

DEP

MeshWorks

Complete parametric CAE platform



European Reseller

Based on its patented parametric technology, MeshWorks offers the best-in-class CAD/CAE morphing, Parametrization and Concept Modeling tools, but also a complete CAE pre & post-processor.

- **CAE Morphing**

Transform existing FE & CFD models to match new geometries while keeping the connections from the original to the new model. No more back and forth between CAE and CAD department.

- **CAD Morphing**

Morph CAD data from an existing model and get updated solid CAD models. Get the updated CAD design from a deformed FEA model.

Patented Technology

- **ConceptWorks**

Concept modelling tools that allows the user to create concept designs at mesh level without any CAD package. Very helpful for early-stage designs to explore new concept designs.

- **Parametrization**

Patented parametric technology to create multi-disciplinary parametric CAE models, including, shape, structural (thickness/material), seam welds, spot welds, holes, ribs, bulkheads, to create DOE and MDO.

- **Model Building:**

Complete CAE platform to carry out the whole simulation set up for different solvers (Nastran, Abaqus, LS-Dyna, Pam-crash, etc) Smart tools include bolts, welds, contacts, loads, BC, etc.

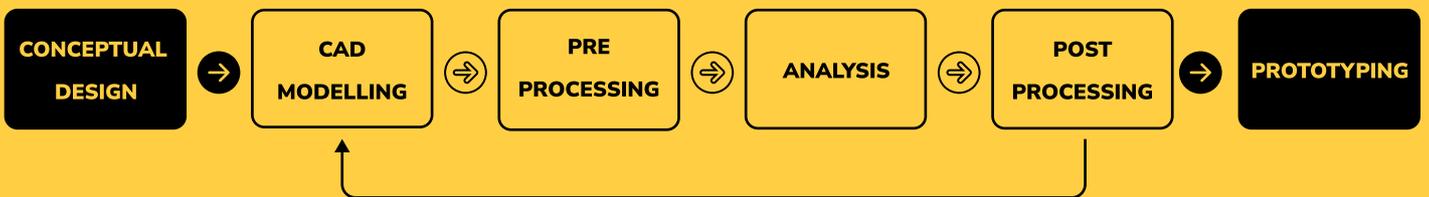
- **Meshing:**

Get high quality HEX meshes on complex geometries, automated templated based Tet / Tetra meshing, tools to and a unique solution for midplane meshing extraction.

DEP MeshWorks is a feature-based morphing tool that can rapidly transform existing FE & CFD models. Minimizes time in design modification by directly working at mesh level.

Traditional Design Process:

FE modeling are performed after the concept CAD is generated.

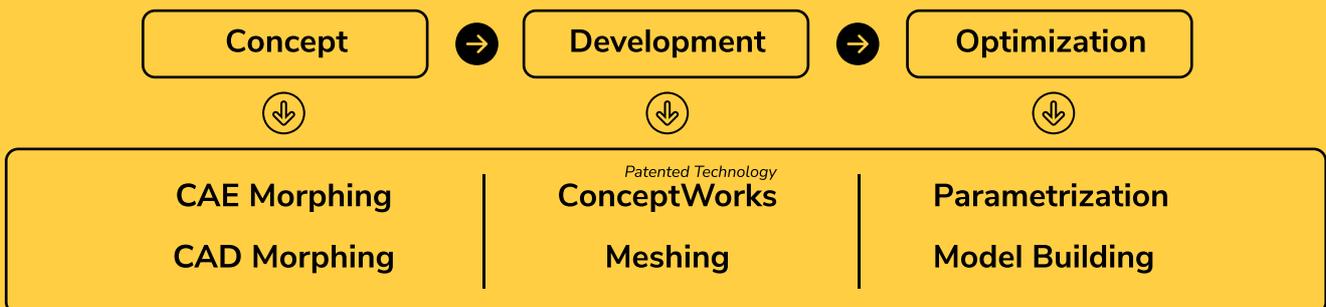


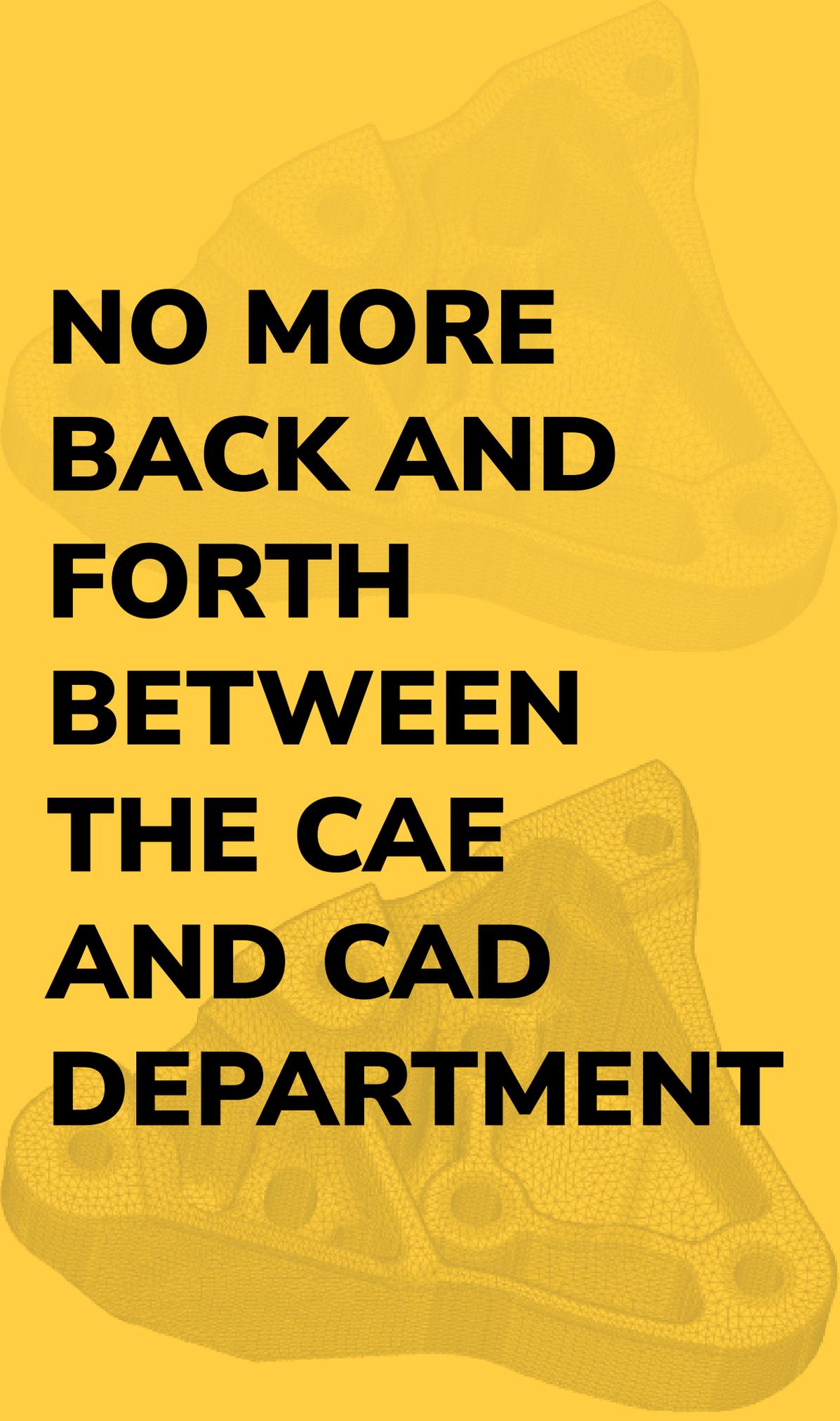
Design Process with DEP MeshWorks:

The concept changes are made on the FE model itself, taking the time required for CAD generation off the cycle.



From the concept to the optimization stage, DEP MeshWorks offers a collection of tools in every module to speed up every process.





**NO MORE
BACK AND
FORTH
BETWEEN
THE CAE
AND CAD
DEPARTMENT**

CAE Morphing

Born as a Morphing tool

Transform existing FE & CFD models to match new geometries while keeping the connections from the original to the new model. No more back and forth between CAE and CAD department.

What is CAE Morphing?

Morphing is an adaptation of given shape to a new form. The geometry of a given concept model can be modified to required proportions to create new designs. CAE Morphing allows users to work on the FE mesh directly reducing the time taken to go back to the designer to update the geometry.

Why CAE Morphing?

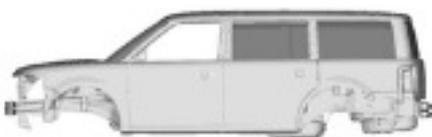
Minimizes time spent on design modification by working directly at the mesh level. Automatic control block creation methods require less skill and effort and allow fast and efficient design creations using parameterized optimization. Easy transformation of CAE models from the original design to a new concept. Keeps your connections from the current to the updated model.

With DEP MeshWork

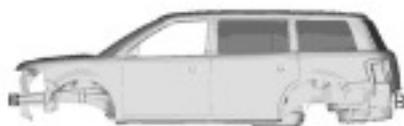
The concept changes are made on the FE model itself, taking the time required for CAD generation off the cycle

...and how can it be done?

- ◀ CAE morphing of 2D and 3D mesh
- ◀ Auto Re-mesh and quality preservation during the morphing
- ◀ Robust, fast and user friendly CAE morphing solution.
- ◀ Manual and Auto control blocks creation using 2 planes, curves or planes
- ◀ Different morphing options as Poly cube, Curve based, Pattern, Stretch
- ◀ Free-form (direct) morphing for more control of the geometry



Initial shape



CAE morphed shape

CAD Morphing

Transform CAD or FE data from an existing model and get updated solid CAD models.

Morph CAD data from an existing model and get updated solid CAD models. Get the updated CAD design from a deformed FEA model.

The value of CAD morphing

Impose the optimized FE design to a solid CAD file:

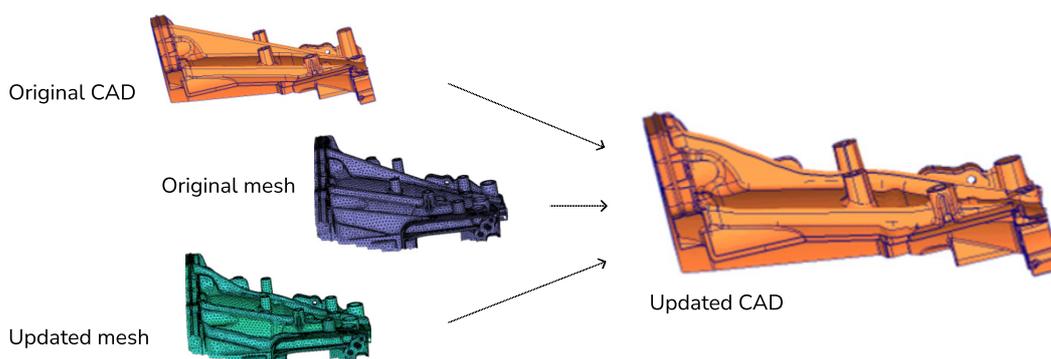
- 1 – Original CAD geometry.
- 2 – Original FE mesh.
- 3 – Optimized FE mesh.
- 4 – Get the optimized solid CAD geometry, maintaining the original surfaces.

Evaluate the feasibility in an early stage

CAD Morphing allows you to evaluate the feasibility of the new designs in an early stage for:

- ◀ Packaging studies.
- ◀ Styling studies.
- ◀ Manufacturing studies.

Export the new solid CAD in different neutral formats for an easy implementation.



Whenever You Want

Changes to your CAD model can be made at all different stages of your product development

Initial concept

Existing CAD designs can be **transformed to obtain new designs** quickly. Morph your current CAD design directly.

Development

Existing CAD designs can be **automatically updated** to fit the new sections as determined by the structural department

Optimization

Existing CAD designs can be **updated to match the optimized** geometry results obtained by the CAE team

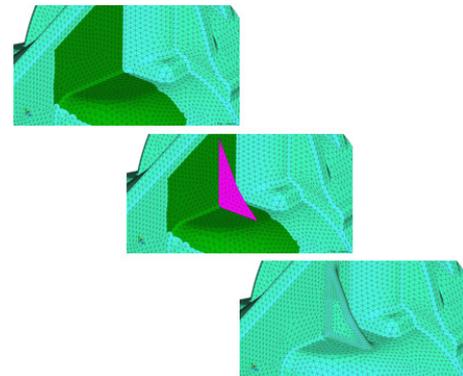
ConceptWorks

Ready-to-use CAE tools required to improve structural performance of the model.

Concept modelling tools that allows the user to create concept designs at mesh level without any CAD package. Very helpful for early-stage designs to explore new concept designs.

Shell and Solid Ribs

Both shell (2D) and solid (3D) ribs can be created at mesh level in minutes. Select the model, create the plane and sketch the shape of the rib. Finally, the mesh is adjusted automatically.

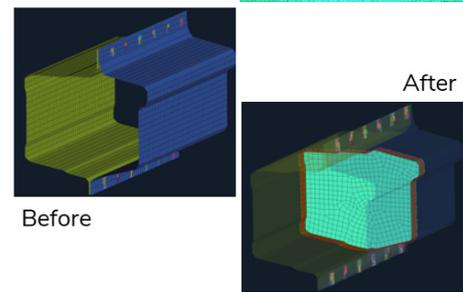


Bulk head

Bulkheads and their connection can be created without waiting for the CAD. Create directly the reinforcement on the model at mesh level.

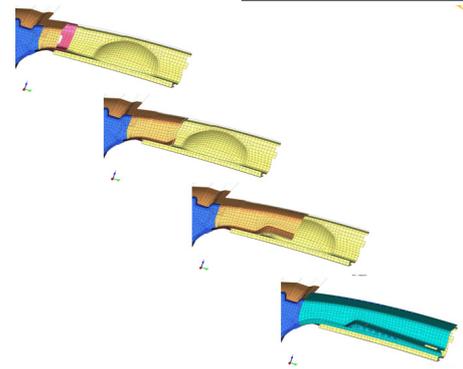
Extension

Part extension or contraction can be performed without CAD in DEP MeshWorks. The part extension is usually used to improve and adjust the structural performance in shock or durability events. Generally no additional packaging or consideration of shape changes in body sections are required.



Bead

Beads can be created in the mesh to increase stiffness and/or initiate crushing during shock events. Create the geometry, assign the shape and finally parameterize the beads to create the DOE or MDO in minutes.



Punch hole

Creating lighting pockets in vehicle panels or cross members to reduce mass or increase rigidity without waiting for CAD data is possible in DEP MeshWorks

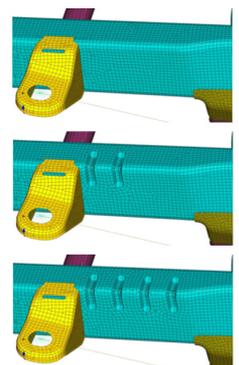
And more...

- ◀ Beads
- ◀ Darts
- ◀ BulkHeads
- ◀ Reinforcements
- ◀ Rolled Blank
- ◀ Holes/Slots
- ◀ Part Extension/Contraction
- ◀ BulkHeads
- ◀ Reinforcements
- ◀ Reinforcements
- ◀ Rolled Blank

✓ Can be executed as a single instance or as a parameter with multiple instances.

✓ Very helpful for early-stage designs to explore new concept designs.

✓ Use it on sheet metal, casting parts, forge parts or plastic parts.



Parametrization

Convert regular FE/CFD models to intelligent parametric FE/CFD

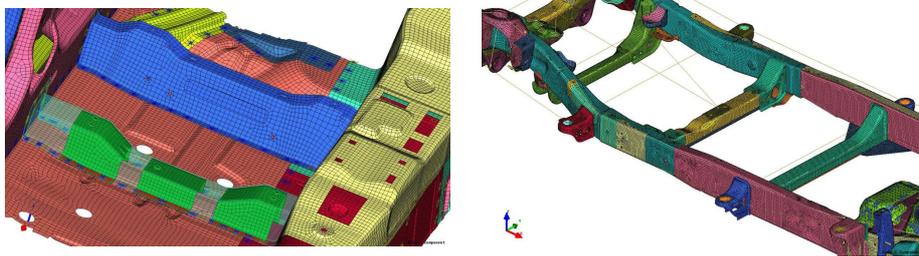
Patented parametric technology to create multi-disciplinary parametric CAE models, including, shape, structural (thickness/material), seam welds, spot welds, holes, ribs, bulkheads, to create DOE and MDO.

Why CAE parametrization?

Using the parametric approach, engineers can quickly and easily create different configurations of their designs by manipulating attributes that are interconnected, allowing users to define entire classes of shapes, not just specific instances.

For DOE and MDO

The parameters can be exercised as one-time execution or linked to Design of Experiments (DOE) and Multi - Disciplinary Optimization (MDO) schemes.



Parametric categories

Create any design component and parameterize it. From a product design engineering perspective, some of the essential modules that are considered design parameters are:

- ◀ Shape
- ◀ Thickness
- ◀ Material
- ◀ Beads
- ◀ Bulkheads
- ◀ Doublers
- ◀ Welds
- ◀ Adhesives
- ◀ LWB/LRB
- ◀ Ribs

Why DEP MeshWorks for CAE parametrization?

- ✓ Rely on CAE-level parameters to speed up the development and optimization.
- ✓ New parameterization categories to assess new designs quickly, efficiently and easily.
- ✓ Reduce re-design time by applying geometric changes at the mesh level.

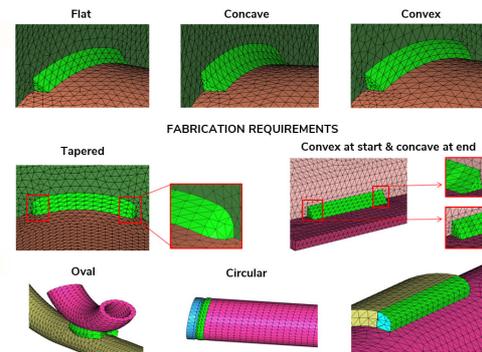
Model Building

Complete CAE pre-processor and post-processor for FEA and CFD.

Complete CAE platform to carry out the whole simulation set up for different solvers (Nastran, Abaqus, LS-Dyna, Pam-crash, etc) Smart tools include bolts, welds, contacts, loads, BC, etc.

Welding

Rapid welding process enable the user to quickly create weld with specific profiles, including the Heat Affected Zone (HAZ) to analyze stress and crack propagation. Whether from a 1D or 3D reference from the CAD file, create in



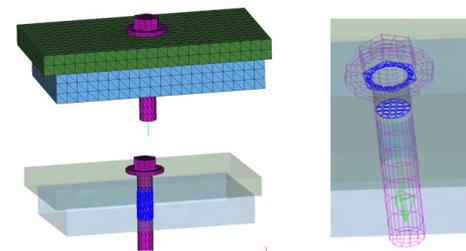
Bolted connections

A wide variety of bolted assembly connection elements can be created automatically by detecting the hole. Define bolt geometry such as size, bolt type, washer layers, property definitions as well as pretension.

Through bolts

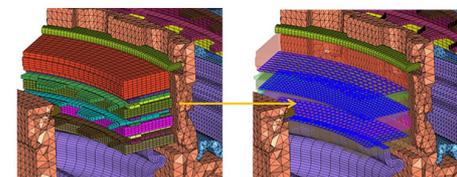
- ◀ Screws
- ◀ Detailed metric bolt modeling
- ◀ Bolt connections with beams/rigid elements

Export the new solid CAD in different neutral formats for an easy implementation.



Contacts

Auto Contact Creation tool allows the user to easily create contact surfaces in less time detecting automatically the contact surfaces. Includes contact pair, contact control, contact interface, pre-tension surface which executes automatically



And Much More...

Adhesive Bonding

Solid bond elements can be generated automatically and connected to the surrounding part meshes through connection equations, contacts.

Loads and Boundary Conditions

The generated mesh is associated to the CAD geometry, which allows to update the mesh automatically when the CAD geometry changes and vice versa.

Include File Management

For large-scale system models, users can organize subset data into include files and perform data manipulation operations on different include files.

Meshing

Create high quality meshes with minimal user intervention and CAD clean-up.

Get high quality HEX meshes on complex geometries, automated templated based Tet / Tetra meshing, tools to and a unique solution for midplane meshing extraction.

Hexa Meshing

Unique features and tools as hexa mesher, extruded hex mesher or thin-wall hex mesher have been developed in MeshWorks to create 100% hexa meshes on sheets and solid complex geometries.

Lorem Ipsum

Tetra Meshing

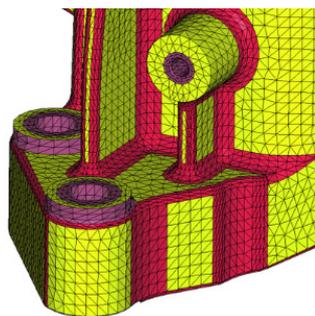
MeshWorks allows to obtain a high quality tetrahedral mesh that can be controlled through templates with the most advanced quality controls. In addition, the mesh model is automatically converted to a parametric model.

Mid-plane Meshing

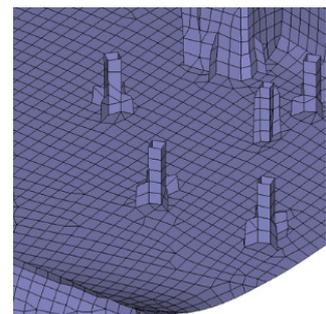
A set of automated meshing tools allows users to create mid-plane meshes for parts with complex geometries including ribs and other intersecting features. Variable thicknesses driven by CAD geometry are automatically assigned to the mesh.



Hexa Meshing



Tetra Meshing



Mid-plane Meshing

And Much More...

Parametric meshing

The patented parameterization technology converts the model into an automatic parametric mesh during the meshing process.

Associativity meshing

The generated mesh is associated to the CAD geometry, which allows to update the mesh automatically when the CAD geometry changes and vice versa.

Integrated meshing

Different mesh templates can be assigned to the CAD data according to the need, obtaining the corresponding meshes from a single model, eliminating the need to duplicate efforts.



ABOUT

CAEmesh is a FEA/CAE consultancy company and DEP MeshWorks reseller in Europe

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 footprints in Europe, China, Korea, Japan, and India.

For more information contact us at sales@caemesh.com or visit www.caemesh.com.

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