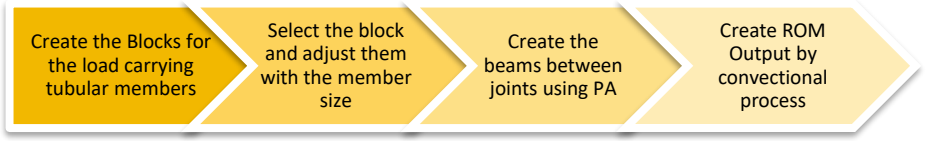
Reduced Order Modelling

DEP MeshWorks | Application Sheet

Automated Reduced Order Modeling simplified the conversion of detailed FE models into high-fidelity, parametric ROMs, enabling faster analysis, up to 50% solver time reduction, and discipline-specific optimization across Crash and NVH applications.



Work Flow - Driven by MeshWorks

Challenges faced in ROM Nastran/Abaqus

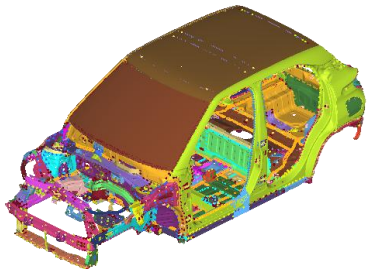
A major challenge in vehicle simulation is the computational intensity and time required to perform full-vehicle analysis, particularly in fast-paced product development environments. Simplifying detailed finite element models into Reduced Order Models (ROMs) while preserving accuracy is essential for effective design iteration and decision-making. Maintaining a strong correlation between the original high-fidelity model and the reduced model is critical, as any discrepancy can compromise simulation reliability and hinder optimization efforts.

The Solution

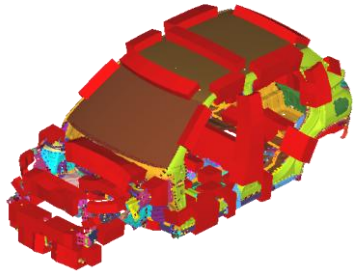
The highly automated Reduced Order Modeling (ROM) module in DEP MeshWorks removes the tedious aspects of ROM creation by converting complex, detailed finite element models into simplified, high-fidelity representations. Leveraging automated structural topology intelligence, it facilitates the creation of 3D-to-1D models, beams, super elements, and more. DEP MeshWorks-enabled ROM process ensures a strong correlation between detailed and reduced-order models.

Value

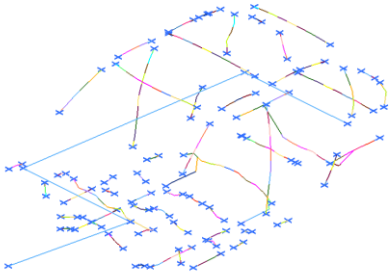
- ROM in DEP MeshWorks enables up to a 50% reduction in analysis solver time, significantly improving CAE turnaround times and accelerating product development cycles.
- ROM models are automatically made parametric by linking geometric cross-sections to beam properties, enabling efficient design modifications.
- Due to the parametric nature of ROMs, subsequent optimizations can be performed rapidly, thanks to substantial solver time reductions.
- ROM supports rapid evaluation of design iterations by simplifying models, allowing engineers to optimize product performance faster.
- ROM modeling criteria vary widely between disciplines such as Crash and NVH; MeshWorks ROM module includes specific tools tailored for each discipline.



Full Vehicle Input Data



Block Created on the full Vehicle



ROM Output