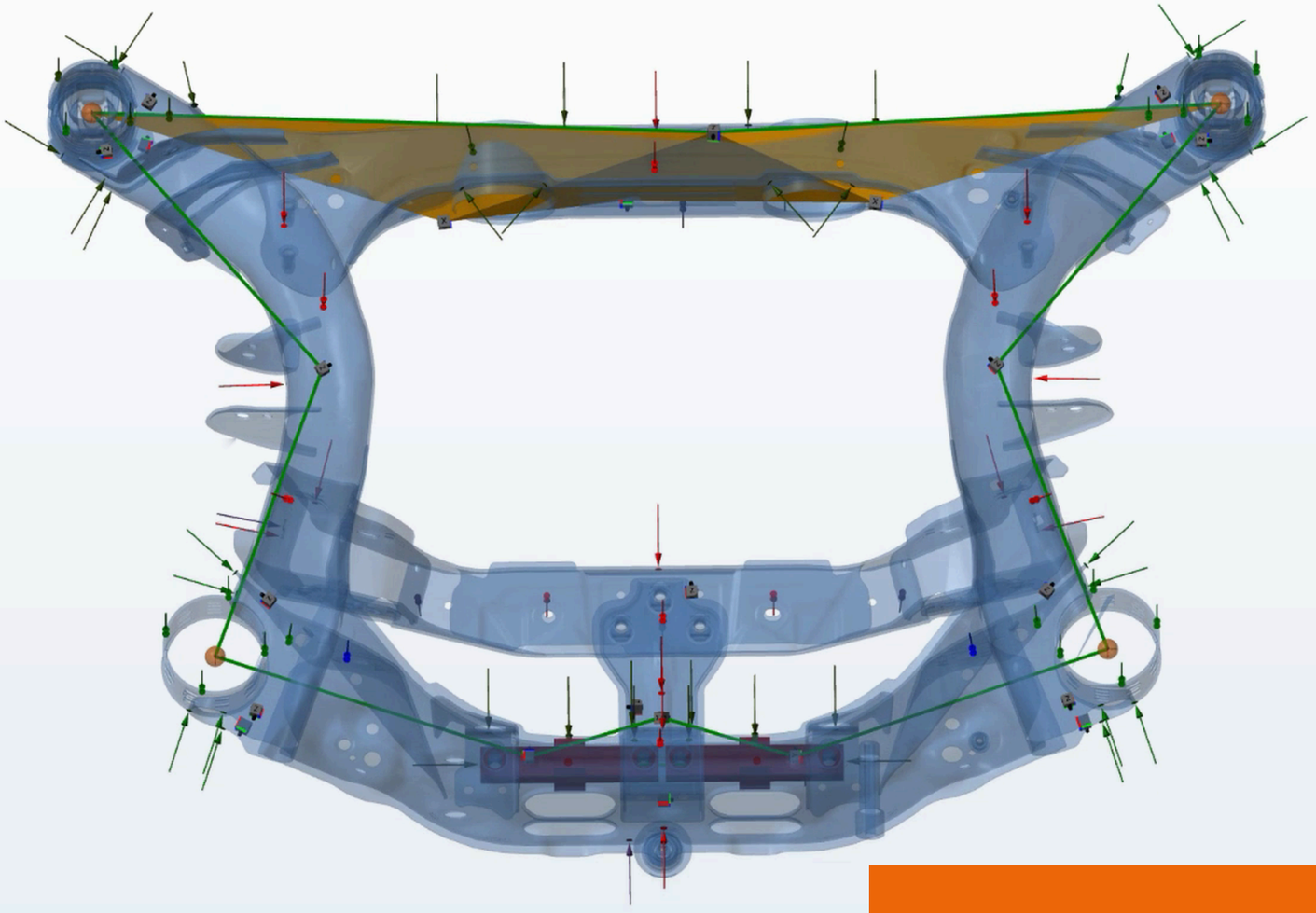


VIBES.technology
engineering good vibrations

TEST-BASED MODELING

Accurate & complete component models

FREQUENCY-RESPONSE MODELS FROM TEST DATA

Test-based Modeling allows for modeling the frequency response behavior of passive components or systems using accurate test data. You can create structural dynamic models with complete interface descriptions, identify robust structural-acoustic transfer functions, and extract mass, center of gravity, and inertia (MCI) properties for subsequent analyses. Furthermore, you can identify accurate 6-DoF dynamic stiffness of rubber mounts and use Hybrid Modular Engineering to combine test-based and numerical models to obtain frequency response functions of complex assemblies.

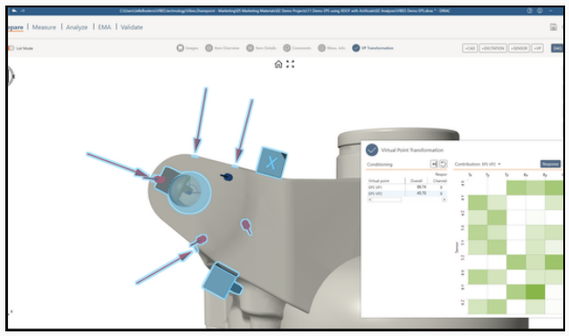
“Re-measurements do not occur: real-time feedback, supported by powerful data quality metrics.”

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

COMMON CHALLENGES

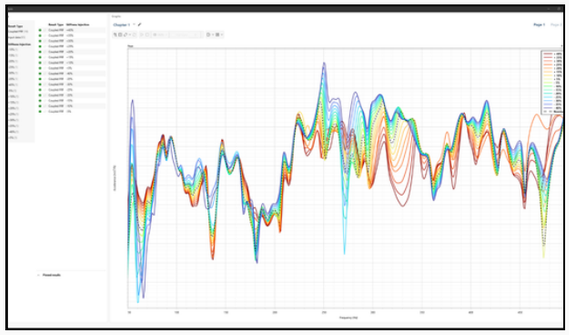
How to avoid errors in an extensive measurement process?	Every manual step, from preparation to evaluation, is a chance for an error to reach the final model. VIBES' Test-based Modeling runs live quality indicators at every step, including sensor layout checks before measuring, so problems are caught during the session instead of weeks later.
How to tell which measurement errors actually matter?	A small error in a badly conditioned measurement can become significant in later stages, while a bigger deviation elsewhere barely matters. Quality indicators such as condition number, coherence and reciprocity show which deviations actually affect the model, so engineers fix what matters instead of guessing.
How to get accurate noise transfer functions when interfaces are hard to reach?	Direct measurements are limited by access to the interfaces, and the faster reciprocal method is hard to combine with virtual points. The workflow applies Virtual Point Transformation to reciprocal measurements, producing NTFs with full six-degree-of-freedom input at every interface.
How to get complete mount stiffness data?	Mounts usually come with static stiffness in three directions only, and conventional test machines can't measure rotations or reach the kHz range. Using VIBES inverse substructuring method, this solution identifies six-degree-of-freedom transfer stiffness into the kHz range with a standard hammer and accelerometers.

THE WORKFLOWS



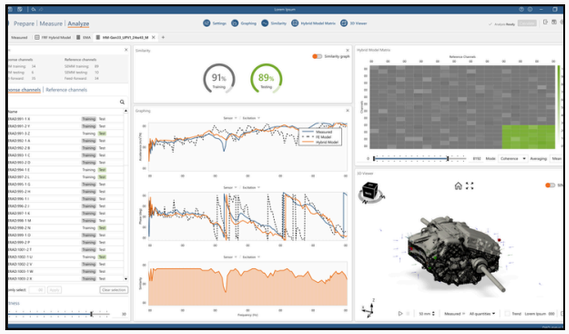
VIRTUAL POINT FRF MODELING

Measured FRFs are transformed to virtual points at each interface, giving a component model with all six degrees of freedom, including rotations that standard sensors can't measure directly. The resulting models are ready for frequency-based substructuring, source characterization and transfer path analysis.



MOUNT STIFFNESS IDENTIFICATION

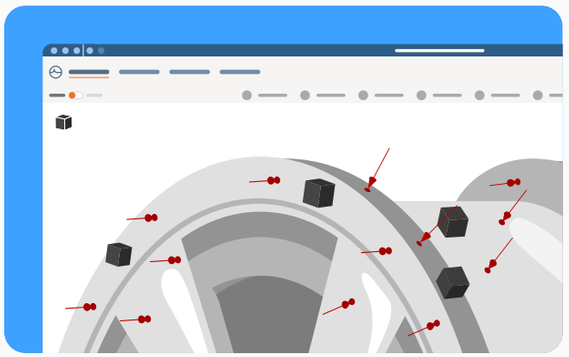
Rubber mounts usually come with static stiffness in three directions only. Using VIBES inverse substructuring method with a standard hammer and accelerometers, this workflow identifies six-degree-of-freedom transfer stiffness into the kilohertz range, including rotations, ready to use as a link model in assembly predictions.



HYBRID MODELING

Hybrid modeling combines a CAE model of a component with FRFs measured on the physical component. The CAE model provides every node and rotational degree of freedom, and the test data provides the real dynamics, giving a complete, accurate component model from far fewer sensors.

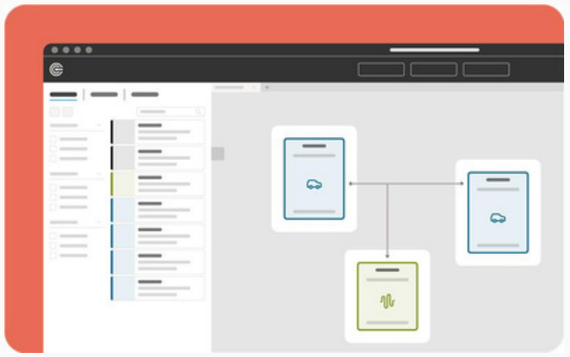
INSIDE THE SOLUTIONS



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.



COUPLE

ASSEMBLE & PREDICT

COUPLE offers you a modular NVH approach where you can easily combine test-based models with models from simulations. Assemble, predict and optimize your NVH design.



EXCITED ABOUT **TEST-BASED MODELING?** GET IN TOUCH FOR A **DEMO**

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