

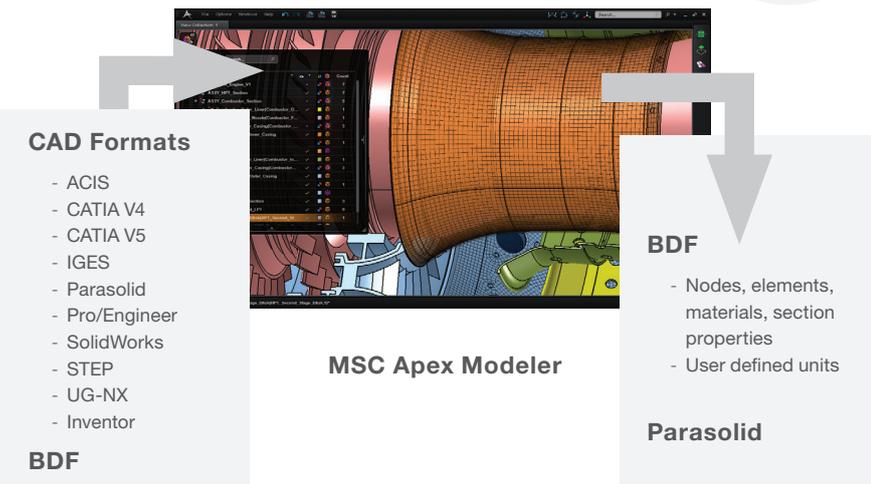
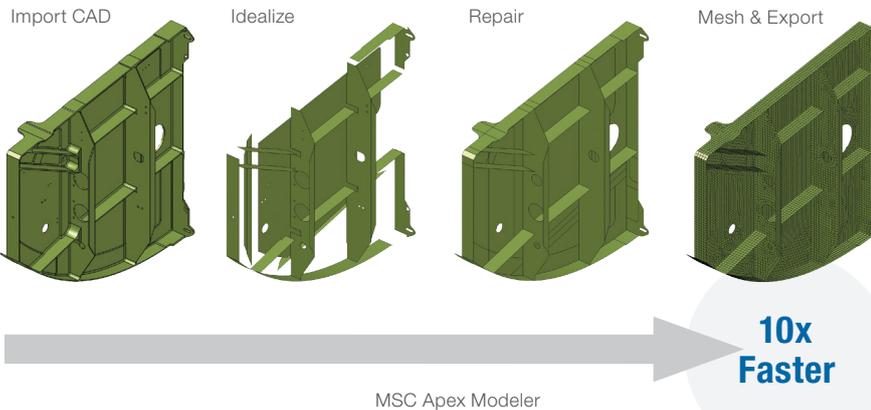
MSC Apex® | Modeler

Direct Modeling & Meshing Solution

Overview

MSC Apex Modeler is a CAE specific direct modeling and meshing solution that streamlines CAD clean-up, simplification and meshing workflow. The solution features sophisticated and interactive tools that are easy to use and easy to learn.

- **Direct Modeling** - Direct modeling allows users to create and edit geometry interactively. Simply select the entities of interest, such as a face, edge or vertex, and push, pull, or drag to implement any modifications. Direct Modeling is complemented with built in meshing technology.
- **Direct Modeling and Meshing** - For models that have already been meshed and require further geometry modification, use any of the Direct Modeling or Geometry Clean-up/Repair tools and the mesh will be immediately regenerated.
- **Easy to Use, Easy to Learn** - MSC Apex was designed to have multi-purpose tools so as to make the application easy to use. It also features numerous learning aids such as tutorials, video based documentation, workflow and at-mouse instructions which promotes single day productivity.



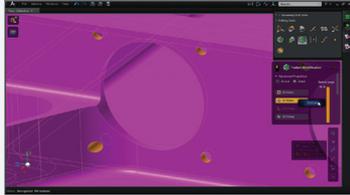
Capabilities

- **Sketching**
 - Sketch lines, squares, circles, ellipsoids, fillets, and chamfers
 - Project, split, and edit existing sketches
- **Geometry Edit Tools**
 - Identify features and defeature
 - Geometry Cleanup and Check
 - Automated Geometry Cleanup
 - Split, fill and stitch surfaces
 - Add/Remove vertices or edges
 - Use Virtual Topology (Suppress/Unsuppress vertices or edges)
- **Direct Modeling**
 - Interactively edit solids and surfaces with Push/Pull or Vertex/Edge drag
- **Assembly Connections**
 - Connect structural components via Glue
 - Represent common connection types as Springs or Rigid links
 - Create mesh dependent connections across parts (Aligning nodes and rigidly tying nodes)
- **Midsurface Creation and Repair Tools**
 - Extract mid-surfaces by auto offset, constant thickness, distance offset, or tapered methods
 - Incrementally build mid-surfaces of uniform or non-uniform thickness for planar or curved solids
 - Connect surfaces via direct modeling (Vertex/ Edge Drag), auto Surface Extend or stitching
- **Meshing and Mesh Editing**
 - Mesh curves, surfaces, and solids, available element types: beam, quad, tria, tet, hex
 - Regenerate meshes automatically as geometry is modified
 - Refine meshes with Feature Base Meshing and Mesh Seeding
 - Move and align nodes, and split elements
 - Visually inspect element quality
 - Construct Seed Points to facilitate part connection
 - Mesh surfaces via paver, 4 side map, or 4+ side map mesh methods
 - Display element normals and reverse or auto align normals
- **Model Attribution**
 - Material Creation and Assignment
 - Behavior Creation and Assignment
 - Automatic creation of thickness and offset properties for uniform and non-uniform cross sections
 - Glue Connections
 - Interactively position and orient beam spans
 - Define beam cross sections for standard shapes
 - Represent point masses
- **Easy to Learn and Use**
 - Use the application in one of 3 supported languages: Chinese, English, and Japanese

Direct Modeling and Meshing Workflow

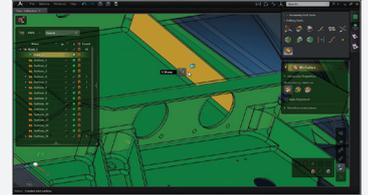
1 Remove numerous & unnecessary features

Specify feature type, i.e. fillets, chamfers, holes, cylinders, etc., define feature dimension ranges, and automatically remove targeted features from the model.



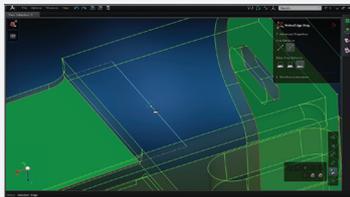
2 Interactively extract midsurfaces

Automatically or manually perform midsurface extraction. Options include: auto offset, constant thickness, distance offset, and tapered midsurface.



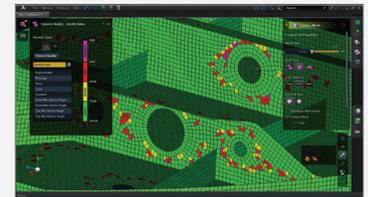
3 Repair surfaces with direct modeling

Select an edge or vertex and interactively drag it to a desired location. Guidelines give you a preview of the action being performed.



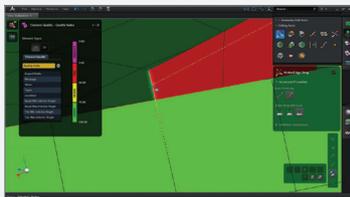
4 Mesh and review mesh quality

Mesh models based on mesh size, element type, mesh seed and feature



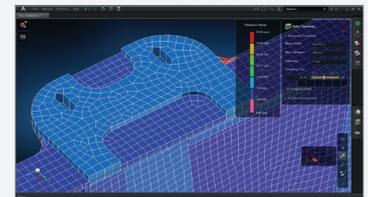
5 Continue repairing with direct modeling and meshing

Use direct modeling to further repair geometry that may already be meshed. Slivers or cracks may easily be resolved and the mesh can be quickly regenerated automatically.



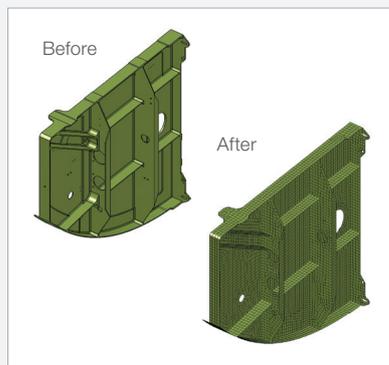
6 Automatically create thickness and offset assignments

Use Auto Thickness and Offset to create numerous property definitions for shell elements, and export to the .bdf file format



Productivity Gains

For this Aerospace Bulkhead and with conventional CAE tools, 50 hours were required to create meshed geometry. In MSC Apex Modeler, the process only took 3.5 hours and required little effort to extract mid-surfaces, connect separate surfaces, mesh, and assign thicknesses and offsets.



	Today's Workflow	MSC Apex Workflow
Expertise Required	High	Low
Analysis geometry creation	35h	1h
Mesh creation	3h	2h
Property Assignments	12h	.5h
Complete entire scenario	50h	3.5h

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