



DEP
MeshWorks



Revolutionizing CAE for
PRECISION. INTELLIGENCE. PERFORMANCE. SUCCESS.

All New MeshWorks 2025

Your Strategic Advantage in the Ever-Evolving World of Product Development

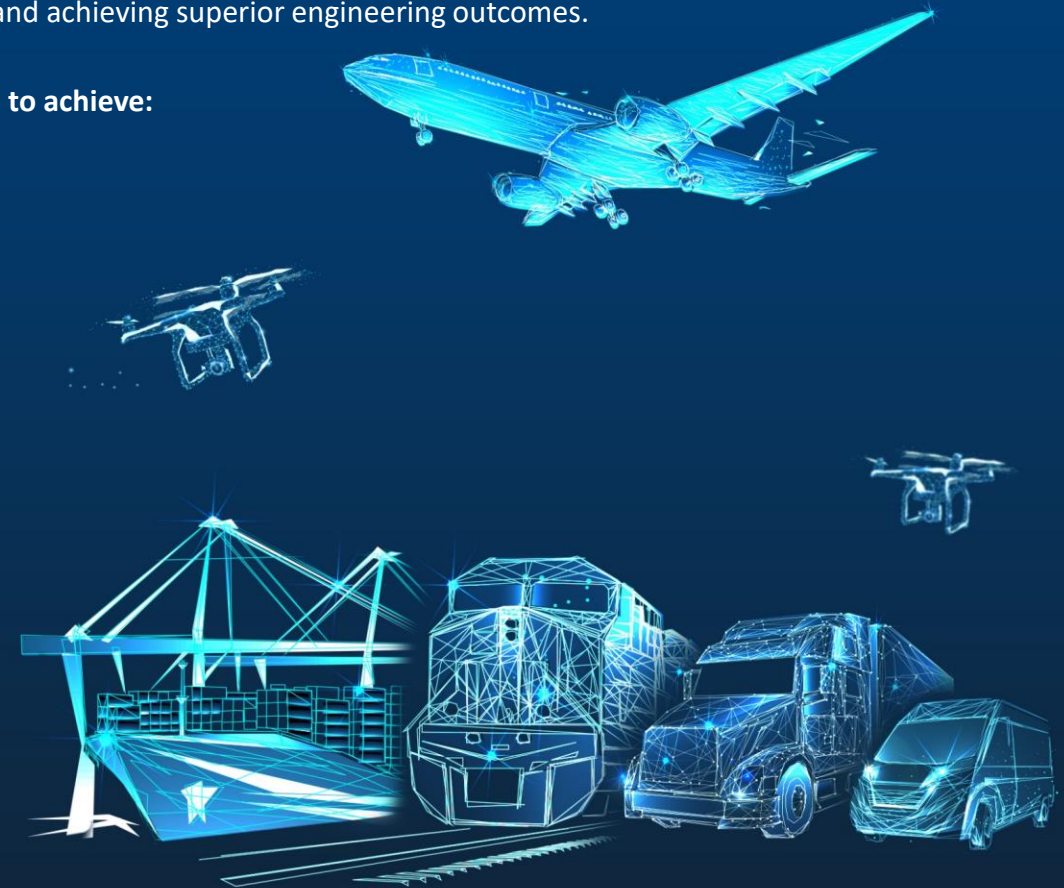
In today's rapidly evolving engineering landscape, staying ahead of the competition is vital. DEP MeshWorks, from Detroit Engineered Products (DEP), is an innovative CAE platform that gives you a competitive edge. With its cutting-edge technology and superior support, MeshWorks is your solution for transforming product development and unlocking new opportunities.

Our latest & feature-rich version, MeshWorks 2025, integrates AI/ML-driven automation, enabling optimized workflows, reduced modelling time, and minimized human error. With lightning-fast concept CAE and CAD model generation, advanced meshing and morphing, and streamlined process automation, MeshWorks accelerates development cycles and ensures faster, more reliable results.

This newer and upgraded MeshWorks leverages advanced algorithms to automate complex tasks, improve simulation accuracy, and drive informed decision-making. AI-powered optimizations enhance product performance, while digital twin technology enables pre-production simulations, reducing costs and enhancing productivity. With DEP MeshWorks, you gain the ultimate solution for accelerating your time to market and achieving superior engineering outcomes.

This enhanced version delivers the full power of CAE directly to your hands, enabling you to achieve:

- **Precision:** With DEP MeshWorks, gain precision in product development through advanced meshing, modelling, and AI-driven automated workflows, reducing development time, enhancing accuracy, and minimizing errors.
- **Intelligence:** Leverage AI/ML-driven automation in MeshWorks to optimize workflows, automate tasks, save engineering time, reduce errors, and enhance simulation intelligence, allowing you to focus on innovation.
- **Performance:** Accelerate product development with MeshWorks' advanced meshing, modelling, and simulation, enabling faster decisions, efficient simulations, and agile design adjustments to meet key targets for weight, cost, and performance.
- **Success:** Maximize ROI and profitability with AI-driven optimizations, digital twin technology for pre-production simulations, and eMOD for rapid electrification model creation, ensuring faster time to market and continuous innovation.

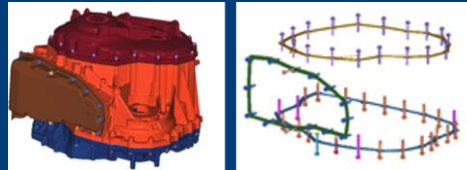


DEP MeshWorks

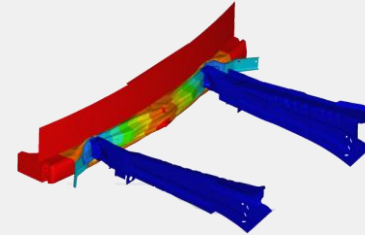
Unlock the New Features



Manufacturing Solutions



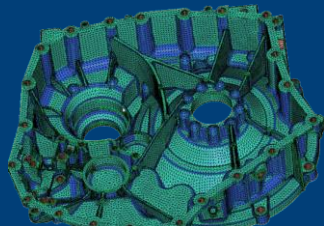
Rapid Model
Building



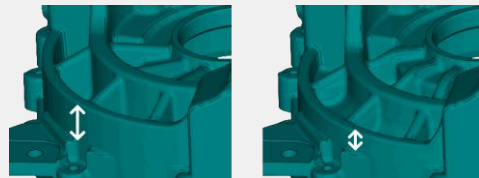
Intelligent AI/ML
CAE framework



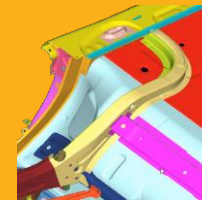
CAE Parameterization



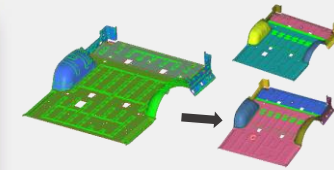
Next-Gen Meshing



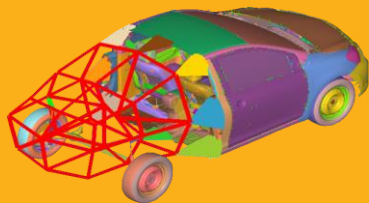
Next generation
CAD/CAE Morphing



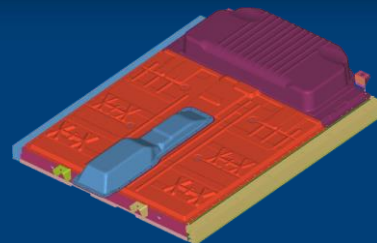
Groundbreaking
Concept Modelling



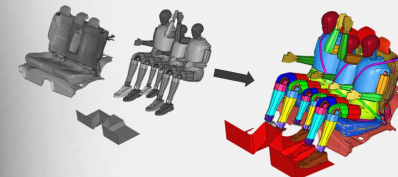
Time Saving MDO



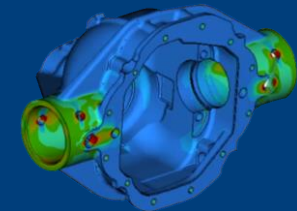
Innovative
ROM Module



Productive
Electrification Module



Highly Automated
Process Workflow



Advanced Post-Processing
Functions

MeshWorks Modules



Next-Gen Meshing: Automated High-Fidelity Meshes from Complex CAD

AI-Powered Meshing, Hassle-Free Workflow

- *Rapid generation of CAD-conforming finite element meshes*
- *Advanced automation minimizes manual user intervention*
- *Template-based workflows ensure repeatable, high-quality mesh output*
- *Supports 2D, 3D, mid-surface, and hexahedral meshing in a unified environment*

RADAR

About Meshing

- The meshing module in MeshWorks provides a complete environment for generating high quality finite element meshes.
- It supports tetrahedral, hexahedral and quadrilateral surface meshing in one platform. With AI driven feature recognition and smart templates, it automates workflows, reduces manual effort and stays fully linked to CAD geometry.
- This allows quick mesh updates after design changes, boosting productivity and adaptability throughout the simulation lifecycle.

DEP MeshWorks Value Proposition



Minimal CAD Cleanup

Mesh directly with minimal CAD preparation, eliminating time-consuming geometry corrections.



High-Speed Mid-Surface Generation

Mid-surface extraction boosts performance by up to 50%, speeding up meshing cycles.



All-in-One Meshing Environment

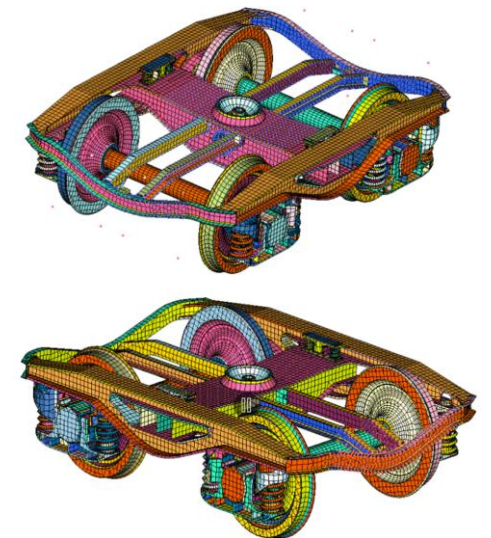
Supports tetra, hexa, plastics, and sheet metal meshing in a single unified framework.



Automated Batch Meshing

Enables system-level meshing via batch processing, ensuring speed and consistency across large assemblies.

Hex Meshing and Parameterization



Features



Advanced CAE Meshing Tools

Quickly create 2D surface and 3D solid meshes (tetrahedral, hexahedral, mid-surface, sheet metal) from complex CAD models.



Automated Mesh Generation

High-level automation reduces dependency on manual CAD cleanup and accelerates mesh creation.



AI-Driven Geometry Recognition

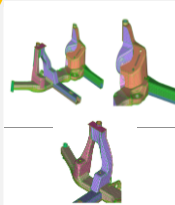
Utilizes AI/ML to maintain geometric fidelity and intelligently handle complex features during meshing.

Meshing Template



Template-Based Control

Apply predefined mesh settings to features like fillets, chamfers, tubes, and machined faces for consistent output.



Batch Meshing Workflow

Automates meshing for full assemblies and subsystems, delivering fast and accurate results with minimal input.



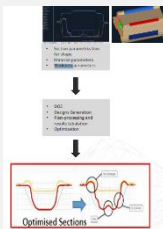
Mid-Surface Extraction Tools

One-click mid-surface creation with precise feature capture and optimal mesh flow.



Automated Mesh Repair

Identifies and corrects over 50% of common mesh defects in a single pass, improving model readiness.



Flexible Thickness Application

Apply thickness data using automated strategies, including intelligent recognition of ribbed and complex sections.



Streamlined Meshing Workflow

Offers end-to-end meshing efficiency, reducing turnaround time while ensuring mesh quality and consistency.

Reduced CAD Dependency

Minimizes the need for geometry corrections, enabling direct meshing from raw CAD.



High-Quality Element Output

Generates superior mesh quality, enhancing simulation reliability and reducing rework.



DEP
MeshWorks
— Uniqueness —

Unified Platform Coverage

Supports all common meshing needs—tetrahedral, hexahedral, mid-plane, plastics, and sheet metal—within a single tool.



Cost and Time Savings

Eliminates the need for multiple meshing tools, lowering overhead and accelerating the development cycle.



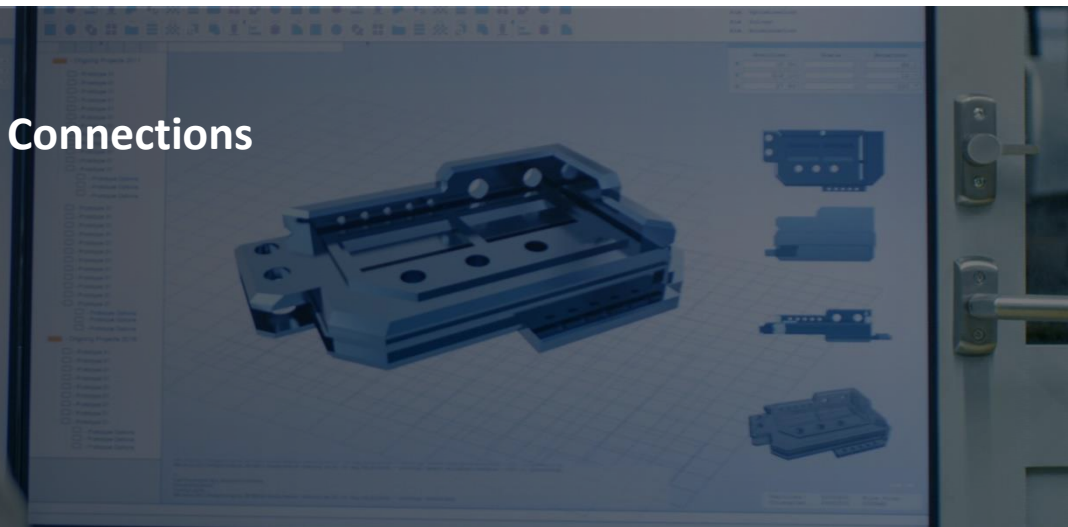
MeshWorks Modules



Rapid Model Building: Automated Tools for Complex Model Connections

Speed, Precision, Automation

- Fully automated creation of 1D and 3D bolts across entire assemblies
- Interactive definition of connectors including welds, bolts, and adhesives
- Automatic contact generation between component interfaces
- Rapid assignment of loads and boundary conditions for complete FE models



About Modelling

- Engineered specifically for CAE users, this module streamlines the assembly of multi-component finite element models with minimal user input and advanced automation.
- It allows for the rapid application of loads, boundary conditions, and connector definitions without the need for manual scripting.
- This approach significantly boosts the efficiency of CAE workflows while maintaining high levels of accuracy and consistency in generating simulation-ready assemblies.

DEP MeshWorks Value Proposition



Unified Assembly Setup

Generate bolts, contacts, and pre-tensions in one workflow to speed-up full-assembly preparation.



Cost-Efficient Connector Optimization

Parametric weld and adhesive control, reduces weld count and material use while maintaining performance.



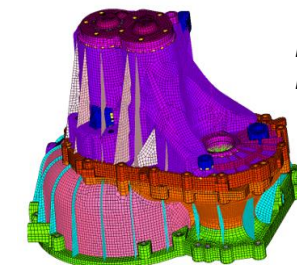
Time-Saving Automation

Achieve up to 60% reduction in modelling time through automated workflows and intuitive user interfaces.

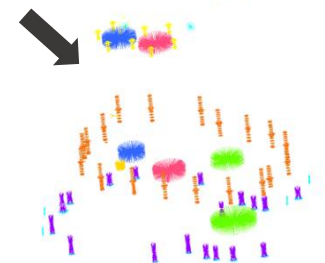


High-Fidelity Connection Modelling

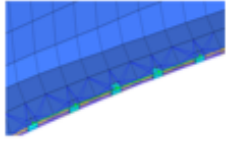
Advanced features like Heat-Affected Zone (HAZ) modelling enable highly accurate structural and crash simulations.



Highly Automated Model Assembly

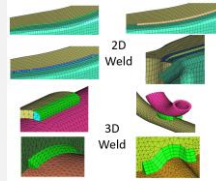


Features



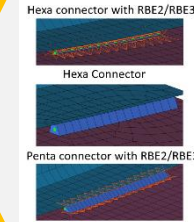
Automated Spot Weld Creation

Generates spot welds with correct material, location, and property definitions for Crash, NVH, and Durability simulations.



Seam Weld Generation Tools

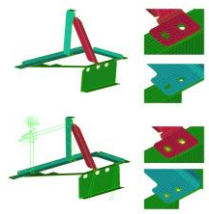
Supports shell, solid, beam, and hybrid seam weld types with automated placement and alignment.



Adhesive Automation

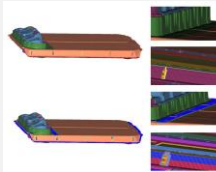
Defines hexa/penta adhesive connectors using RBE2/RBE3 elements, with auto material and solver setup.

Modelling



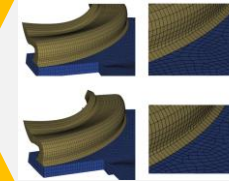
Bolt Modelling Utilities

Quickly creates 1D/3D bolt connectors with automatic pre-tension and contact definition.



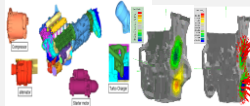
Contact Auto-Detection

Automatically detects contact surfaces and defines contact pairs across complex assemblies.



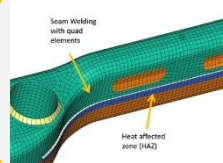
Solid Fuse Functionality

Merges solid components with proper nodal connectivity, ensuring accurate mesh behavior at interfaces.



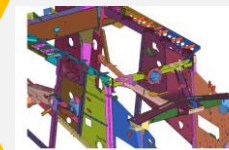
Discipline-Specific Connector Adaptation

Automatically adjusts connector definitions based on target simulation domains such as Crash or NVH.



HAZ (Heat Affected Zone) Modelling

Enables detailed modelling of thermal effects in weld regions for both sheet metal and solid structures.



Assembly-Level Parameterization

Allows grouped parameter control of connectors, bosses, and associated features for efficient design variation studies.

Automated Bolt Generation Across Assemblies

Quickly generate 3D bolts and associated contact conditions—even when bolt geometry is absent from the CAD model.



Full Assembly Parameterization

Enable parameter-driven modelling of connectors and related features at the assembly level for scalable design studies.



DEP
MeshWorks
— Uniqueness —

Discipline-Aware Conversion

Automatically switch connector configurations based on simulation type (Crash, NVH, etc.) to maintain accuracy.



Advanced Connector Modelling Capabilities

Incorporates detailed connection features such as HAZ and fused solids to support high-resolution simulation requirements.



MeshWorks Modules



AI/ML CAE framework: Data-Driven Prediction with Physics-Based Reliability

Smarter Designs Through AI and ML Integration

- *Adaptive algorithms trained on customer-specific datasets*
- *Physics-informed models governed by physical laws*
- *Auto-parameterization links geometry with performance targets*
- *Generative AI produces feasible designs within defined constraints*

About AI/ML Framework

- MeshWorks AI/ML module is a flexible framework combining neural networks (CNN, PINN, UNET, GNN), encoders/decoders, genetic algorithms, and approximation models.
- These models can be continuously trained using customer-specific datasets to generate rapid, reliable, and customized design insights.
- The system blends data-driven intelligence with physics-based constraints to deliver actionable outcomes tailored to real-world engineering challenges.

DEP MeshWorks Value Proposition



AI-Guided Early-Stage Design

MeshWorks' AI advisors aid concept design, boosting efficiency and decisions.



High Predictive Accuracy

AI/ML models improve reliability across simulations.



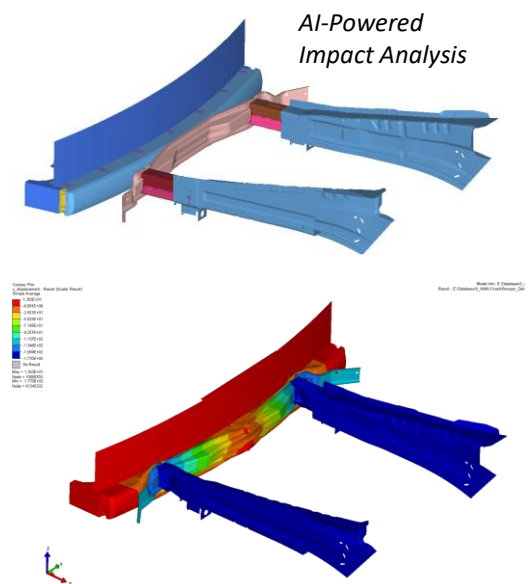
Augmented Dataset Creation

CAE integration generates large datasets for data-scarce cases.



Accelerated Iterations Cycles

AI cuts design cycles, enabling faster optimized solutions.



Features



AI/ML Project Setup

Supports the creation of new or existing projects using a range of neural network architectures including CNN and GNN.



Multi-Set Management

Allows users to generate and manage multiple model sets to support comparative learning and testing.



Training Data Preparation

Automates the creation of essential MeshWorks input files (ET, EL, MWPlot) required for AI/ML training.



Training File Consolidation

Merges multiple input files into a unified dataset, streamlining the training process.



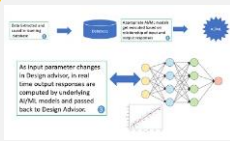
Model Training Utility

Utilizes consolidated files and input hyperparameters to train selected AI/ML models efficiently.



Predictive Capability

Post-training, the model accurately forecasts simulation results for the design under evaluation.



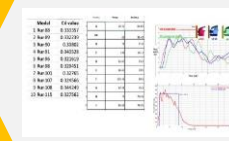
Parameter Library Generation

Automatically captures and stores component-wise model parameters for quick reference and reuse.



Generative Geometry Creation

AI algorithms synthesize production-ready geometries from initial design inputs, supporting rapid concept development.



Comprehensive Output Prediction

Delivers predictions across scalar, vector, tensor, temporal, and matrix data, enabling full-spectrum CAE insights.

Physics-Integrated Machine Learning

Combines traditional ML with physics-based modelling to improve the realism and reliability of predictions.



Rapid Design Evaluation

Enables quick assessments and informed decision-making during time-constrained development cycles.



DEP
MeshWorks
— Uniqueness —

Model-to-Task Matching

Selects and applies the most suitable AI/ML architecture based on the specific application or domain objective.



Production-Ready Design Output

Transforms early-stage concepts into manufacturable designs, guided by AI-generated geometry and performance constraints



MeshWorks Modules



Meshing



Modelling



AI/ML



Digital Twin



CAE Parameterization



CAD/CAE Morphing



ConceptWorks



MDO



ROM



eMOD



Process Automation



Post Processing

Digital Twin: Efficient Manufacturing Solutions

Effective transfer of scan data into a 3D model

- *AI-driven mesh generation from scanned or digitized data*
- *Applied across the entire product lifecycle using intelligent automation*
- *Morphs mesh to scan data with auto-alignment of geometric features*
- *Generates midsurface and volume meshes with enhanced mesh quality*

About Digital Twin

- The morphing module in MeshWorks enables engineers to rapidly reshape and adapt existing FE and CFD models using feature-based deformation techniques.
- It eliminates the need for manual setup of morphing zones, offering intuitive region selection for localized or full-system adjustments.
- Globally recognized in CAE morphing, MeshWorks delivers efficient, precise solutions that streamline design updates while maintaining performance and mesh quality.

DEP MeshWorks Value Proposition



Manufacturing-Focused Design Optimization

Optimize parts, tools, and workflows for manufacturability and assembly.



Automated Deformation Compensation

Correct warpage and spring-back issues automatically.



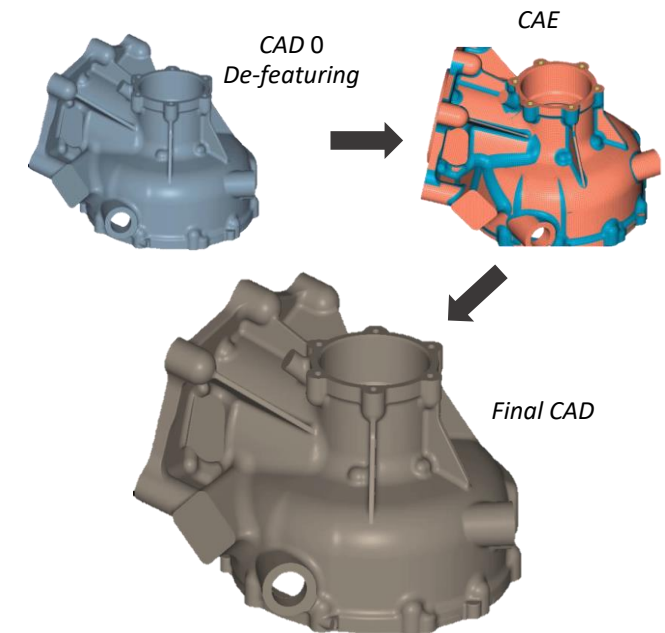
Instant AI-Powered Simulation

Apply real-time AI simulation updates after design changes.

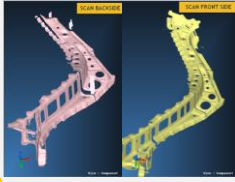


Intelligent Morphing Capabilities

Convert scans into accurate models using AI-guided morphing.

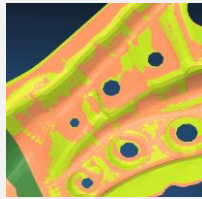


Features



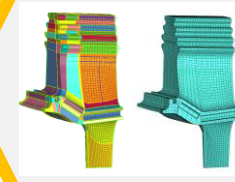
Scan-to-Mesh Conversion

Converts digitized scan data into mesh-ready models using robust morphing tools.



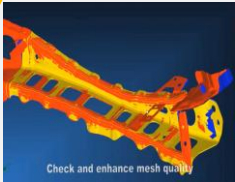
Automated Feature Alignment

AI algorithms automatically align scanned geometry with nominal CAD or mesh models.



Midsurface and Solid Mesh Generation

Generates both midsurface and 3D volume meshes with precision for downstream analysis.



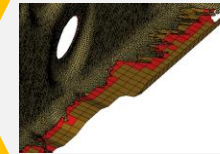
Mesh Quality Enhancement

Improves element quality and mesh fidelity, increasing simulation accuracy and reliability.



Nominal vs Actual Model Comparison

Enables direct comparison of scanned and nominal models to evaluate manufacturing deviations.



Deformation Compensation Tools

Adjusts FE models for anticipated warpage and spring-back in forming or tooling processes.



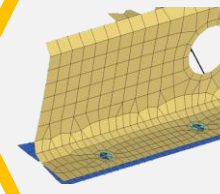
DOE-Based Optimization Support

Integrates Design of Experiments (DOE) techniques for systematic part and tool improvements



AI/ML Integration

Interfaces with MeshWorks AI/ML modules to enable predictive corrections and learning-based optimization.



Support for Assembly Components

Capable of handling entire assemblies in morphing workflows.

Automated Morphing of Scan Data

Automatically morphs full FE models to align with scanned part data, minimizing manual intervention.



Intelligent Surface Detection

Recognizes target surfaces accurately—even in the presence of scan noise or surface irregularities.



DEP
MeshWorks
— Uniqueness —

Assembly Morphing with Gap Preservation

Maintains precise part spacing and stack-up order during full-assembly morphing operations.



Feature-Aware Mesh Alignment

Detects and aligns slots, holes, and circular features based on their center geometry, ensuring high-precision morphing.



MeshWorks Modules



CAE Parameterization: Streamlined Modelling for Rapid Design Changes

Robust parameters enable fast & easy design modifications

- Enables comprehensive CAE model parameterization for rapid design iteration
- Automates the creation of parametric CAE models across disciplines
- Integrates with AI/ML and Reduced Order Modelling (ROM) workflows
- Supports seamless connectivity with Multi-Disciplinary Optimization (MDO) processes

About CAE Parameterization

- MeshWorks provides a powerful platform for full-spectrum CAE model parameterization, enabling engineers to convert conventional FE/CFD models into flexible, intelligent parametric models.
- Supporting crash, NVH, durability, and more, the module empowers users to run optimization studies, manage configuration changes, and accelerate virtual validation.
- The platform integrates directly with ROM and AI/ML frameworks to streamline optimization and design space exploration.



Broadened Design Exploration

MeshWorks' wide parameterization options enable deeper cross-domain design trade-off studies.



Optimized Weight Reduction

Improves weight and performance by combining geometry tuning with multi-objective optimization.



ROM-Accelerated Optimization

Integrates parametric Reduced Order Models to cut iteration time without losing accuracy.

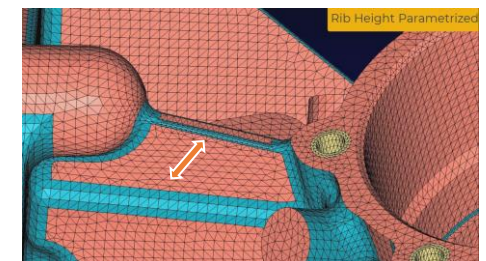
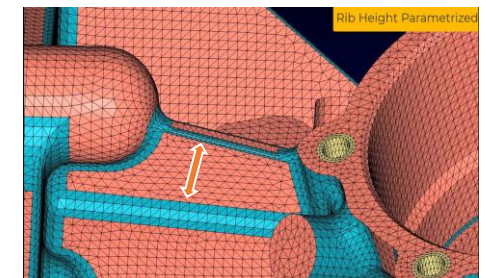


Fast, Scalable Iterations

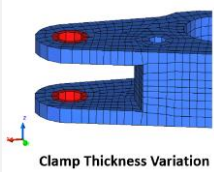
Quickly apply design updates with easy parameter setup and automated mesh regeneration.

DEP MeshWorks Value Proposition

Parameterization

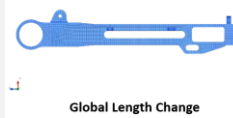


Features



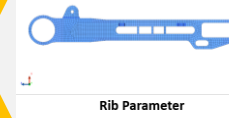
Gauge Parameters

Control material thickness variations across components for lightweighting and structural tuning.



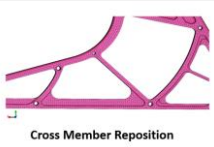
Shape & Section Parameters

Adjust beam profiles, cross-sectional dimensions, and contour curves for geometry-driven performance changes.



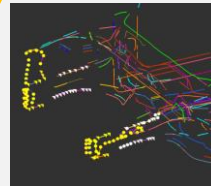
Feature-Based Parameters

Manage locations and counts of design features like ribs, holes, slots, and stiffeners.



Topology Parameterization

Modify part topology, relocate members, and apply structural layout changes automatically.



Connector & Weld Parameters

Parameterize seam spacing, pitch, adhesive lengths, and spot locations for detailed joint optimization.



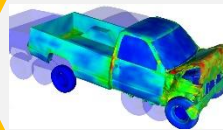
Mesh Rebuild Automation

Automatically remesh affected areas after parameter changes while maintaining mesh quality constraints.



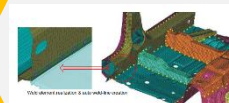
Part Toggle Parameters

Enable toggling of parts, foam, or design alternates for configuration and variant studies.



Multi-Domain Parameterization

Simultaneously manage parameters across crash, NVH, safety, and durability for cohesive system optimization.



Tailor Weld Line Control

Define cut-line location for tailor-welded blanks, controlling material distribution at a localized level.

Extensive Parameter Coverage

Offers the broadest parameter library in CAE, supporting geometry, connections, topology, and part toggling.



Rapid Parameter Creation

Intuitive tools simplify the definition and editing of parameters, even in large models.



DEP
MeshWorks
— Uniqueness —

Detail-Oriented Parametric Control

Supports stack-ups, weld sequencing, and complex interdependencies for high-fidelity modelling.



Integrated Multi-Domain Optimization

Links parameters across simulations for accurate and synchronized design studies across full product systems.



MeshWorks Modules



CAD/CAE Morphing: Advanced Tools for Rapid Design Adaptation

Reshape Models with Full Control & Precision

- *Advanced, feature-based FE/CFD morphing*
- *No manual setup for control zones*
- *Preserves assembly stack-ups and connectors*
- *Localized reshaping with cross-section control*

About CAD/CAE Morphing

- The morphing module in MeshWorks enables engineers to rapidly reshape and adapt existing FE and CFD models using feature-based deformation techniques.
- It eliminates the need for manual setup of morphing zones, offering intuitive region selection for localized or full-system adjustments.
- Globally recognized in CAE morphing, MeshWorks delivers efficient, precise solutions that streamline design updates while maintaining performance and mesh quality.

DEP MeshWorks Value Proposition



Intuitive, Clay-Like Flexibility

Sculpt models freely with fast, intuitive iterations.



No Setup Required

Perform complex morphs instantly—no predefined zones required.



High-Fidelity Transformation

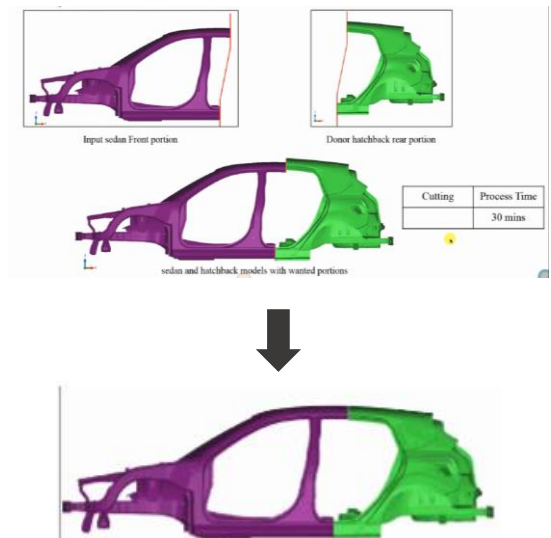
Achieve up to 0.01 mm accuracy for perfect alignment.



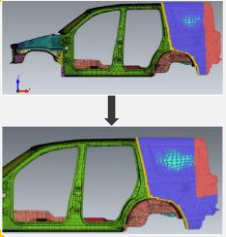
Streamlined User Experience

Simple UI enables quick learning and high productivity.

Morphing Technology

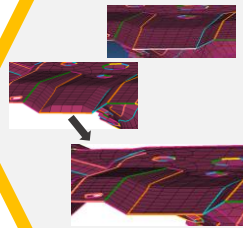


Features



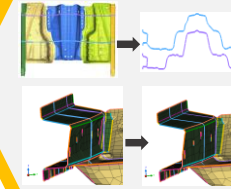
Control Block Morphing

Apply both low- and high-order deformation blocks to modify local or global shapes efficiently.



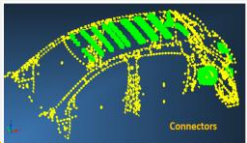
Freeform Morphing

Sculpt surfaces and features directly at the mesh level for advanced shape control without CAD.



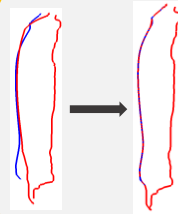
Pattern & Section Morphing

Replicate deformations across symmetric sections or repeated features for consistent updates.



Connector Preservation

Automatically maintains bolts, welds, and adhesives during mesh deformation to retain assembly integrity.



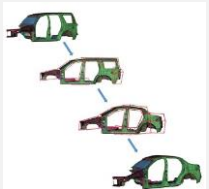
Precision Matching

Aligns model geometry to scanned or target shapes with accuracy within hundredths of a millimeter.



Automated Remeshing and Rewelding

Meshes morphed regions and regenerates connections like spot welds, bolts, and adhesives automatically.



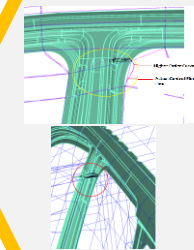
Feature-Based Morphing

Morph using only key feature lines and surfaces for localized, constraint-driven deformation.



CAD/CAE Interoperability

Supports both mesh- and CAD-based morphing; also enables reverse CAD generation from mesh data.



Constraint-Controlled Deformation

Maintains part features such as hole diameters, beam straightness, and part outlines during shape changes.

Zero-Zone Setup

Morph models directly without defining fixed or deformable zones, significantly reducing prep time.



Direct Region Morphing

Users can intuitively select and deform specific regions while maintaining design constraints.



DEP
MeshWorks
— Uniqueness —

Preservation of Key Features

Retains cross-sections, hole sizes, and assembly-level stack-up during morphing operations.



Micron-Level Precision

Delivers unmatched deformation accuracy up to 0.01 mm for high-fidelity results.



MeshWorks Modules



ConceptWorks: Simplified CAE Design with Minimal Training

Directly Create Concept FE Model Without CAD

- Enables direct CAE model creation without reliance on CAD
- Incorporates manufacturing feasibility into early-stage concept models
- Automates 1D-to-3D structural model generation
- Powered by patented technology ensuring unique capabilities

About ConceptWorks

- ConceptWorks, a specialized module within MeshWorks, empowers CAE engineers—regardless of CAD expertise—to rapidly develop and refine structural design concepts directly at the mesh level.
- By eliminating the dependency on traditional CAD workflows, ConceptWorks accelerates early-phase design iterations, allowing users to model and optimize structural members, joints, and components quickly and efficiently, ultimately reducing development time and cost.

DEP MeshWorks Value Proposition



Accelerated Concept Design

Enable quick design changes in CAE with reduced CAD dependency.



Integrated Design & Analysis

Seamlessly connect ideation to simulation for faster development.



Time & Cost Reduction

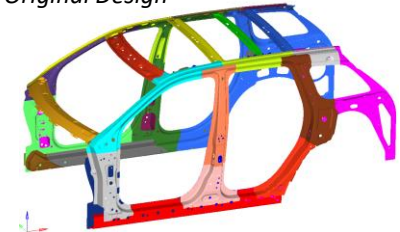
Cut modelling time by up to 70%, reducing lead time.



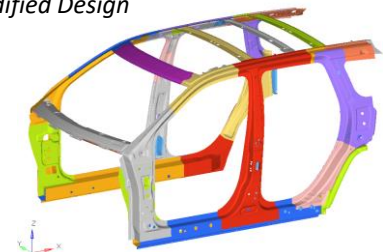
Multi-Domain Applicability

Supports sheet metal, castings, plastics, and more across industries.

Original Design



Modified Design

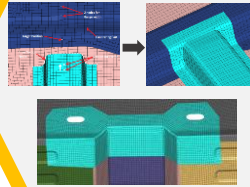


Features



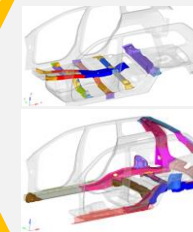
Parametric Member Creation

Generates structural members using predefined or custom sections with full parametric control for quick adaptability.



Automated Joint Modelling

Creates standard or custom joints with minimal user input, ensuring mesh continuity and compatibility.



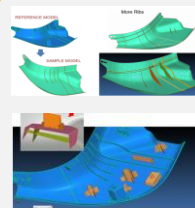
Internal Structures Generation

Automates the creation of components like roof rails and cross-members with accurate, mesh-ready geometry.



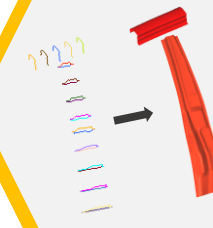
IC to EV Model Transformation

Supports full model conversion from internal combustion to electric vehicle architectures without CAD dependency.



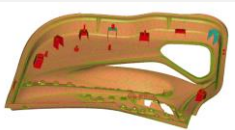
CAD-Free Mesh Editing Tools

Enables direct editing of meshes for processes such as forming, casting, molding, extrusion, and additive manufacturing.



Topology-Based Sketching

Utilizes 1D parametric sketches to quickly generate structural layouts, removing the need for CAD-driven sketches.



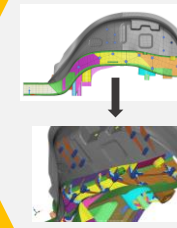
Auto Feature Integration

Automatically inserts design features like fillets, ribs, and holes to enhance model fidelity with minimal input.



Assembly-Level Concept Modelling

Supports full assemblies with part interaction definitions, connectors, and interface modelling at the concept stage.



Direct FE Model Creation

Builds finite element models using inputs like sections and trajectories, bypassing traditional CAD-based workflows.

CAD-Free Finite Element Modelling

Allows complete FE model creation and editing without the need for CAD input—a groundbreaking industry innovation.



Built-In Manufacturing Feasibility

Supports downstream processes such as casting, sheet metal forming, molding, extrusion, and additive manufacturing.



DEP
MeshWorks
— Uniqueness —



Patented Innovation Status

Backed by proprietary, patented methods—offering unique and unmatched modelling capabilities.



Accelerated Full Vehicle Modelling

Enables the creation of complete vehicle FE models up to five times faster than conventional workflows.

MeshWorks Modules



Multi-Disciplinary Optimization: Streamlined Design via Parametric DOE Studies

Time & Weight Reduced Through Minimalistic Design

- Automates design and simulation using parametric modelling
- DOE-based workflows manage complex, multi-physics simulations
- Scalable 'batch mode' supports high-throughput CAE processing
- Integrates with leading solver platforms easily

About MDO

- The Multi-Disciplinary Optimization (MDO) module in MeshWorks enables engineers to evaluate and optimize design alternatives across multiple domains using integrated parametric and non-parametric modelling.
- MeshWorks automates the optimization process, from solver execution and post-processing to seamless integration with third-party tools. With built-in support for DoE, ROM, and automated model updates, it enables efficient multi-objective decision-making across the design space.

DEP MeshWorks Value Proposition



Balanced Performance Optimization

Reduce weight and cost while preserving structural, thermal, and acoustic performance.



ROM-Enhanced Efficiency

Uses Reduced Order Models to significantly cut simulation and optimization time.



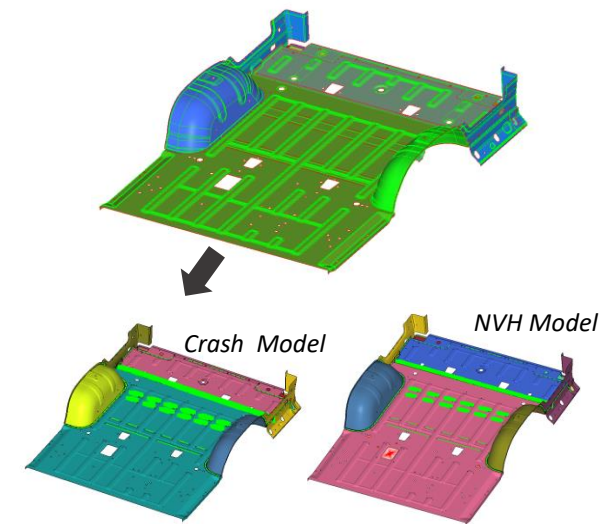
Holistic Design Consideration

Includes manufacturability, ergonomics, packaging, and cost in the optimization loop.



End-to-End Workflow Automation

Streamlines the MDO workflow to speed convergence and enable smarter design decisions.

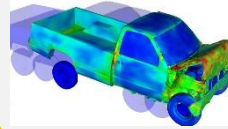


Features



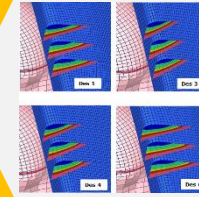
Daily MDO Integration

Seamlessly connects MeshWorks parameters with top optimization engines for continuous, reliable optimization cycles.



Cross-Domain Parameter Reuse

Share and reuse parameters across disciplines like crash, NVH, CFD, and durability to reduce set-up effort.



DoE Matrix Automation

Generates and manages DoE datasets to support nominal, robust, and sensitivity-based optimization.



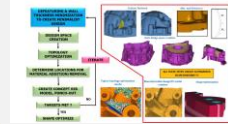
BMW	Node count	Element Count
Input Model	8300330	13570479
Rear End Mass Model update	5592763	9879768
% reduction	33.70	27.40



ROM-Based Acceleration

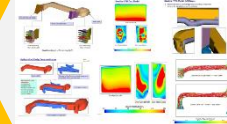
Employs parametric ROMs to enable rapid evaluation of large design spaces with high accuracy.

Optimization



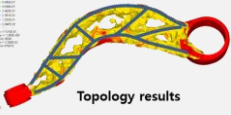
Efficient MDO Workflow

Streamlines optimization to meet targets, reduce weight, cut costs, and boost productivity.



Rapid Design Exploration

Integration of ROM approaches allows for fast and accurate optimization studies across large design spaces.



Topology Optimization Support

Functions as both pre- and post-processor in topology workflows, enhancing integration and flexibility.



Geometry Simplification

Automatically de-features ribs, bosses, and other non-critical geometry to speed-up optimization runs.



Automated Morphing Capabilities

Engineers can generate minimalistic, manufacturable designs through automated morphing at both component and full-vehicle levels.

Unified Parameter Framework

Enables consistent parameter definition and transfer across crash, NVH, thermal, and fluid domains.



Seamless Optimization Integration

Directly interfaces with industry-standard optimization & solver tools, eliminating the need for custom scripting or middleware.



DEP
MeshWorks
— Uniqueness —

Automated Design Synchronization

Applies design updates across both CAD and CAE environments, ensuring simulation and geometry are always aligned.



Full-System Optimization

Supports coordinated, multi-domain optimization at system and sub-system levels for maximum product performance.



MeshWorks Modules



Reduced Order Modelling: Accelerated CAE Workflows for Rapid Product Development

Customization & Optimization at lightning speed

- *Auto-parameterization of linear/non-linear ROM models*
- *Rapid 3D–1D–3D model conversion*
- *Save up to 50% solver time*
- *Super Element ensures closer correlation*

About ROM

- The ROM module in MeshWorks efficiently transforms detailed finite element (FE) models into compact, high-fidelity parametric 1D representations.
- It intelligently reduces complex 3D structural assemblies into equivalent 1D beam models while preserving critical behavioral accuracy across disciplines such as crash, NVH, and more.
- This model reduction significantly accelerates CAE workflows by minimizing solver computational time without compromising predictive capability.

DEP MeshWorks Value Proposition



ROM-Driven CAE Acceleration

MeshWorks ROM cuts analysis solver time by up to 50%, speeding up CAE optimization cycles.



Faster Parametric Optimization

Parameterized ROMs significantly reduces development time, speeding-up optimization cycles.



Design-to-Manufacture Efficiency

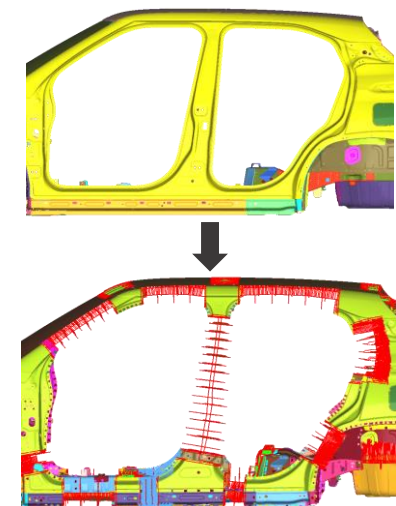
ROM models enable optimization of cross-sections and shapes for manufacturability.



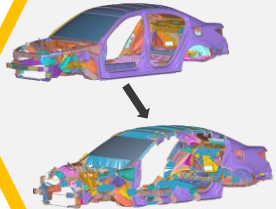
Automated Topology Modelling

Identifies tubular and joint regions for location-specific ROM modelling.

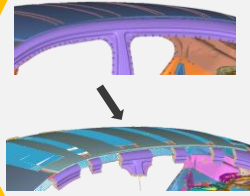
3D to 1D Beam Creation



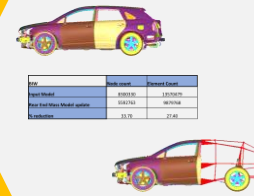
Features



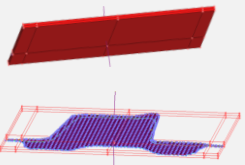
3D to 1D Conversion Tools
Transforms 2D/3D structures into accurate, efficient 1D beam models for high-fidelity simulation.



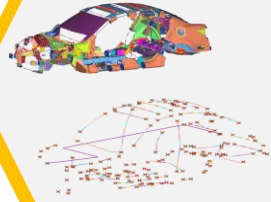
Topology & Cross-Section Recognition
Automatically identifies joints and members for quick cross-sectional synthesis and structural simplifications.



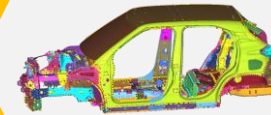
Solver Time Reduction
Fewer elements and nodes reduce complexity, speeding up solver execution time.



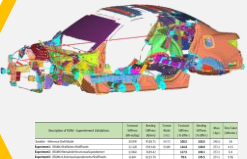
Cross-Section Parameterization
Vary height, width, and other geometry to dynamically update beam properties in the reduced order model.



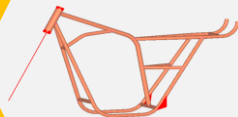
Super Element Simplification
Simplifies detailed joints into super-elements, cutting complexity while preserving response accuracy.



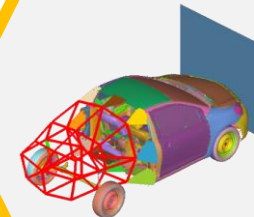
Automated ROM Generation
Converts detailed FE models into simplified, high-fidelity ROMs with minimal manual effort.



Correlated with Full Models
Feature robustness to maintain high fidelity and closely match baseline models for accurate, reliable predictions.



Geometry-Property Integration
Automatically ties geometric cross-sections to beam and spring properties for efficient parametric modelling.



Discipline-Specific Tools
Tailored ROM modelling capabilities for different applications like Crash and NVH analysis.

Faster CAE Turnaround MeshWorks ROM cuts solver time by up to 50%, speeding up CAE and product development cycles.



Parametric Model Automation
Automatically links geometry to beam properties for efficient design changes and parametric studies.



DEP MeshWorks
— Uniqueness —

Optimized ROM Fidelity

MeshWorks offers domain-specific ROM tools for Crash, NVH, and more, ensuring high fidelity and performance across applications.



Lightweight Modelling

Converts complex 3D assemblies into 1D beam equivalents, streamlining analysis without losing essential behavior.



MeshWorks Modules



Meshing



Modelling



AI/ML



Digital Twin



CAE Parameterization



CAD/CAE Morphing



ConceptWorks



MDO



ROM



eMOD



Process Automation



Post Processing

Electrification Module: Solver-Integrated EV Modelling Toolkit

Achieving Range Improvement For EVs With Optimized Design

- *High-frequency noise analysis of Electric Drive Units (EDUs)*
- *Electro-chemical modelling at the battery cell level*
- *Full vehicle-level crash simulations for battery packs*
- *Vehicle weight optimization through parametric design*

About eMDO

- The Electrification Module (eMOD) in MeshWorks is a dedicated suite of tools built for modelling and simulation of electric vehicle (EV) systems and components.
- Covering every stage from system-level evaluation to detailed component-level analysis, eMOD leverages parametric CAE technology combined with automated workflows to deliver rapid, accurate, and efficient results across electrification programs.

DEP MeshWorks Value Proposition



Accelerated CFD Model Creation

MeshWorks cuts CFD model build time by 60%, boosting engineering throughput.



Performance-Driven Optimization

eMOD facilitates with model development that has reduced weight and drag, in-turn improving range and efficiency.



CAD-Independent Optimization

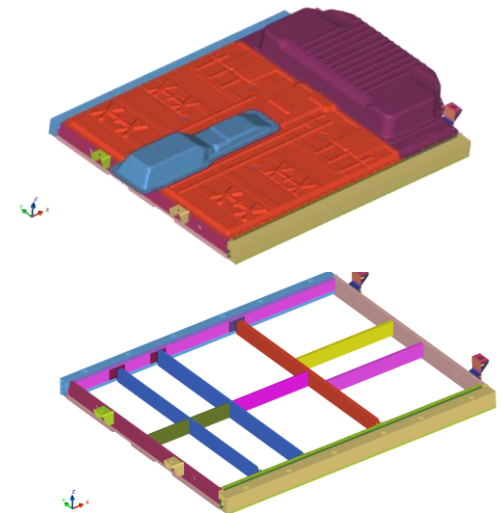
Optimize heat sink sizes/positions directly in MeshWorks, reducing CAD iterations.



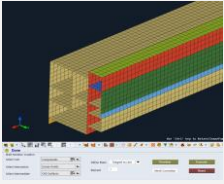
Seamless EV Integration

MeshWorks + eMOD enables accurate EV analysis for faster design creation and validation.

Battery Pack Modelling

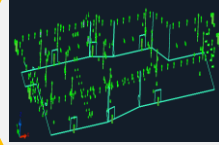


Features



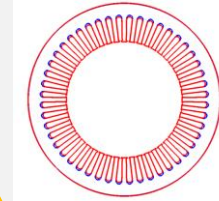
EV-Specific Meshing Tools

Enables detailed meshing at the battery cell, module, and pack levels, including EDUs and inverters.



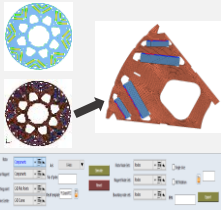
Automated Assembly Connections

Automates contact definitions such as bolt and cell connections, reducing manual setup time in EV assemblies.



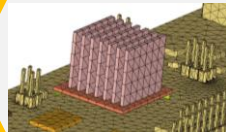
Parametric Modelling Capability

Built-in parametric features allows for rapid design updates and efficient optimization workflows.



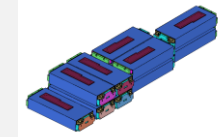
Automation for EV Applications

Integrated tools streamlines CFD analysis, battery pack modelling, and finite element (FE) optimization for electric vehicles.



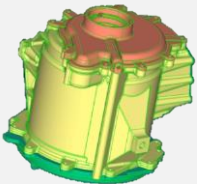
Multi-Disciplinary Support

Enables integrated studies across crash, NVH, durability, thermal, and fluid domains.



Modelling Speed and Efficiency

Provides fast turnaround times and avoids redundancy across modules, maximizing productivity.



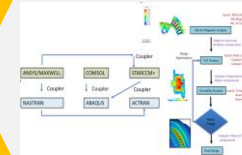
High-Speed Optimization Engine

Supports rapid design variation studies and robust optimization processes.



ICE-to-EV Conversion Automation

Transforms conventional ICE vehicle models into EV models in under a week using ConceptWorks.



Solver Coupling Utilities

Automatically converts models between different solvers to enable integrated electrification simulations.

Dedicated EV Meshing Tools

Supports precise meshing and assembly of all major EV components, including batteries, EDUs, and power electronics.

Fast ICE-to-EV Transformation

Converts traditional ICE models into EV configurations within one week using automated workflows.



DEP
MeshWorks
— Uniqueness —



Rapid Parametric Modelling

Enables efficient design updates and high-speed optimization through built-in parametric capabilities.



Integrated Development Platform

Combines modelling, solver integration, and optimization in a single environment to streamline EV development.

MeshWorks Modules



Meshing



Modelling



AI/ML



Digital Twin



CAE Parameterization



CAD/CAE Morphing



ConceptWorks



MDO



ROM



eMOD



Process Automation



Post Processing

Process Automation: Simplifying Repetitive CAE Workflows

Customized Processes Saving Time & Cost

- *No-code workflow capture via intuitive GUI*
- *Custom UI panels for streamlined automation*
- *Drag-and-drop logic linking*
- *Reusable process functions for teams and projects*

About Process Automation

- The Process Automation (PA) capability in MeshWorks enables engineers to record, customize, and execute modelling workflows through a fully visual interface. Using the intuitive Record > Create GUI > Plumb > Publish methodology, users can capture CAE tasks and convert them into reusable automation scripts—without writing a single line of code.
- These automation routines support repeatability, consistency, and reduced modelling time across projects, making PA a powerful tool for standardizing simulation processes across an organization.

DEP MeshWorks Value Proposition



Time-Efficient Modelling

MeshWorks PA automates workflows, cutting repetitive modelling time.



Zero Coding Required

Create automations via a visual interface—no coding needed.



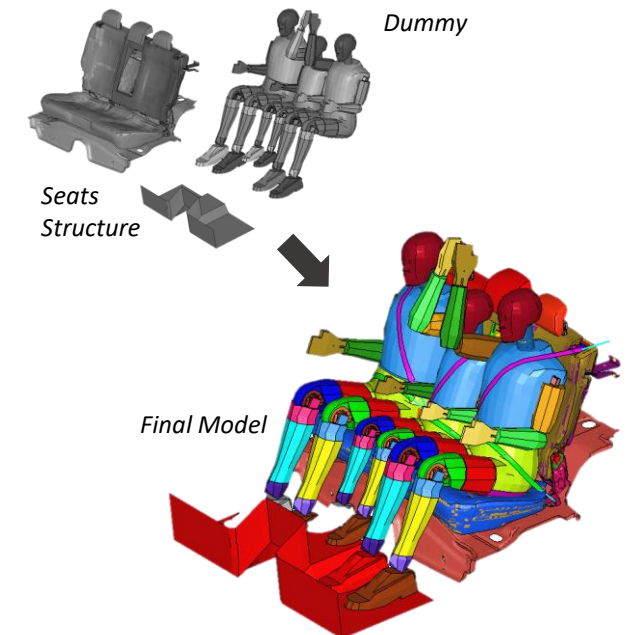
Fast Workflow Setup

Build and deploy automation panels in minutes with drag-and-drop functions.

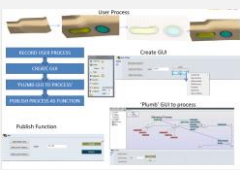


Pre-Built Packages

Ready-to-use automation packages addresses most of the common use case scenarios.

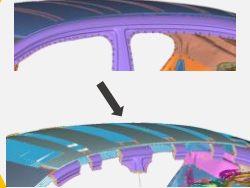


Features



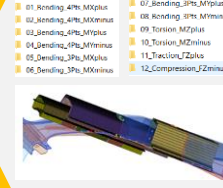
Streamlined Hex Automation

Combines advanced hex modelling tools with rapid process automation to efficiently handle repetitive CAE tasks using the Record > Create-GUI > Plumb > Publish workflow.



Complexity Handling

Even complex geometry and mesh creation processes can be automated without any scripting or programming expertise.

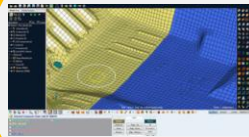


Extensive Pre-Packaged Library
MeshWorks includes over 60 specialized, pre-packaged Process Automations (PA) that serve as enabler functions for various tasks.



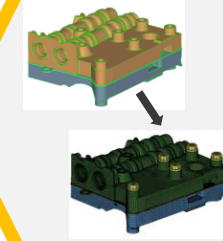
External Script Integration

PA functions are built with flexibility to integrate with external scripts like Python, etc. for extended functionality.



Cross-Platform Compatibility

MeshWorks PAs can be called from external environments such as TCL/TK, enabling complete bi-directional integration.



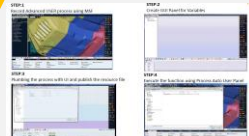
Visual Creation Interface

PA creation is visual and intuitive, eliminating the need for script-based workflows.



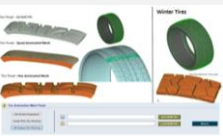
No Scripting Needed

Automation setup requires no programming knowledge, making the process accessible to all users.



Faster Workflow Development

The simplified PA creation process significantly reduces the time required to build automation routines.



Universal Functionality Support
PA functions are general-purpose and adaptable across a wide range of modelling and simulation tasks.

Drag-and-Drop Interface:

Build automation panels quickly using a user-friendly visual environment—no coding required.



Quick Interface Linking

Easily connect interface elements to automation logic using visual plumbing.



DEP
MeshWorks
— Uniqueness —

Enterprise-Ready Automation

Deploy repeatable routines organization-wide to promote standardization and efficiency.

Extensive Built-In Library:

Access 60+ specialized automation templates covering a wide range of CAE and simulation tasks.



MeshWorks Modules



Post Processing: Animations, Contours, and Automated Report Generation

Accelerated Results And Ease Of Use For All Level Of Users

- Automatically detects high-stress regions for targeted analysis
- Synchronized contour visualization for multi-case comparisons
- Interactive plotting tools improve interpretation of results
- Analytical scorecards summarize performance metrics for design decisions

About Post Processing

- The Post Processing module in MeshWorks is built to deliver fast, accurate, and visual evaluations of simulation results across disciplines.
- With advanced scripting automation and intelligent visualization tools, it enables users to extract key metrics—such as peak stresses and model responses—across multiple designs or load cases.
- A multi-page, multi-viewport interface supports side-by-side comparisons, while built-in scorecards and database-linked session tracking ensures traceable insights aligned with design improvements.

DEP MeshWorks Value Proposition



Informed, Faster Decisions

Automated visualization tools accelerate the transition from simulation output to actionable insights.



Data-Driven Design Feedback

Scorecards and stress mapping connect analysis outcomes directly to targeted design improvements.



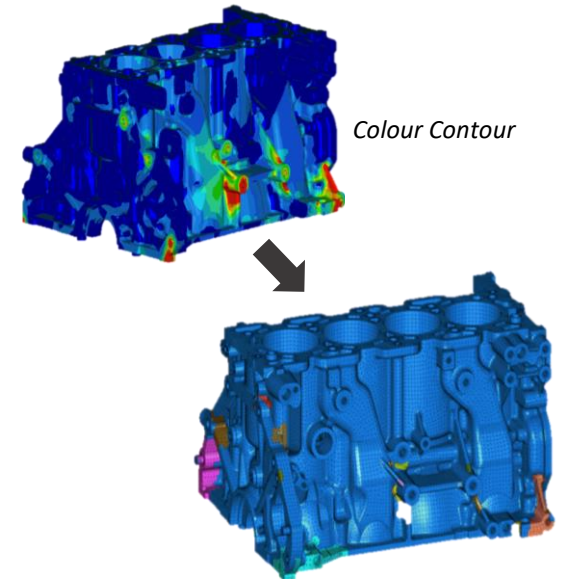
Efficient Result Interpretation

Multi-view layout and scripting minimize manual post-processing efforts.

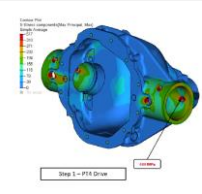


Seamless Parametric Integration

Natively supports parametric result evaluations across design and optimization studies.

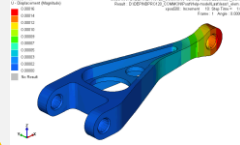


Features



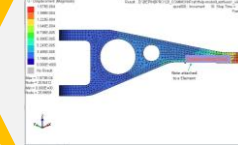
Contour Plotting

Display spatial result distributions with scalar and vector contour plots for instant interpretation.



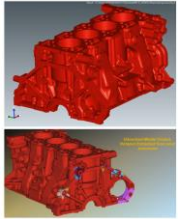
Animation Tools

Visualize modal, linear static, and transient deformations to assess structural responses dynamically.



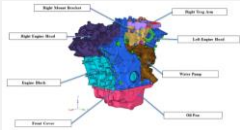
Model Info Panel

View metadata, annotated parts, and track component-specific details for structured documentations.



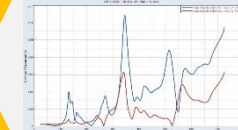
Hotspot Extraction

Automatically detect and isolate high-stress regions for focused design enhancements.



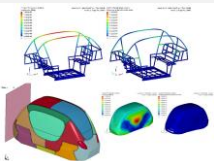
3D HTML Report Generator

Generate interactive web-based reports with embedded 3D model views—no software required for review.



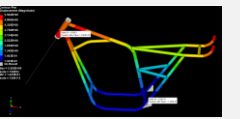
Graphing Utilities

Import results, perform advanced data analysis, and create plots for simulation-attribute correlations.



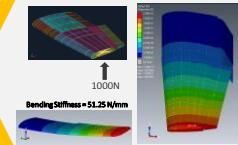
Multi-Disciplinary Result Viewing

Supports post-processing of results across Crash, NVH, CFD, Durability, and more within a unified environment.



Built-In Design Guidance

Suggests design adjustments based on performance results to support rapid iteration.



Optimization-Aware Feedback

Directly links results to design optimization goals, enabling informed decision-making.

Streamlined User Experience

Delivers high-speed workflows and intuitive tools accessible to both novice and expert users.

Production-Grade Output

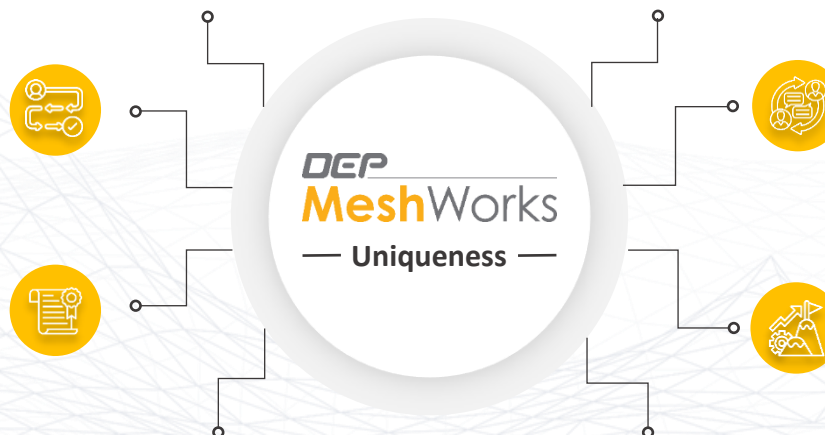
Supports design-ready evaluations that feed directly into manufacturing-level decisions.

FE-Level Design Integration

Enables feedback loops and design changes directly at the FE model level—without CAD intervention.

Accelerated Design Improvement

Highly automated tools, support rapid enhancements from baseline to optimized performance with minimal effort.



DEP LOCATIONS

USA

(Headquarters)
Detroit Engineered Products, Inc.
850 East Long Lake Road
Troy, Michigan 48085
Ph: +1 (248) 269 7130

INDIA

DEP India Pvt. Ltd.
#2/86, 7th Avenue,
Ashok Nagar, Chennai
600 083, India
Ph: +91 44 42141453

DEP India Pvt. Ltd.
4th Floor, Gamma Block.,
Sigma Soft Tech Park,
HAL – Whitefield Main Rd
Bangalore 560066
Ph: +91 80 42052777

CANADA

1030 Cumming Blvd,
Milton, ON L9T 6S8,
Canada.

CHINA

DEP China Software Co., Ltd.
Rm 3222, Yinggang International
Building, #577, Jingang Rd., Nansha
District, Guangzhou- 511458, China
Ph: +86-18665820511

JAPAN

DEP Japan Co., Ltd.
1129 the SOHO 2-7-4 Aomi
Koto-ku Tokyo 135-0064
Ph: +81-3-4405-4868

PARTNER LOCATIONS

FRANCE: DynaS+, 5 Avenue Didier Daurat, 31400, Toulouse, France, Ph: +33 5 61 44 54 98 www.dynasplus.com

GERMANY: Dr, Schafstall Consultancy., Kiefernweg 3, 21357 Barum, Germany, Mobile: +49 160 8050767
Telephone: +49 4133 510410, hendrik@dr-schafstall-consultancy.com www.dr-schafstall-consultancy.com
Simuplast UG, Simuplast UG Pfarrstraße 30, 73773 Esslingen a.N, Ph: +49 (0)170 9381423,
andrew.kessler@simuplast.com, www.simuplast.com

INDIA: Spectratek, Animesh., Plot No. 358, Lane Number 17, Mahatma Society, Pune, Maharashtra 411038,
Ph: +91 9822052694 www.spectratek.co.in
Suvidiscus, 54, Appanaickenpalayam, Thudiyalur, Coimbatore- 641017, Ph: +91 63854 70666
www.suvidiscus.com

ITALY: Exemplar srl, Corso Vittorio Emanuele II, 161, 10139 Torino (Italy), Ph:+39 011435051
www.exemplar.com

JAPAN: IDAJ Co. Limited., 37F, Yokohama Landmark Tower, 2-2-1-1 Minato Mirai, Nishi-ku, Yokohama,
Kanagawa, 220-8137, Japan, Ph: +81 45 683 1971 www.idaj.co.jp
Silicon Technology Co., Ltd. 2-2-16 Sangenjaya, Setagaya-ku, Tokyo 154-0024, Japan, Ph: +81-3-3795-
6461, contact@si-tech.co.jp <https://www.si-tech.co.jp/>
BlueRise Partners, Roppongi KS Bldg 6F, Minato-Ku 3-16-12 Roppongi, Tokyo 106-0032,
gllilli@bluerisepartners.com www.bluerisepartners.com

KOREA: STC Integration Inc., #509, Yeongdongdaero 721, Gangnam, Seoul – 06072, Ph: +82 2 3446 9290
LOTUS Technologies, Inc., #1505, Saebitgongwon-ro 67, Gwangmyeong-si, Gyeonggi-do, KOREA 14348, Building A,
Gwangmyeong Station Zai Tower, Ph: 02-543-3990, lotustech@lotustech.co.kr <https://www.lotustech.co.kr/>

SPAIN: Simulexa., Carrer de Picanya, 39, Torrent, València, Spain, 46900 Ph: +34 96001823 www.simulexa.com

THAILAND: Sigma Solutions Co. Ltd., 77/95, Sinn Sathorn Tower, 23rd Floor, Thanon Krung Thon Buri, Khlong San,
Bangkok 10600, Thailand. Ph: +662 862 1188 www.sigmasolutions.co.th

TURKEY: Bias Mühendislik Ltd. Sti., Haluk Tursoy sok. 12/3, Altunizade-Uskudar, 34662, Istanbul/Turkey, info@bias.com.tr,
www.bias.com.tr

USA: MathPros, Inc., PO Box 102 Natick, MA 01760, support@mathpros.com, www.mathpros.com



Smarter Solutions. Realized.

Detroit Engineered Products (DEP) is an Engineering Solutions and Product Development company. Since its inception in 1998 in Troy, Michigan, USA, DEP is now a global company with footprint in Europe, China, Korea, Japan and India. DEP uses the accelerated and transformed product development process, accomplished by utilizing our proprietary platform, DEP MeshWorks, which rapidly reduces the development time of products for all segments.

Rapid time to market of new products across several industry sectors such as automotive, defense, aerospace, energy, oil & gas, electronics, consumer products and heavy equipment is a unique value proposition delivered to clients via DEP's world class engineers and the DEP MeshWorks platform.

Email us: email@depusa.com | Visit our website: www.depusa.com/meshworks/

