

Automotive solutions

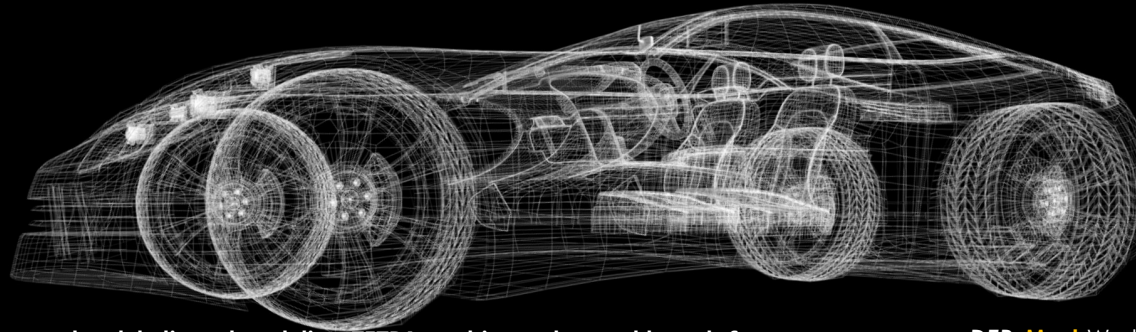
VEHICLE INTERIORS & EXTERIORS

- **DEP MeshWorks** has a good set of automated and dedicated modeling, Mid-plane QUAD meshing and assembly tools for:
 - Complete front & rear fascia, headlamp
 - Complete IP
 - Seating system
 - Door system
- **DEP ConceptWorks** to build heat stakes, locators, clips, dog houses in simple or multi way directly at the FE level
- Parameterization and optimization of energy management features for head impact
- Comfort optimization for seating systems
- Reverse windage DOE based optimization with MOLDFLOW

BODYSTRUCTURES & CLOSURES

- **DEP ConceptWorks** to build whole BIW model (members, joints, arms, pillars, etc) from scratch directly at the FE level for early design phases
- Full vehicle morphing & Body Swap of CAE and/or CAD data
- Very fast counter measures creation and model updates using morphing and design enablers
- Reverse engineering from scanned data using unique accelerator tools
- Alternative material based BIW concepts facilitators
- Automated modeling tools for Crash, CFD, NVH, etc. based performance evaluation and homologation
- Lightweighting using parametric model technology and Multi Disciplinary Optimization (MDO)
- Parameterization and optimization for:
 - BIW sub assemblies
 - Bumpers, crash boxes
 - Vehicle exteriors and aerodynamics
 - Weld and/or adhesive layout
 - Tailored sections
 - Reduced Order Modeling (ROM)
- Reduced Order Modeling tools for static & dynamic load cases with close correlation

POWERTRAIN



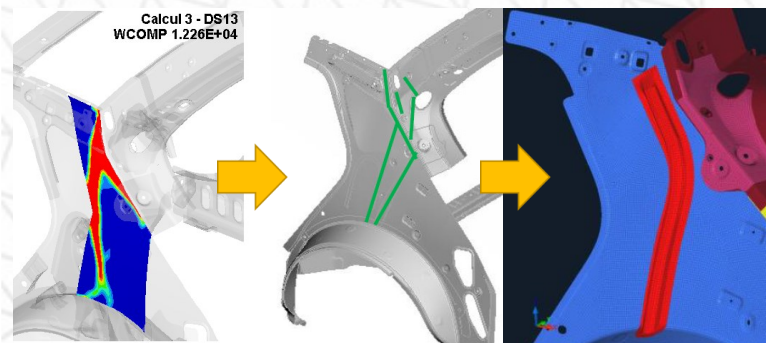
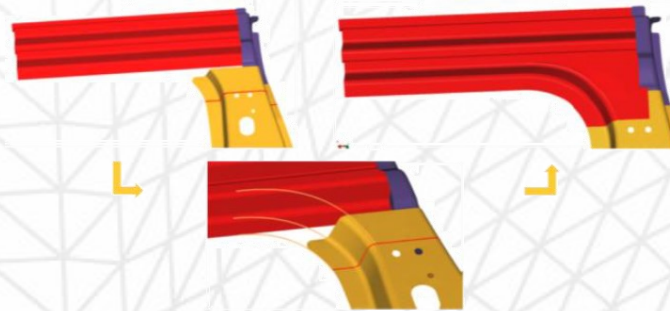
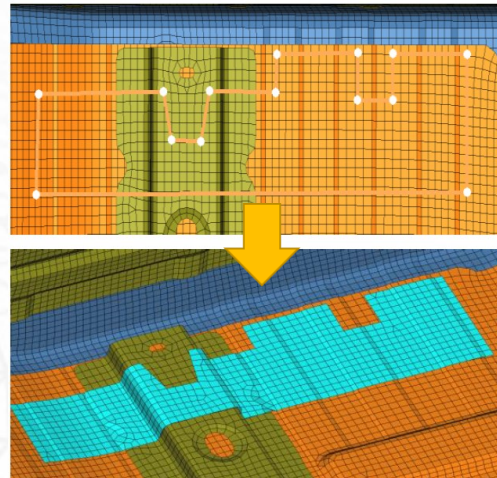
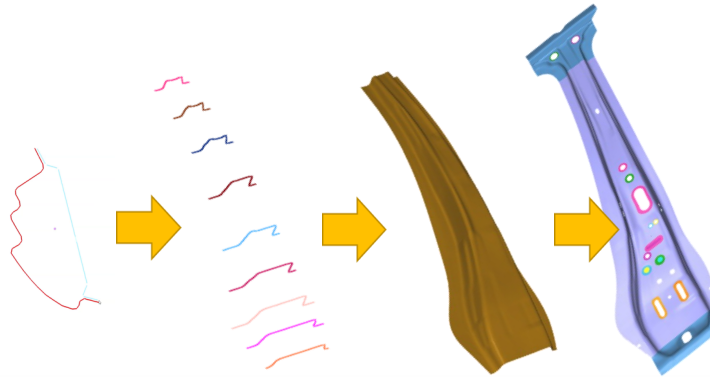
CHASSIS

- **DEP MeshWorks** has extensive set of automated and dedicated modeling, TETRA meshing and assembly tools for:
 - Complete Powertrain and its components
 - Gear train
 - Battery system
- Engine, transmission and axle system morphing and parameterization
- Lightweighting using parametric model technology and Multi Disciplinary Optimization (MDO)
- Rapid morphing and design space creation for topology optimization
- Conversion of optimization concepts into realized models using unique accelerator tools
- Minimalist design approach directly at the FE level

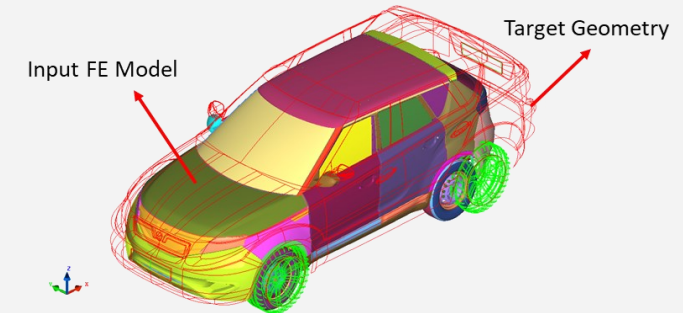
- **DEP MeshWorks** has toolsets for automatic modeling, HEXA meshing and assembly of:
 - Suspensions
 - Brakes modeling
 - Chassis components
 - Tires
- **DEP ConceptWorks** to build from scratch directly at the FE level chassis model
- Parameterization and optimization of suspensions, chassis frame and tire grooves

ConceptWorks

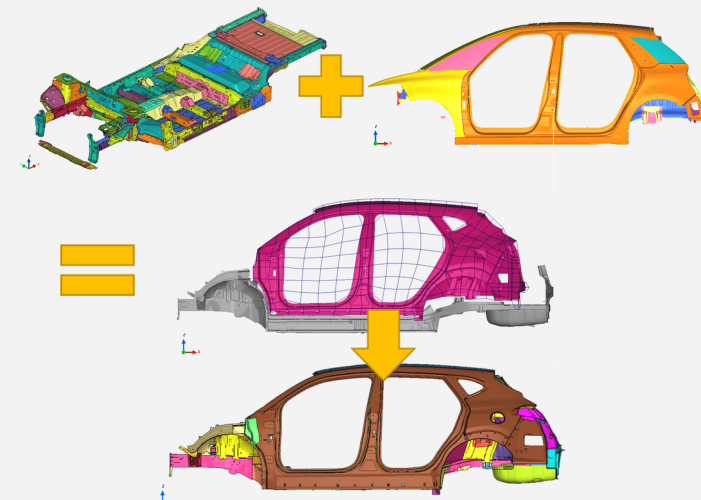
- Early conceptual design and development can be done without CAD data
- The conversion procedure for conventional CAE car models into hybrid types are done easily
- Any part of a BIW model can be build directly at the FE level in a very short time frame
- The perfect next step to topological optimization results
- Highly automated tool to sketch, create and parameterize cross-sections
- Highly automated tool to generate components from multi sections
- Easy sketch and build of new members, interior components, joints, and unique characteristics like holes, stamps, ribs, fillets, beads, etc directly at the FE level
- Very high number of design diversities and possibilities
- Drastic time is saved during the early design phases by avoiding to wait from CAD department the updated components
- Patented technology by Detroit Engineered Products



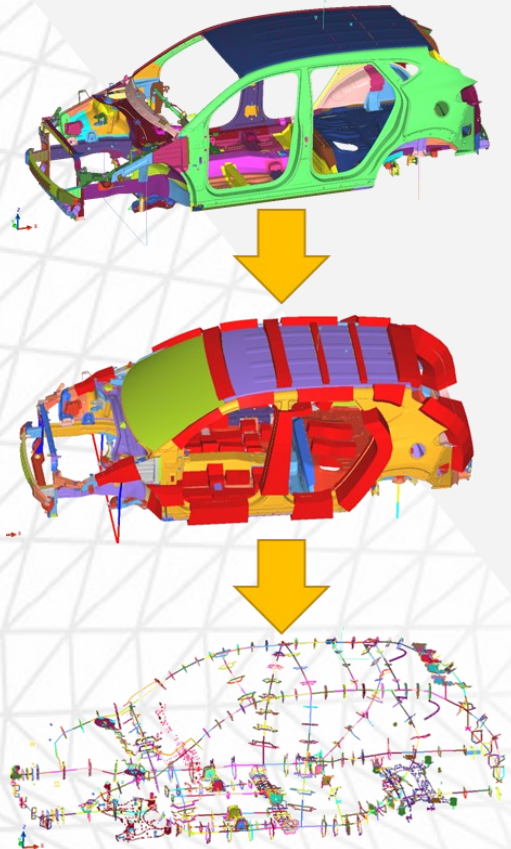
FULL VEHICLE MORPHING & BODY SWAP



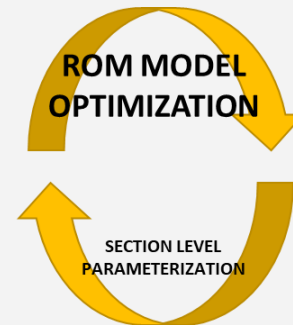
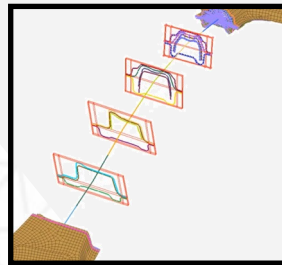
- Using Full Vehicle Morphing technology, concept FE model can be created in only one week whereas the conventional method would take around 12 weeks
- Cutting, blending & stitching functions to create early-stage concept FE & CFD models very rapidly
- Early concept designs can be created in the FE level there by eliminating CAD in the loop
- Rapidly develop new vehicle derivative of existing platform
- Under body platform of one model and the Upper body of another model can be merged resulting in a new concept design quickly



FROM 3D TO 1D



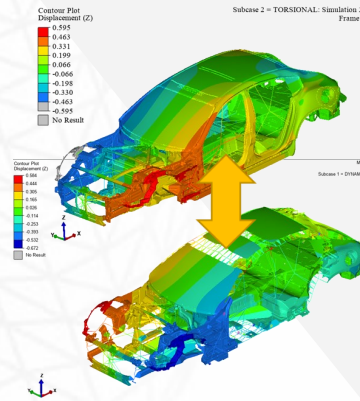
- ROM build & update duration is between 1 to 3 days based on level complexity
- At early stage of vehicle development, designer team can focus on customizing models for performance & lightweighting
- CAE team can benefit from autoperparameterization & optimization option for the complete family of ROMs & cross sections to create concept models



>90% correlation

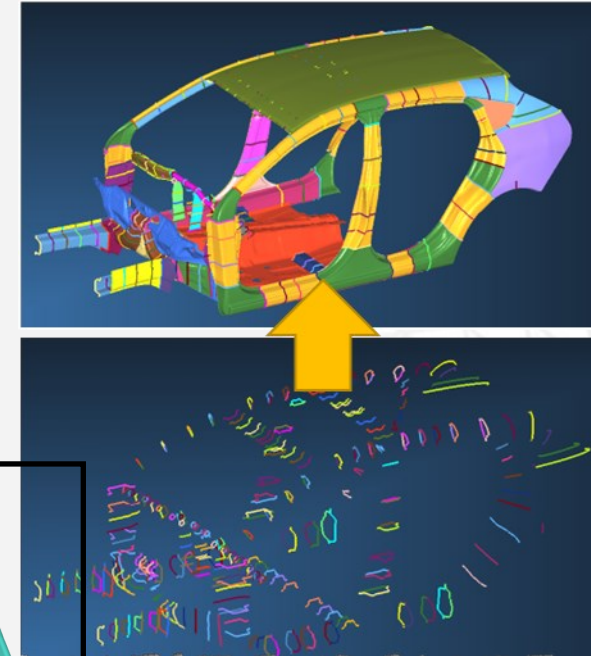
NASTRAN model reduced by ~60%

LS-DYNA model reduced by ~45%



ANALYSIS & OPTIMIZATION

FROM 1D TO 3D



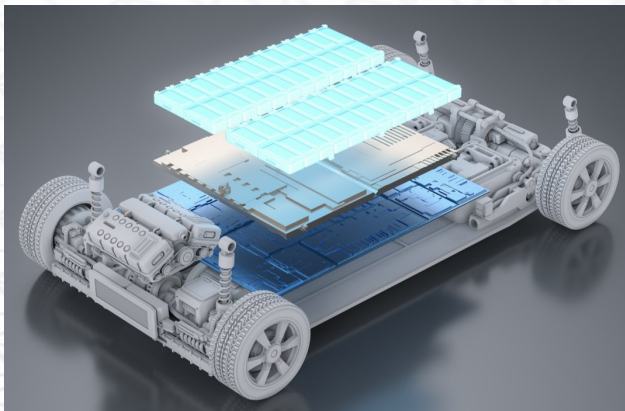
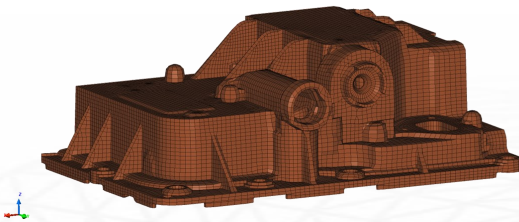
- Drastic reduction of analysis run-time without compromising the detailed model build
- Lots of design iteration at rapid rate & subsequent optimization at lightening speed
- **DEP ConceptWorks** is highly automated to transform 1D optimized cross section into 3D FE model at very less efforts and reduced time
- Using **DEP ConceptWorks** capabilities, early conceptual design and development can be done without CAD data

- Highly automated 3D to 1D Beam creation tool
- Highly automated Joint creation tool
- Section synthesizers available for all 20 standard section elements to study various load cases
- Eliminates tedious design cycles of iterative model building for 3D models
- Auto parameterization of ROM models available

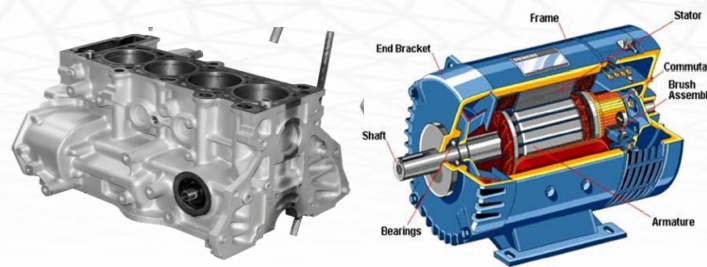
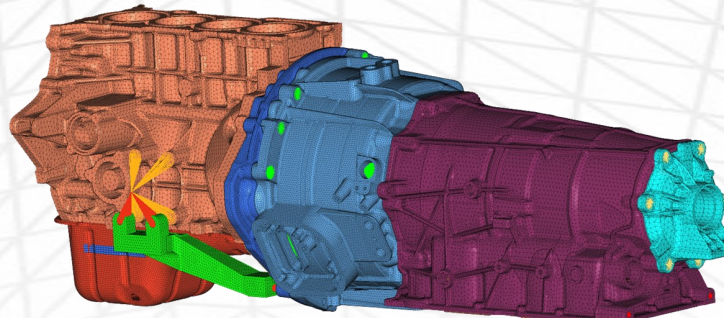
BATTERY MODELING

DEP MeshWorks has extensive automatic time saving tools for battery components, with a versatile tool set for structural, thermal and safety modeling aspects of battery system.

- Battery cell level modeling
- Battery stack-model assembly tools for safety and evaluation HEXA modeling tools for battery frame
- Mesh modeling and optimization for battery frame/tray
- Contact definition and input deck creation
- Battery model checking tools
- Skin mesh tools for cell level and mini channel thermal modeling
- Process automation tools for battery system modeling and assembly



E-Powertrain solutions



INTEGRATED ELECTRIC DRIVE UNITS

DEP MeshWorks has a good set of tools for modeling complex housing, motor sub system, gear train, carrier and parking system parts.

It has parametric modeling functions, connection to solvers and optimizers, as well as process automation tools to accelerate the virtual validation phase for such complex assemblies.

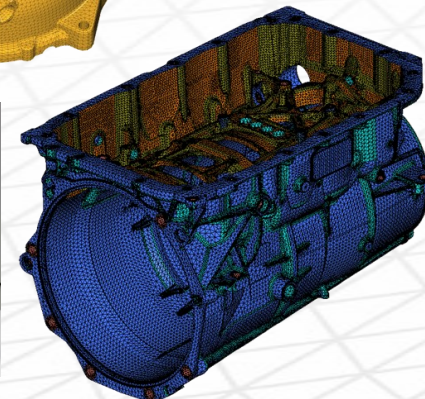
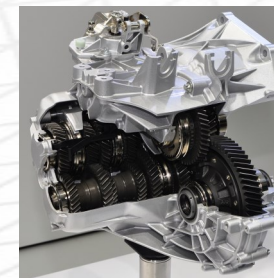
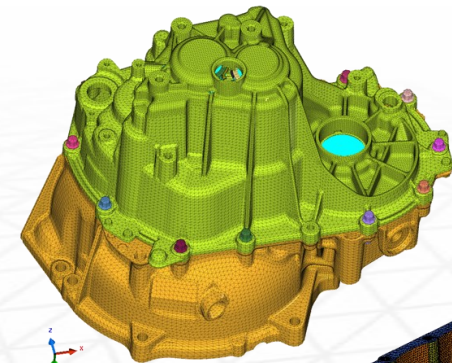
- Modeling stator, rotor, shaft and casing for mechanical and electromagnetic performance
- Modeling for motor thermal analysis
- Parameterization of geometry for stator and magnet slot
- Wrapper model building tools for motor NVH and acoustics
- Process integration and automation for optimization

MOTORS MODELING

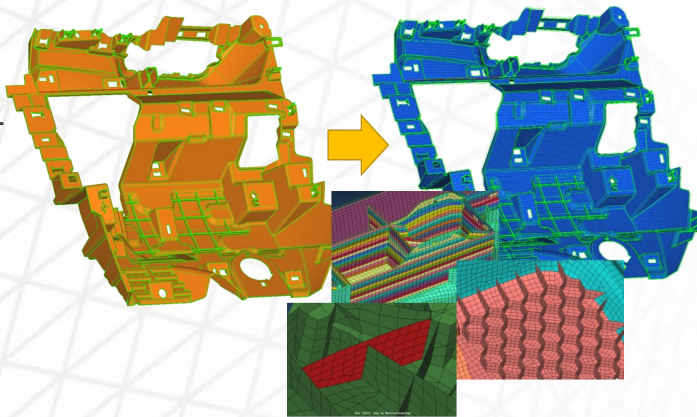
DEP MeshWorks has toolsets for modeling complex powertrain assemblies and electric vehicle motor systems.

Typically powertrain/motor durability, NVH and electromagnetic performance assessment require good quality FE models.

- Modeling engine, transmission and axle system for durability and NVH performance
- Modeling stator, rotor, shaft and casing for mechanical and electromagnetic performance
- Mount and accessory bracket tuning
- Topology optimization and RIB optimization
- MDO studies
- Shell modeling, solid HEXA and TETRA modeling to capture complex motor sub components
- Model assembly tools and process automation for electric motor virtual validation

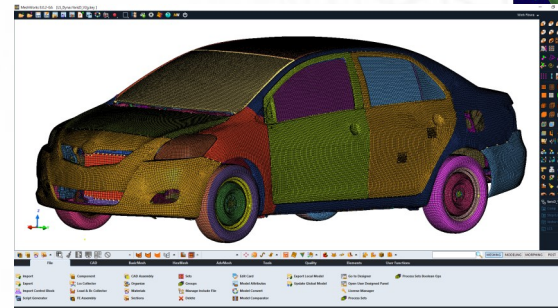


Automated QUAD Mid-Plane Meshing
including drastic time savings
for Vehicle Interiors & Exteriors



QUAD MID-PLANE MESHING

QUAD Batch Meshing
for Full Vehicle
assembly



QUAD BATCH MESHING

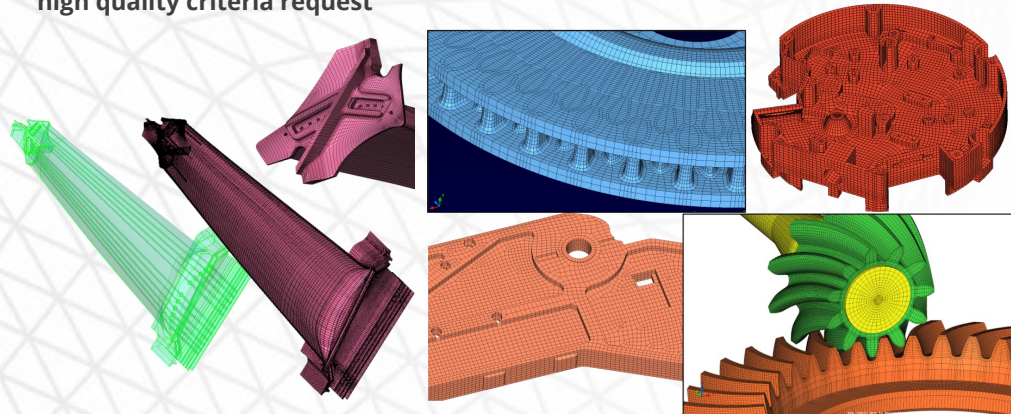
Save time using the powerful Meshing capabilities of

DEP
MeshWorks

HEXA MESHING

Semi-automated methodology for
high complexity components with
high quality criteria request

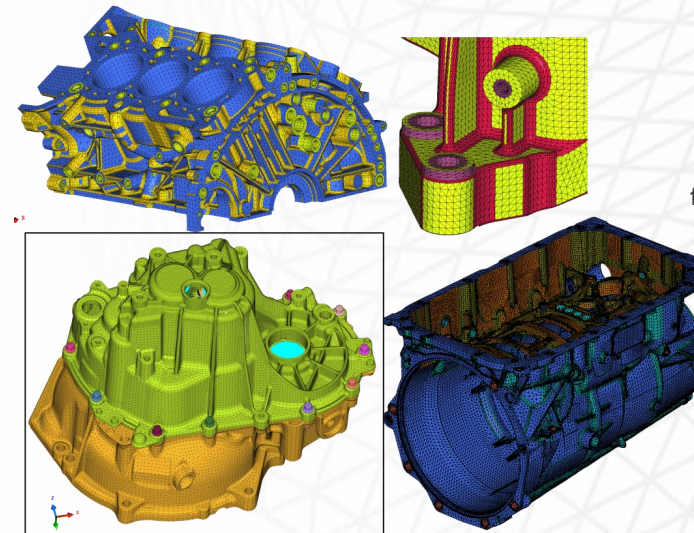
for bumpers, brakes, suspensions, tires etc

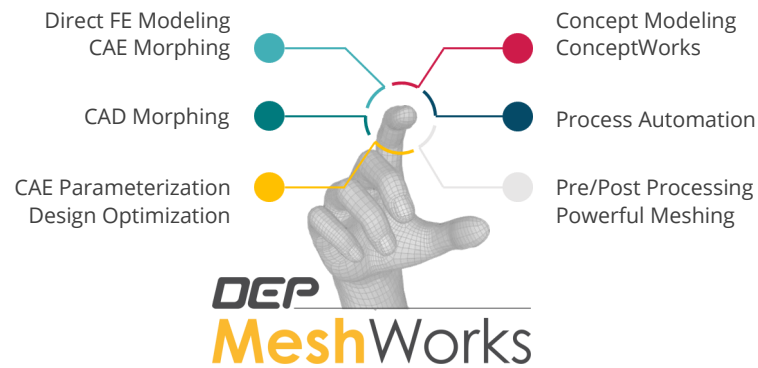


TETRA MESHING

High quality TETRA Meshing
controlled by user-defined
templates

for Powertrain and Driveline
assemblies





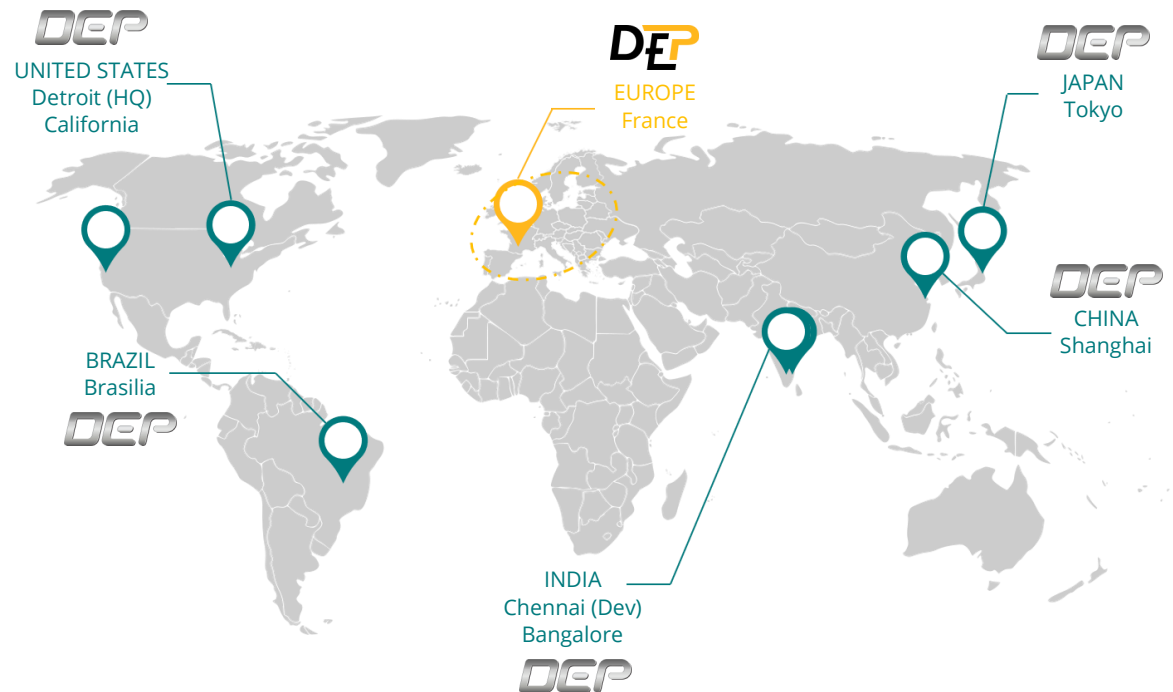
A software designed by CAE engineers for CAE engineers

DEP MeshWorks is a reference for morphing and design directly at the FE level on the market for 20 years.

DEP MeshWorks is an integrated CAE platform that accelerates the product development process. It contains a meshing engine combining performance and user-friendliness for an overall gain in productivity. It is a specialized software for rapid concept modeling, automated morphing at FE and CAD level, parameterization and optimization, involving rapid concept CAE and CAD model generation.

DEP MeshWorks is edited by Detroit Engineered Products.

More information at depeurope.com



Dynas+ Engineering Products is **DEP MeshWorks** Europe Technical Centre.

Dynas+ Group is a technical engineering group specialized in numerical modelling, which provides its customers (automotive, defense, aeronautics, space, consumer goods, etc) digital solutions to support and optimize the studies and development of their products.

Dynas+ Group choose **DEP MeshWorks** for its engineering departement, ensuring drastic time savings in all modelling workflows.

