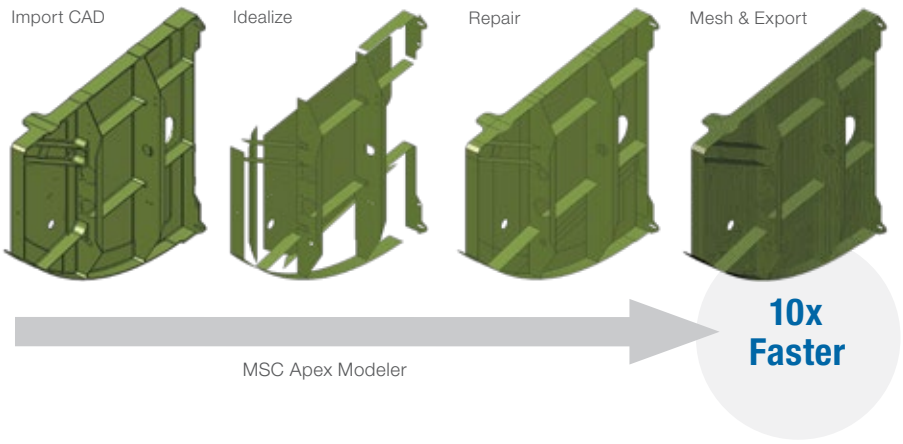
MSC Apex® | Modeler

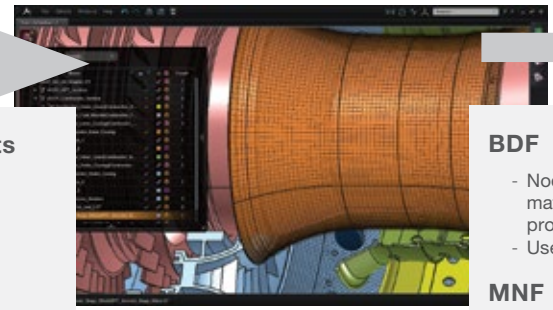
Direct Modeling & Meshing Solution

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 that automatically updates the mesh for any geometry modification.
- **Midsurfacing** - Apex provides efficient midsurfacing tools from large assemblies. Our dedicated midsurfacing algorithms allow the user to create midsurfaces from solids with complex geometry and varying thickness. Another set of geometry tools extends and connects these surfaces automatically.
- **Meshing** - Apex high performing meshing algorithms are generative. Complex solids can be hex meshed, by splitting them into hex-meshable cells and suppressing optional edges. The mesh can be guided by face splits, mesh seeds, and outer face meshes.
- **Easy to Use, Easy to Learn** - MSC Apex is 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.





MSC Apex Modeler

CAD Formats

- ACIS
- CATIA V4
- CATIA V5
- IGES
- Parasolid
- Pro/Engineer
- SolidWorks
- STEP
- UG-NX
- Inventor

BDF

- Nodes, elements, materials, section properties, loads
- User defined units

MNF

- Modal Neutral File
- Adams Flexible Bodies

CAD Formats

- ACIS
- Parasolid
- Stereolithgraphy (.stl)

Capabilities

- Geometry Edit Tools
  - Identify features and defeature
  - Automated geometry cleanup
  - Split, fill, stitch and extend surfaces
  - Use Virtual Topology (Suppress/Unsuppress vertices or edges)
  - Slicing, mirroring and Boolean geometry operations
- Direct Modeling
  - Interactively edit solids, surfaces and features with intuitive Push/Pull or Vertex/Edge drag tools
- 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
  - 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 normal
  - Mesh solid geometry with hex elements using multi-cut, multi-sweep approach.
- Model Attribution
  - Define composite plies
  - Material Creation and Assignment
  - Automatic creation of thickness and offset properties for uniform and non-uniform cross sections
  - Interactively position and orient beam spans
  - Define beam cross sections for standard shapes
  - Represent point masses
- Assembly Connections
  - Mesh topology display to see unconnected parts
  - Connect structural components via Glue
  - Represent common connection types: springs, dampers, spring-dampers, bushing, rigid links or flexible links
  - Create generative mesh dependent connections across parts (Aligning nodes and rigidly tying nodes)
  - Local coordinate system
- Easy to Learn and Use
  - Learn with in-program videos, workflow instructions, at-mouse instructions, and searchable documentation
  - Use the application in one of 5 supported languages: Chinese, English, French, German, and Japanese
  - Submit application enhancement ideas or issues with the Integrated Reporting Tool
  - Undo/Redo actions

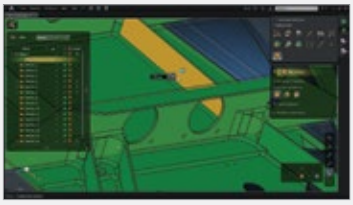
Direct Modeling and Meshing Workflow

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.

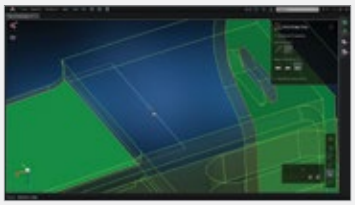
2 Interactively extract midsurfaces

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



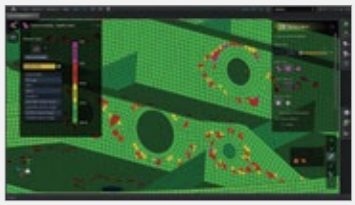
3 Repair surfaces with direct modeling

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



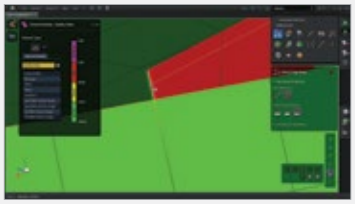
4 Mesh and review mesh quality

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



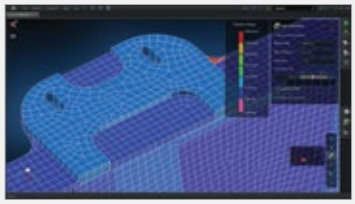
5 Continue repairing with direct modeling and meshing

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

Aerospace

Before

After

	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**

Automotive & Consumer Goods

Before

After

	Today's Workflow	MSC Apex Workflow
Expertise Required	High	Low-Medium
Analysis Geometry Creation	7h	.75h
Mesh Creation	2h	.17h
Property Assignments	1h	.08h
Complete Entire Scenario	**10h**	**1h**

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