

DATA SHEET



3D Mesh

Product Overview

3D Mesh is an object-based software development toolkit providing fully-configurable surface and volumetric meshing capabilities. The component is optimized for pre-processing within a wide-range of applications with computer-aided engineering (CAE) requirements including structural analysis, heat transfer, computational fluid dynamics and electronic design automation (EDA). 3D Mesh provides fast, automatic mesh generation for arbitrary curves, surfaces and volumes. It also provides mapped mesh, boundary layer and extrusion mesh generation for specialized geometry. The component is thread-safe, enabling multi-threaded applications to take advantage of multi-core hardware platforms to deliver unsurpassed performance. 3D Mesh is licensed from Visual Kinematics, Inc.

Industry Proven

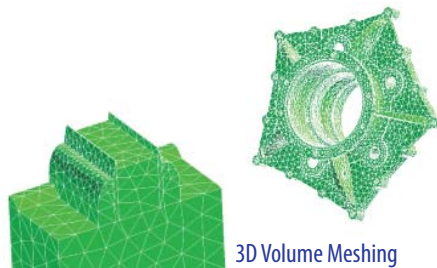
3D Mesh provides a wide-range of meshing capabilities to meet specific industry requirements. Mesh refinement and sizing control is supported with any combination of global element size, minimum element size, curvature based sizing and growth rate parameters. Further refinement is possible thru specific sizing control placed on any number of arbitrary locations in space as well as a user defined function of spatial coordinates. 3D Mesh includes unique defeaturing and healing capabilities that can be performed on both the 3D geometry and the mesh.

Product Highlights

- Automated 3D mesh generation
- 3D volume, surface and curve mesh
- Wide-variety of element sizing controls and refinement
- Integrated with ACIS® and HOOPS
- Thread-safe component

3D Volume Meshing

3D Volume meshing is provided for applications such as mechanical engineering stress analysis (10 node parabolic tetrahedra), fluid flow and electronic TCAD analysis (4 node linear tetrahedra).



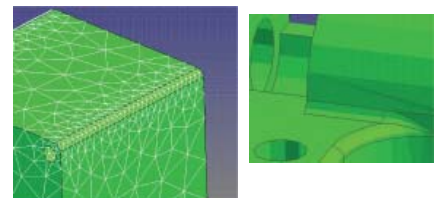
3D Volume Meshing

Specific capabilities include:

- Fully automatic tetrahedral meshing
- Target edge length and growth rate
- Input geometry from surface mesher as linear or parabolic boundary triangles
 - Interior hard points, lines and triangles
- Linear or parabolic output tetrahedra
- Boundary triangulation unchanged in output grid by default
- Adaptive mesh refinement

Surface Meshing

3D Mesh provides both curve and surface meshing for applications such as electronic method of moments analysis (3 nodes triangles, 4 node quads) and aircraft structures/automotive body panels (4 node quads).



Surface Meshing

Capabilities include the ability to:

- Generate linear or parabolic triangles and/or quadrilaterals
- Incorporate arbitrary user defined points and edges into mesh
 - Snap to edge or face
 - Trimming loops or scratches
- Control element size
 - Target edge length, minimum or maximum edge length
 - Maximum spanning angle, minimum included angle
 - Growth rate
- Optionally control edge length on any ACIS geometry entity
- Simplify or coarsen mesh
- Optional geometry defeaturing removes small geometry resulting in fewer distorted elements and reduced element count

DATA SHEET - 3D Mesh

Extrusion Meshing

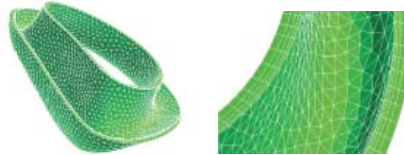
3D Mesh supports extruding 3D elements from 2D elements. Input geometry is provided by the surface mesher as linear or parabolic triangles or quadrilaterals. Elements can be extruded along a piecewise cubic path or extruded along node normals with optional growth rate.

Extrusion meshing is often used to generate boundary layers for computational fluid dynamics and to generate hexahedral elements for 2.5D prismatic structures for mechanical analysis.

Extrusion meshing supports:

- Input triangles extruded to tetrahedra
- Input quadrilaterals extruded to hexahedra
- Automatic recession algorithm checks for extrusion collisions

3D Mesh also provides 2D Plane meshing to help support the transition to 3D applications. The special purpose 2D mesher is extremely fast and well suited for electronic analysis of a microprocessor and general two dimensional analysis (3 and 6 node triangles).



Extrusion Meshing

3D Mesh/ACIS/HOOPS Bridge

3D Mesh includes a bridge to 3D ACIS Modeler and HOOPS 3D Application Framework (HOOPS/3dAF) for fast, reliable integration. The bridges ensure integration reliability and rapid implementation.

The bridge provides the ability to:

- Input geometry directly from ACIS and directed to the surface mesher
- Generate nodes and elements associated to ACIS entities
- Access internal meshing objects for specialized application needs
- Generate meshes from ACIS entities and display them via HOOPS

For more information or to request a free evaluation go to: <http://www.spatial.com/products/3d-mesh>

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