilization diagram, automatically or by hand. Each mode comes with its MPC, a 3D animation, and similarity and MAC checks.

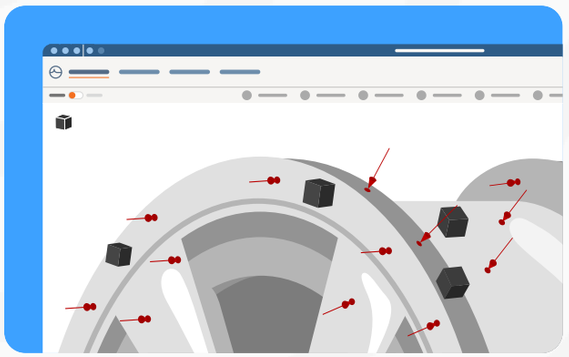


MODEL VALIDATION

The workflow shows CAE engineers where a simulation model is accurate, and which assumptions cause deviations. A validated model can be trusted for design changes, which means fewer prototypes and fewer iterations between test and simulation.

Mode shapes and natural frequencies from your EMA are compared with those of a numerical model, imported as .vib or UFF. The MAC matrix shows which modes match, and how well. Measurement, EMA and validation run in the same DIRAC project, so correlation starts as soon as the test is done.

INSIDE THE SOLUTIONS



DIRAC

MEASURE

DIRAC is VIBES user-friendly FRF testing software with Virtual Point Transformation technology. It enables engineers to measure FRFs of components and full-vehicles and to use the resulting models in many different configurations or for Blocked Force calculations.

EXCITED ABOUT **MODAL ANALYSIS?** GET IN TOUCH FOR A **DEMO**



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