



What's New in [Version 9.0](#)

# List of new features developed in V9.0

## CAD

- Geometry creation features  
Node, Line, Arc, Spline
- Advanced geometry tools  
Revolve, Extrude, Sweep, Loft
- Improved surface meshing  
Updated NetGen meshing  
EGADS based meshing algorithm
- Improved STEP and IGES import
- Read Coloured STEP file
- Group faces and Label properties
- New GridPro CAD format \*.gpcad

## Surface

- Surface mesh quality
- New surface import formats
- Revolve surface-feature curves along the axis
- CAD Label based surface splitting
- Inherit Surface Labels from CAD

## Topology / Blocking

- Map Topology from template to new geometry
- Auto-select block faces close to a surface/s
- Smart Topology based Cell sizing
- Higher Order based Cell sizing
- New Macro for axisymmetric geometries
- Advanced Topology Block smoother
- Split and run two independent topologies
- Clamped Nesting
- 3D Array

## Grid

- Revamped Grid schedule
- Variable boundary layer
- Grid block smoother
- Multi-select option to load grids
- Split blocks in Grid
- Extrude block faces
- New Export Formats
- Export Fluid and Solid grids
- Higher Order Mesh quality Checker

## Others

- Multiple Cut planes to create sectional view
- Improved GL features  
New Picking  
New Surface selection
- Qt Upgradation to 5.x
- Preview feature for wireframes
- Python 3 support on Linux and MAC

## Verticals

- AutoMesh Volute
- AutoMesh Nuclear Rods



# New CAD Panel

## Geometry creation features

Node, Line, Arc, Spline

## Advanced geometry tools

Revolve, Extrude, Sweep, Loft

## Geometry fixing capability

Updated Heal

## Improved surface meshing

Updated NetGen meshing

EGADS based new meshing algorithm

## Improved STEP and IGES import

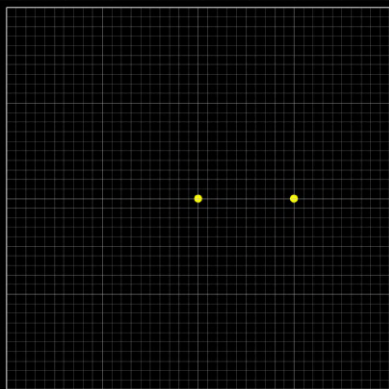
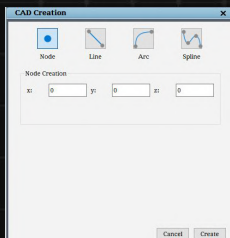
## Read Coloured STEP file

## Group faces and LAbel properties

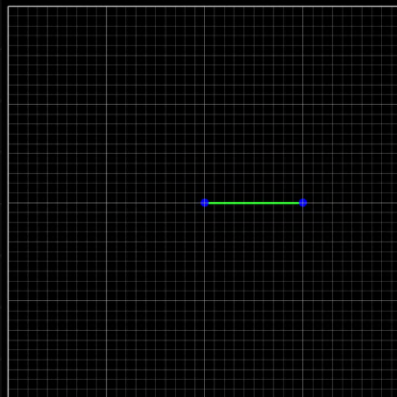
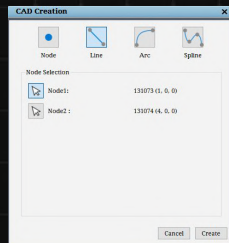
## New GridPro CAD format \*.gpcad



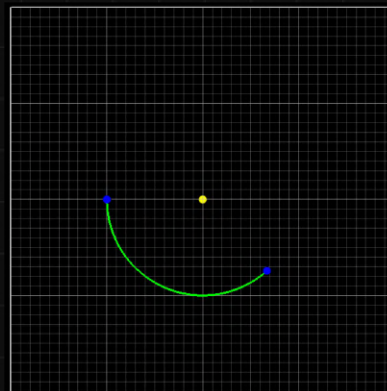
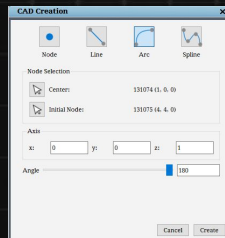
# Basic CAD Geometry Creation Tools



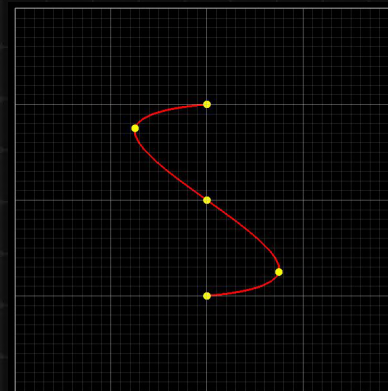
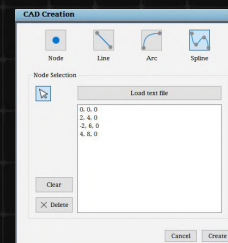
Creation of Nodes



Create Lines



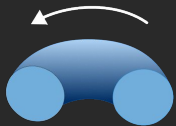
Create Arc



Create Spline





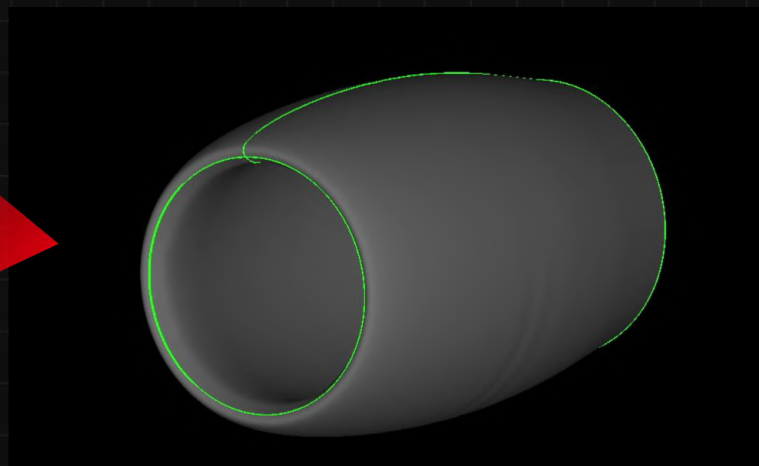
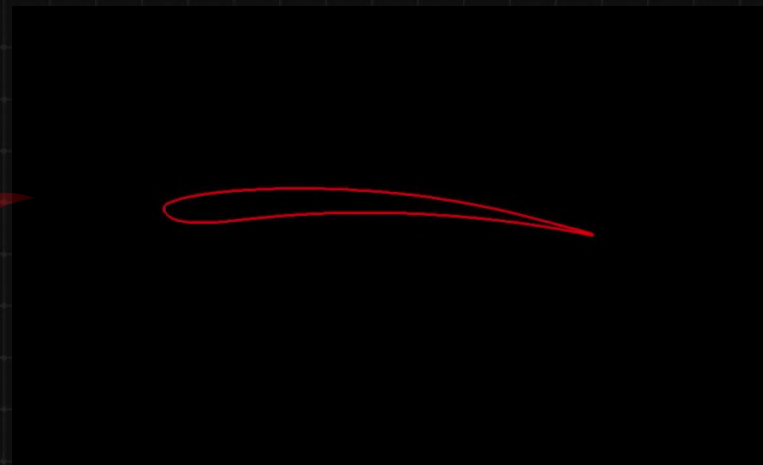
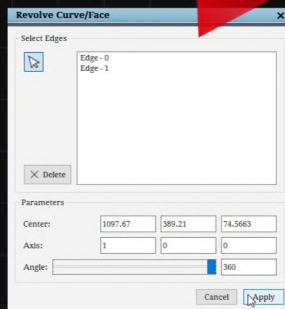


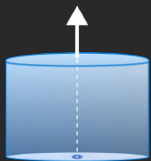
Advanced Geometry Creation tools

# Revolve

## Revolve about axis

- Any curve can be created or imported and revolved about an axis








Advanced Geometry Creation tools

# Extrude

A 2D profile can be created and extruded to create a 3D geometry.



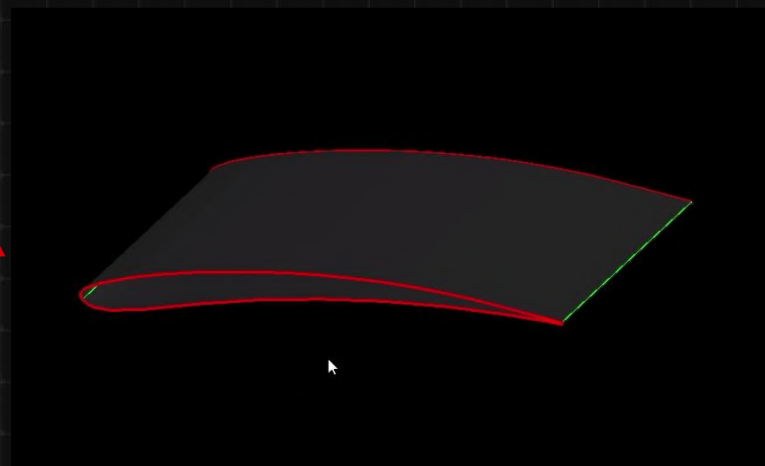
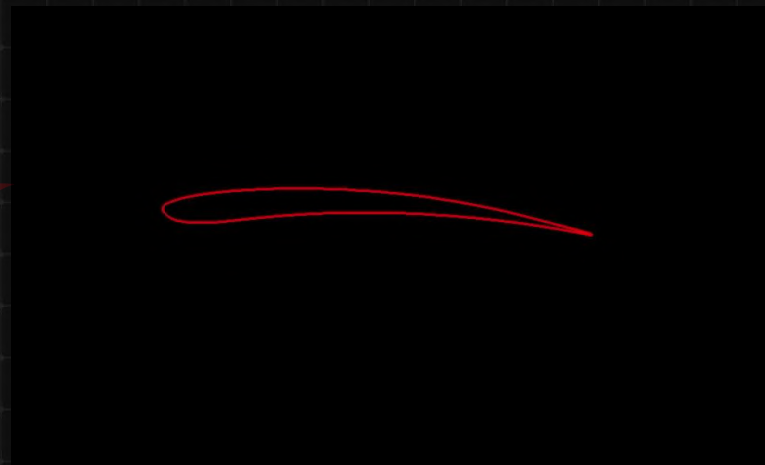
Select

 Loop - 0

Parameters

Distance:

Axis:



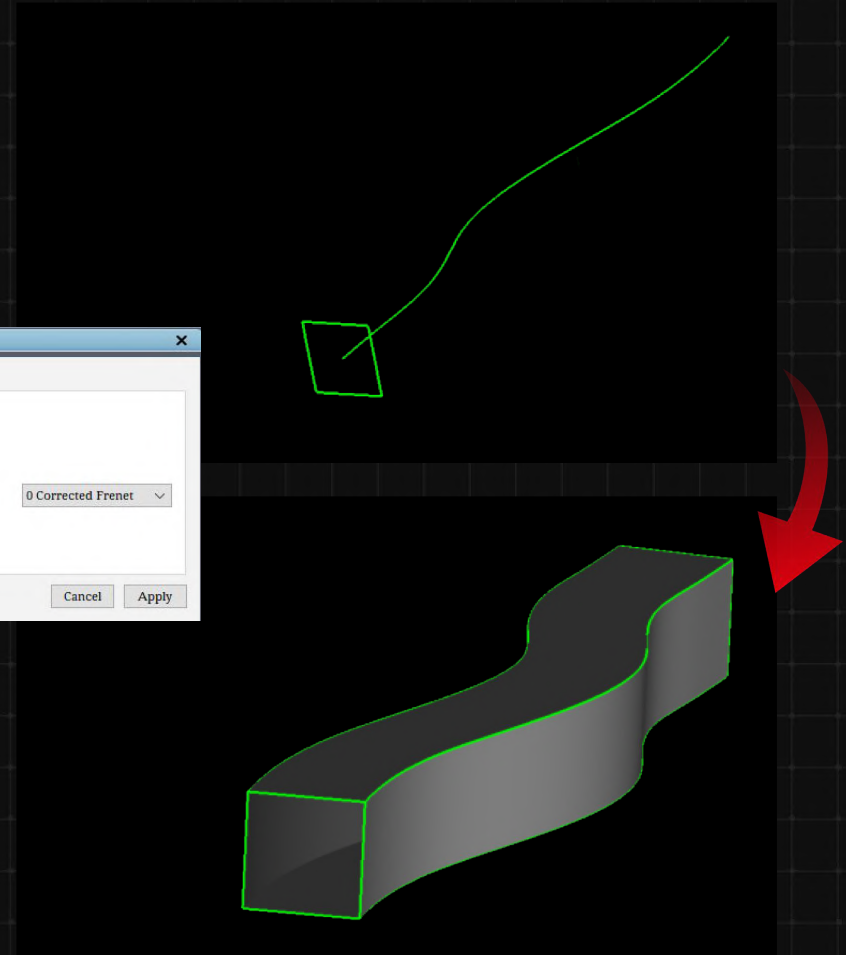
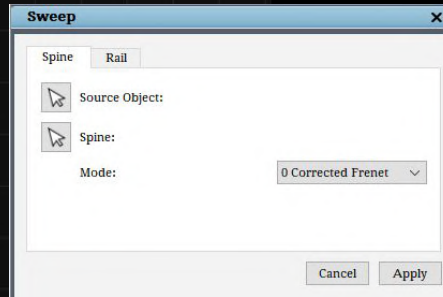


Advanced Geometry Creation tools

# Sweep

Sweeping a curve can be done by using the following parameters

- Centerline and Object
- Centerline , Source and Target
- Sweep Along Axis



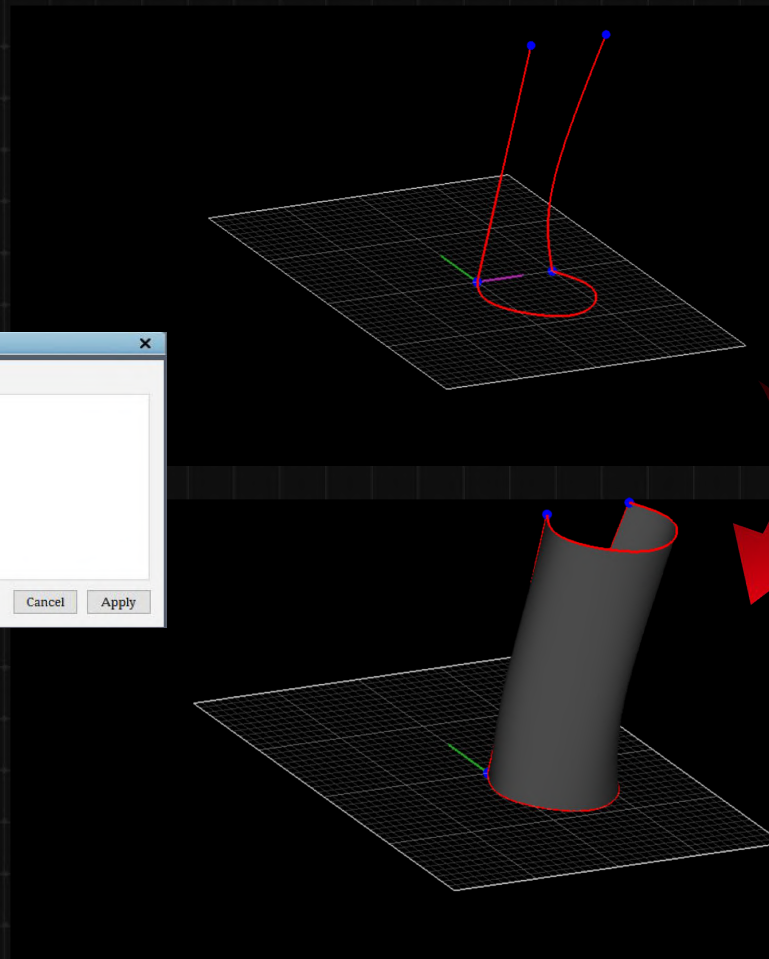
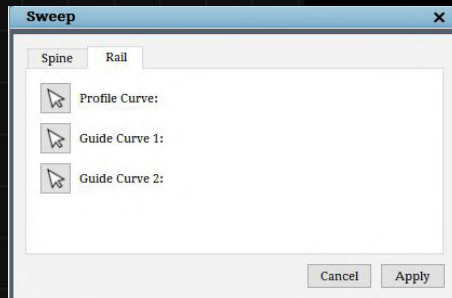


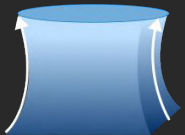
Advanced Geometry Creation tools

# Sweep

A curve can be swept along to two other perpendicular curves to create a more free form geometry.

Object along 2 curves





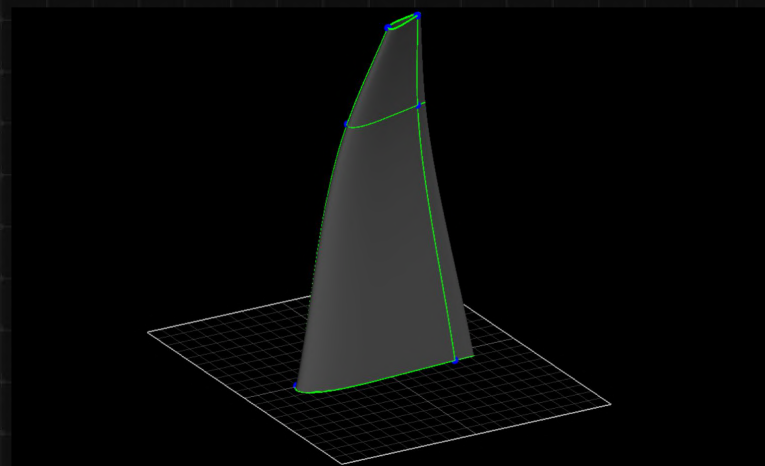
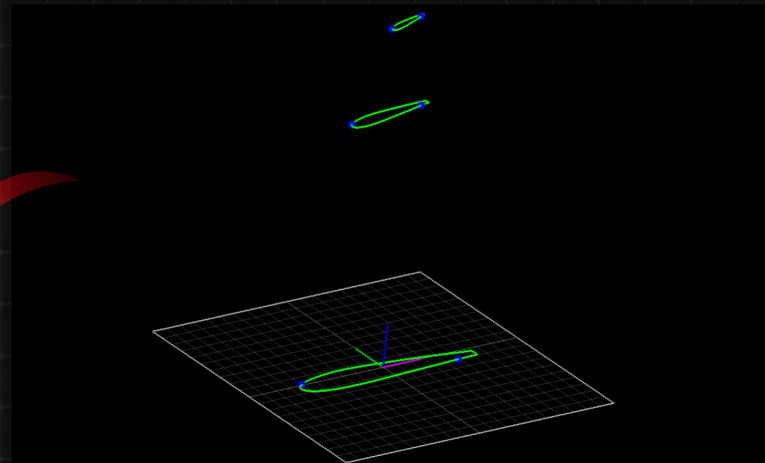
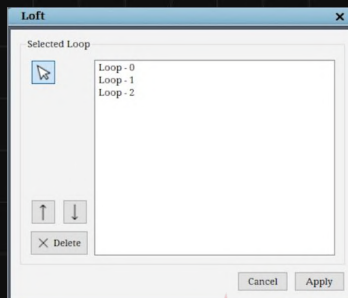
Advanced Geometry Creation tools

# Loft

Multiple sectional curves can be created or imported in GridPro to create a lofted surface.

Between two sectional Curves

Multiple sectional Curves

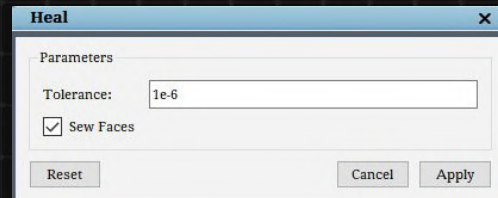
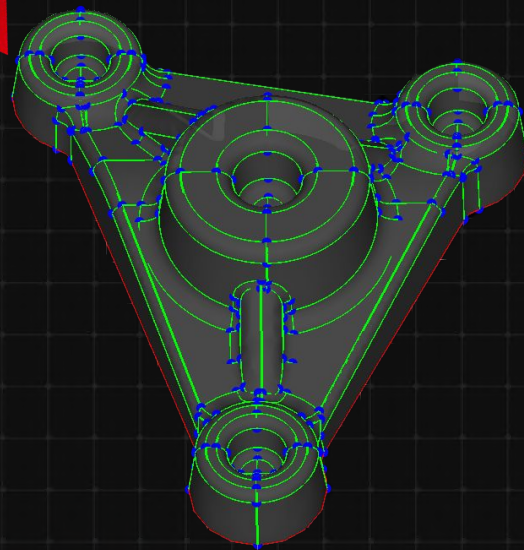
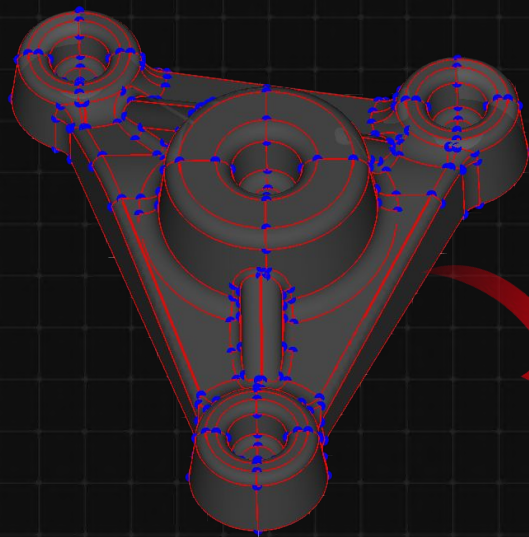




Advanced Geometry Creation tools

## Updated Heal

Improved sewing of the disconnected faces in CAD geometry

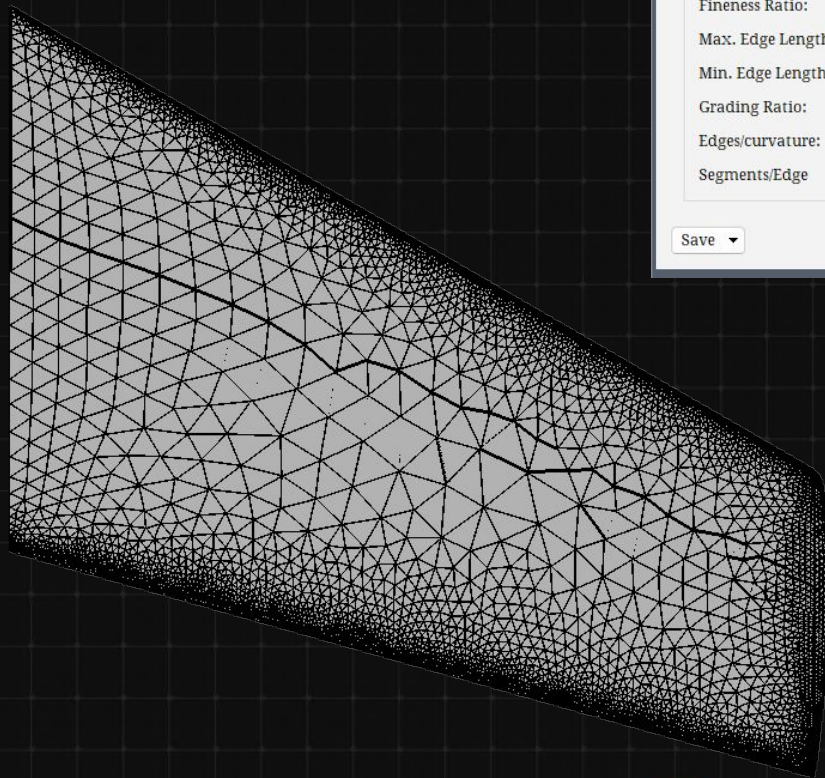


Grid Pro a product of Program Development Company LLC



Improved surface meshing

# Updated NetGen Meshing



**Generate Mesh** [X]

Engine

☐ EGADS Mesh ☒ NGMesh

Parameters

Fineness Ratio:

Max. Edge Length:

Min. Edge Length:

Grading Ratio:

Edges/curvature:

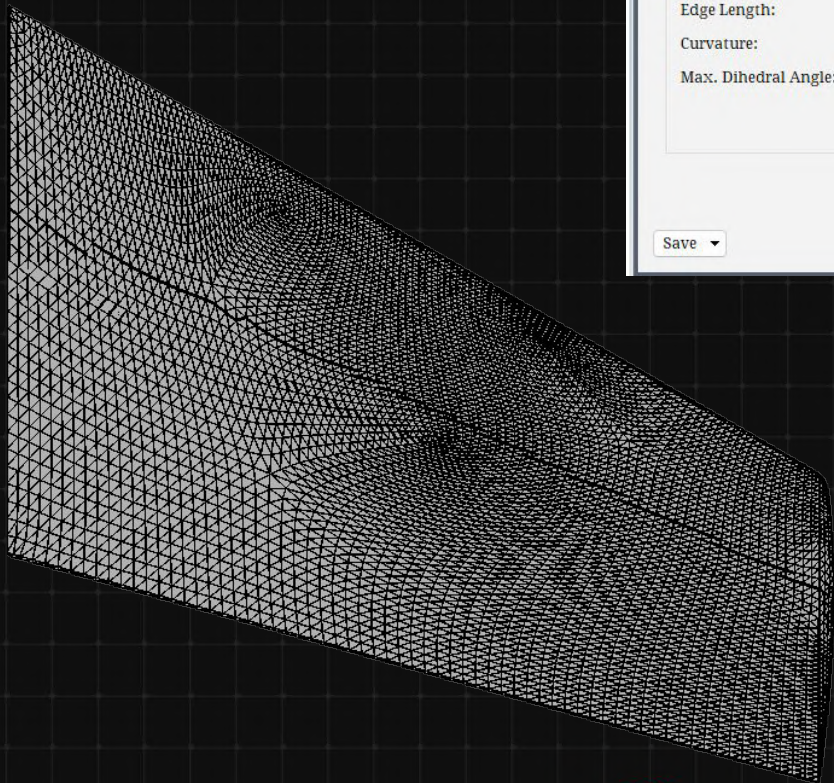
Segments/Edge:

Save [v] Cancel Apply



Improved surface meshing

# EGADS based meshing



**Generate Mesh** [X]

Engine

☒ EGADS Mesh ☐ NGMesh

Parameters

Edge Length: 0.03

Curvature: 0.01

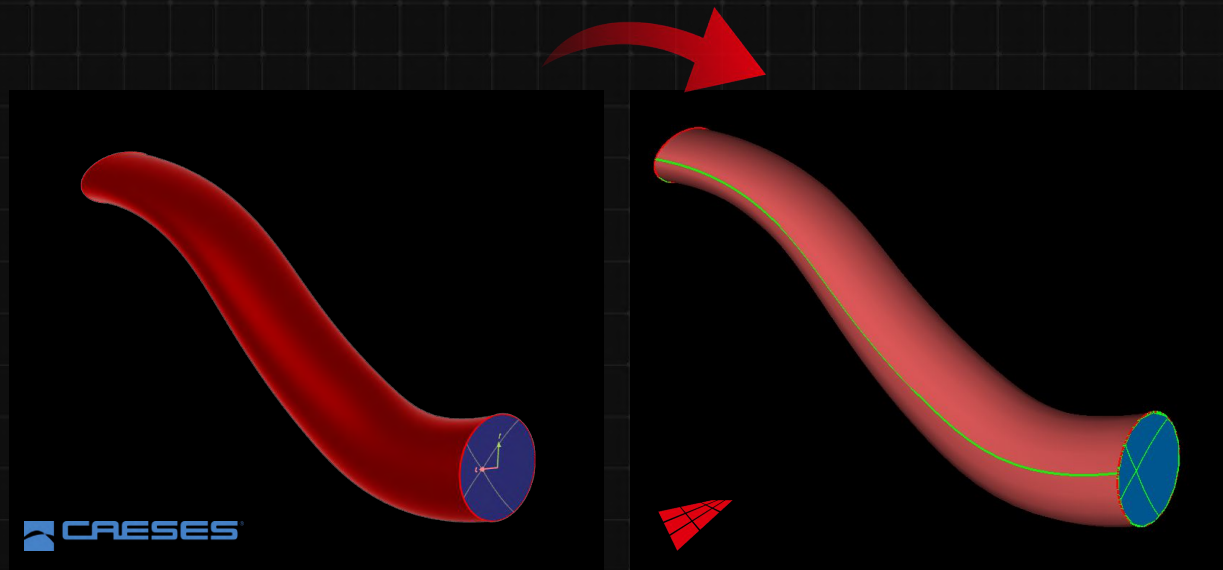
Max. Dihedral Angle: 90

Save [v] Cancel Apply



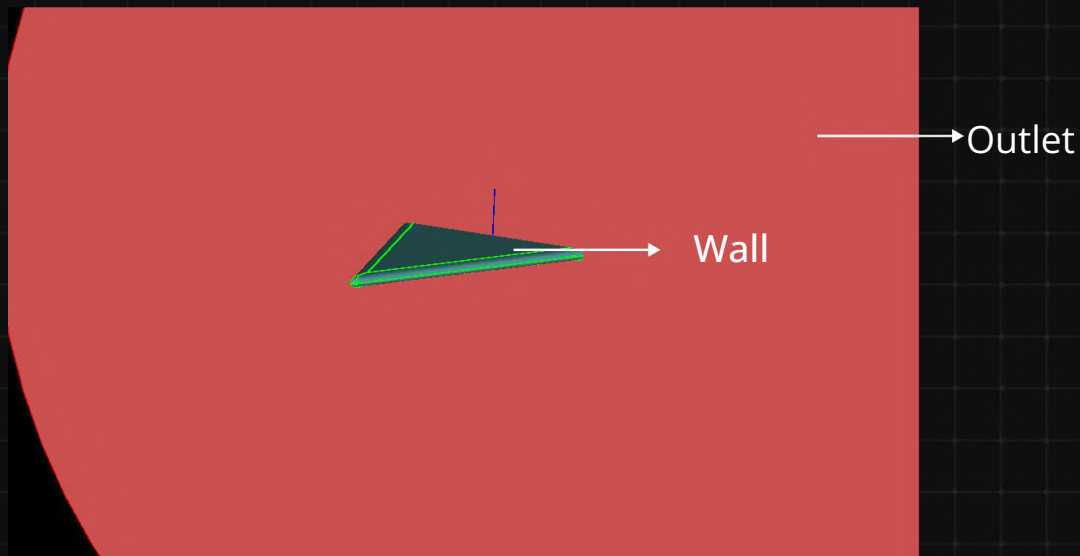
Improved surface handling

## Read Coloured STEP file



Improved CAD to Surface Handholding

## Group and Label faces with property Labels in CAD.



# Surface Features

| Surface mesh quality

| CAD label based surface splitting

| New surface import formats

— PLY

— MEDIT

| Inherit Surface Labels from CAD

| Revolve surface-feature curves along  
the axis



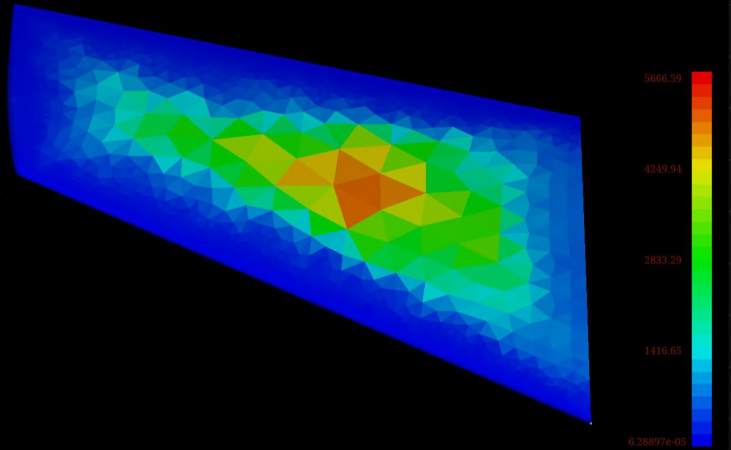
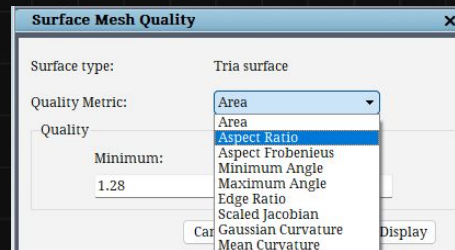
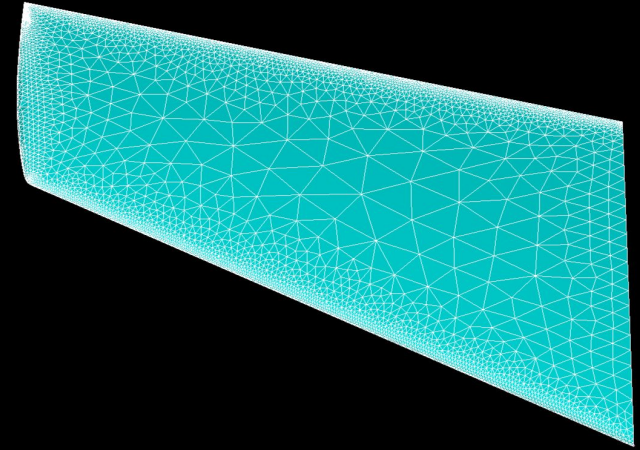
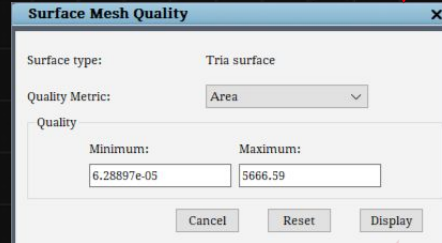


# Surface Mesh Quality

Investigate the Mesh quality of surface triangulation

— Quality parameters

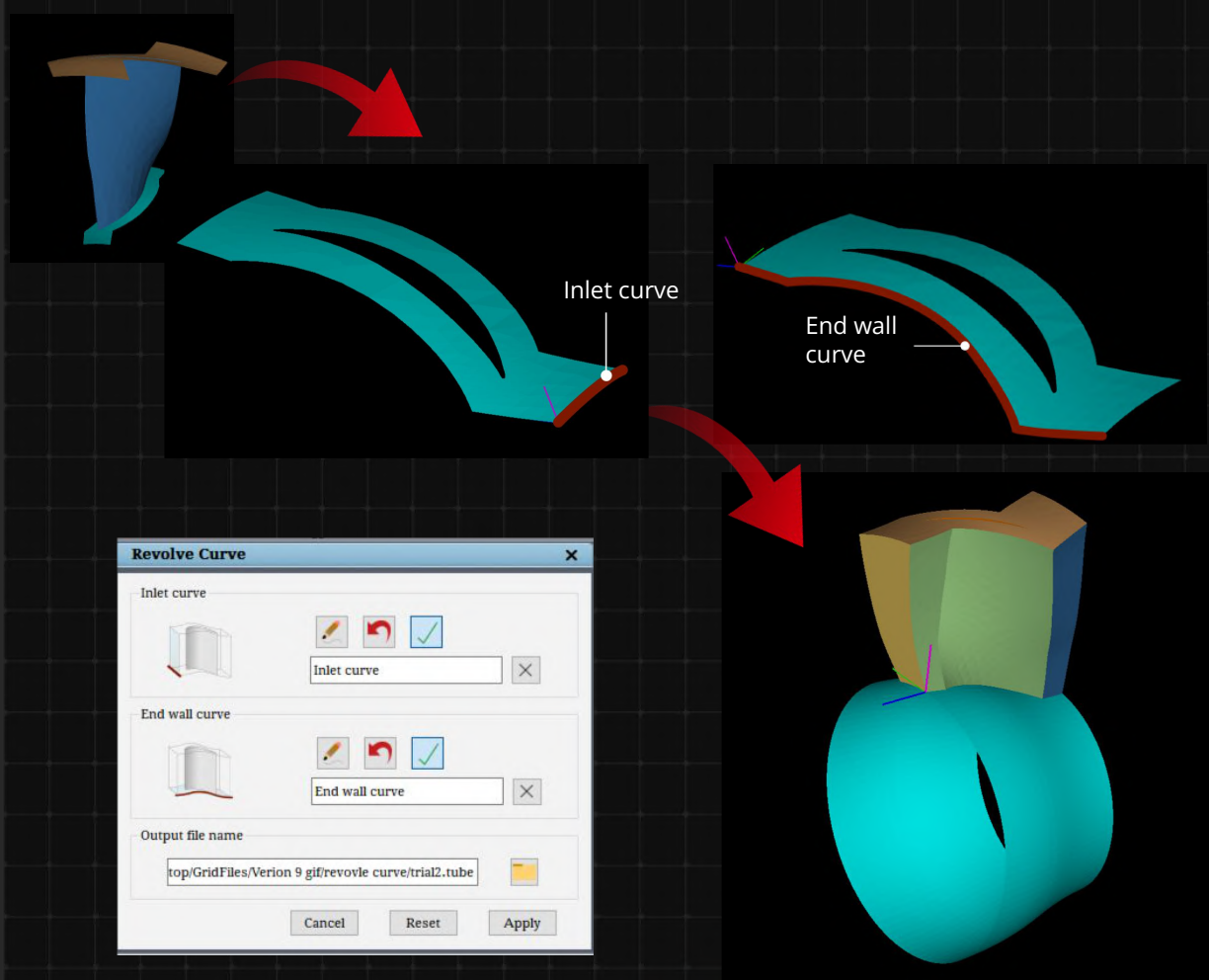
- Area
- Aspect Ratio
- Minimum Angle
- Maximum Angle
- Edge Ratio
- Scaled Jacobian
- Gaussian Curvature
- Mean Curvature





# Extend surface by Revolve

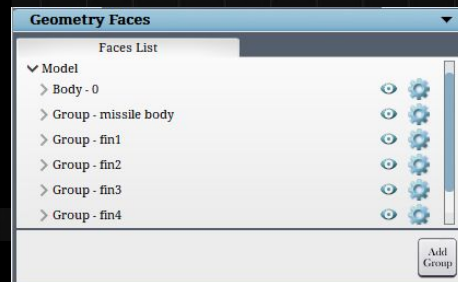
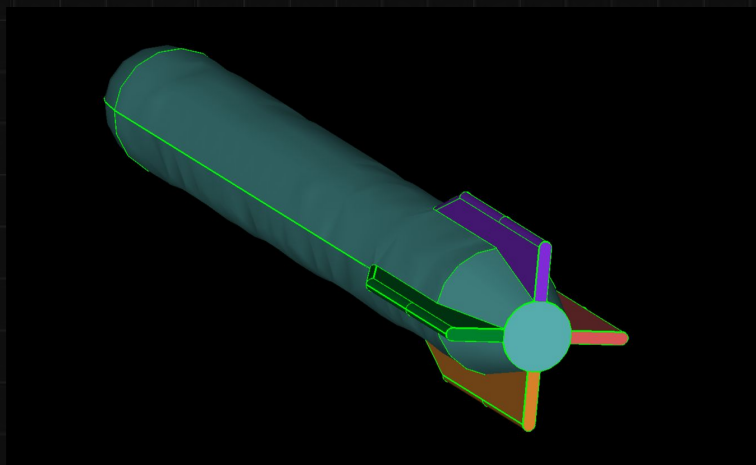
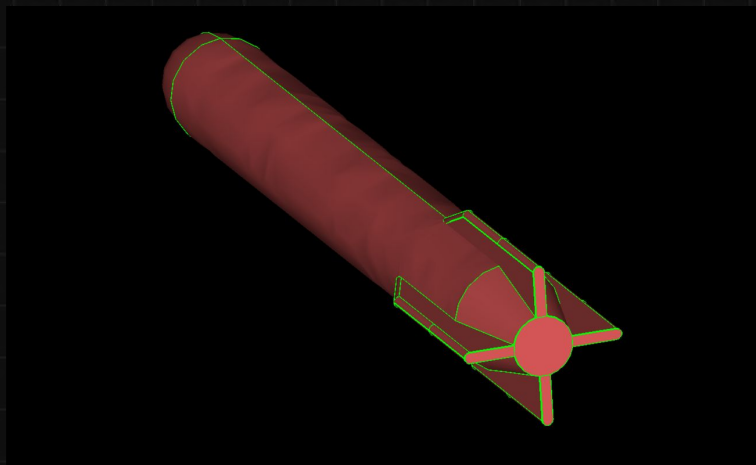
Create complete Hub and Shroud surfaces from a periodic section of a blade (STL).



# CAD label based surface splitting

Split the surfaces using the CAD Face Groups

- Now the user can label the geometries which will be carried over to Surfaces as label and grid as property label

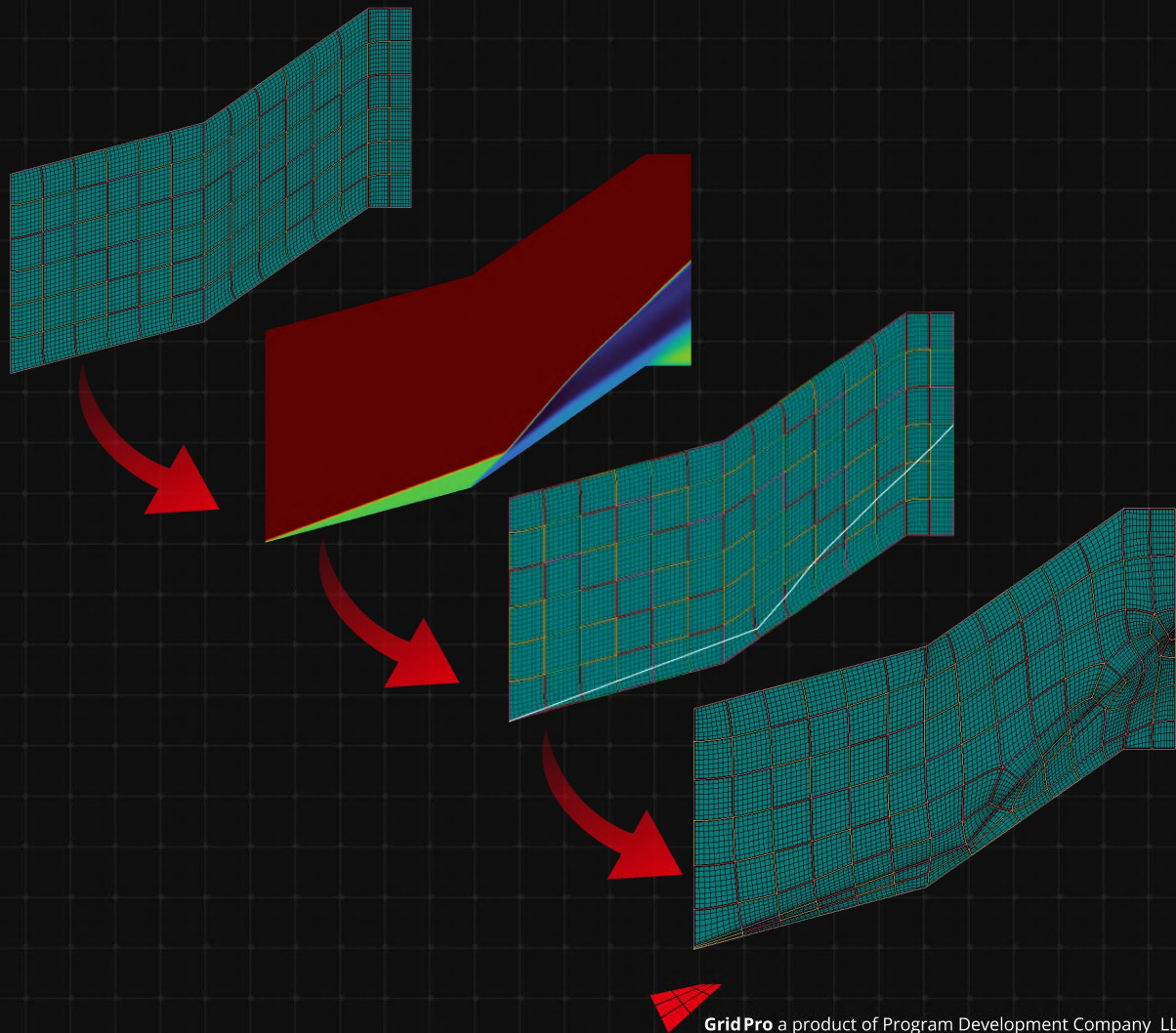


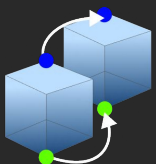
# Topology Features

- | Auto select block faces close to a given surface/s
- | Map Topology from existing template to new geometry
- | Smart topology based mesh sizing
- | Higher Order based Cell sizing
- | New topology macro for axisymmetric geometries
- | Advanced topology smoother
- | Split and run two independent topologies
- | Clamped Nesting
- | 3D Array



**Auto - select block  
faces close to a  
surface**



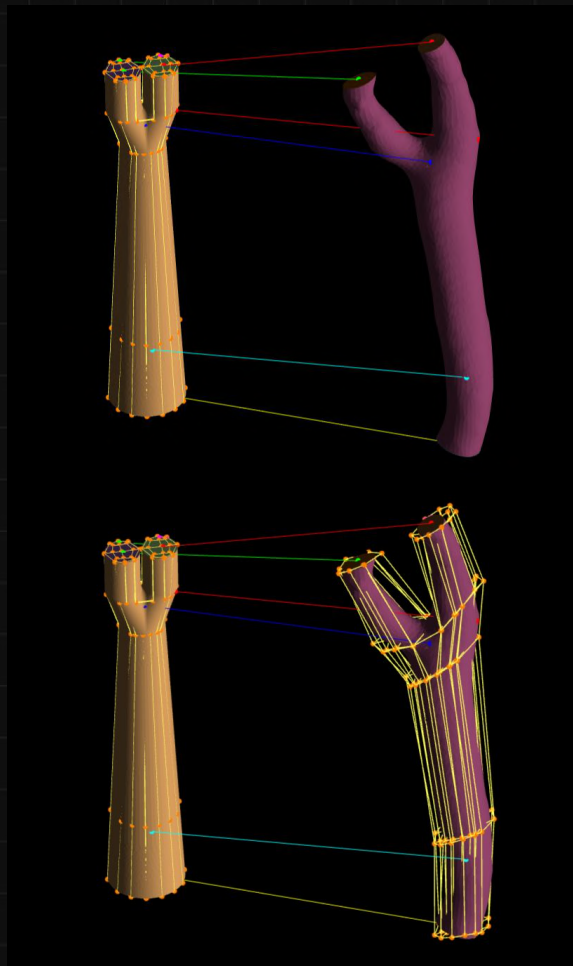


Advanced Templating Feature

# Topology Mapping

## Map Blocks between geometries

Map from one template to another new geometry which is topologically similar.



**Topology Morph**

☒ Copy ☐ Move

☒ Wireframe ☐ Topology(Wireframe+Surface)

Corner Group: c1 Surface Group: Select

Mapping Source:

a1	8000000 59.799999000000	b1	6852134 91.425547926143
a2	0000000 59.799999000000	b2	6592908 27.058582239347
a3	3000000 -449.809998000000	b3	376315 -468.356744566018
a4	1000000 -26.954109000000	b4	4445680 -83.523211029770
<a href="#">+ Add more</a>			
a5	2000000 -28.305977000000	b5	4445680 -92.540211029770
a6	4000000 59.799999000000	b6	30337670 19.511815903873
a7		b7	
a8		b8	

☒ Preview ☐ Use linear components

Cancel Reset Apply



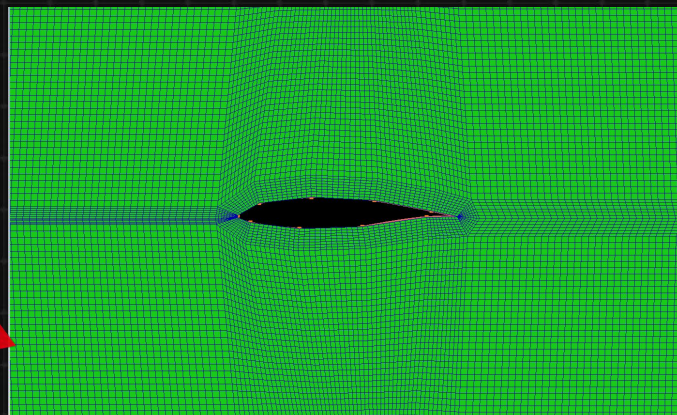
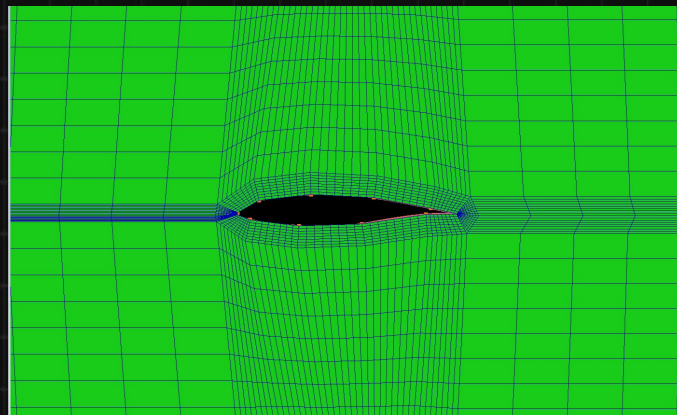
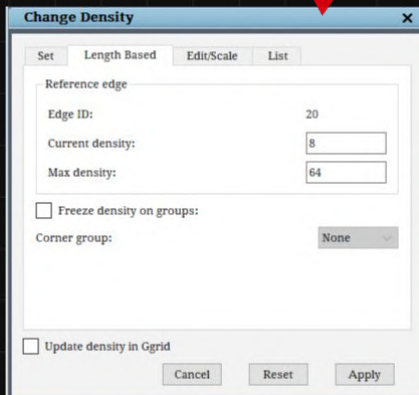




Smart topology based mesh sizing

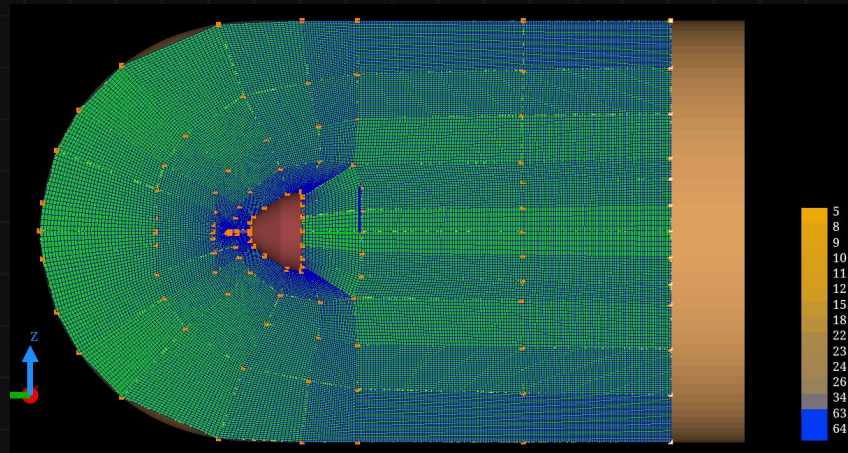
# Smart Edge Length Based Density

Change density based on Topology  
Edge Lengths





# Higher Order based Cell sizing



Change Density

Set Length Based Edit Scale List

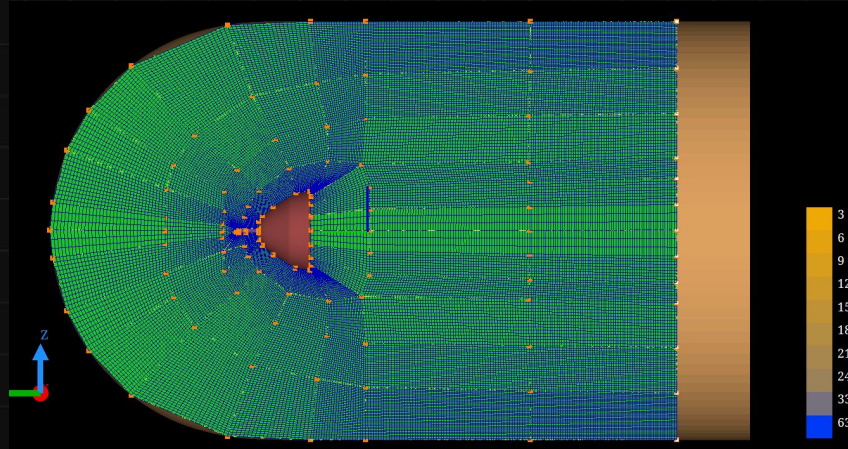
Global default density: 8

Edge ID: Select

Current density: Select

☐ Update density in Ggrid

Cancel Reset Apply



Change Density

Set Length Based Edit Scale List

☒ Change all edges with density

Change: 3 To: 3

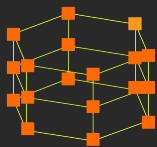
☐ Scaling: Select

Note: For Higher Order Elements

Cubic  
Linear  
Quadratic  
Quartic

Cancel Reset Apply

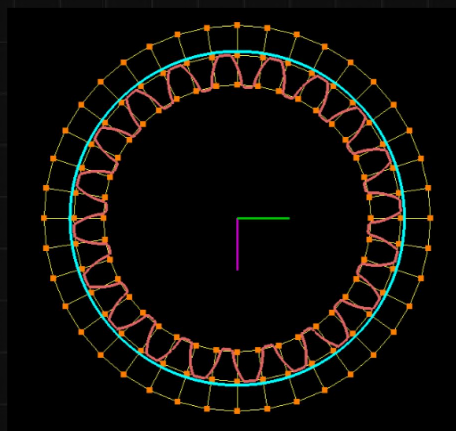
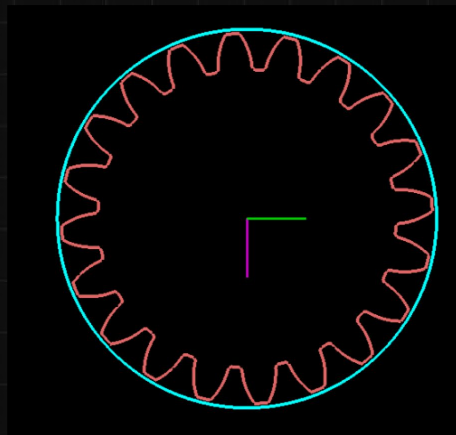




Topology macro for axisymmetric geometries

## Polygon Macro

Can be used to create automatic topology for desired number of sides. For e.g., 2D Gear



**Topology Templates**

3D

Box Cylinder Ellipsoid Polygon

Axis

☐ X ☐ Y ☒ Z

☐ User defined

X: 0 Y: 0 Z: 1

Evaluate axis: None

Centre

X: 0 Y: 0 Z: 0

Evaluate centre: None

Radius

☐ Radius Value 18

Evaluate radius: None

Height along the axis

☐ 1

Wireframe specification

☐ No of sides: 40

☐ No. of sections along height: 0

☐ Wireframe along the radius: 3

Increment level for radius: 4

☐ Angle of rotation w.r.t axis: 0

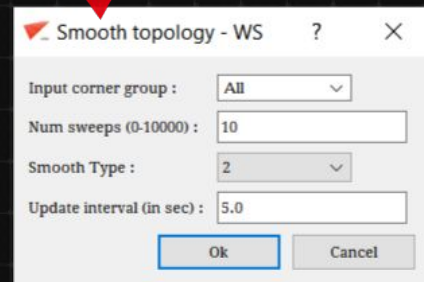
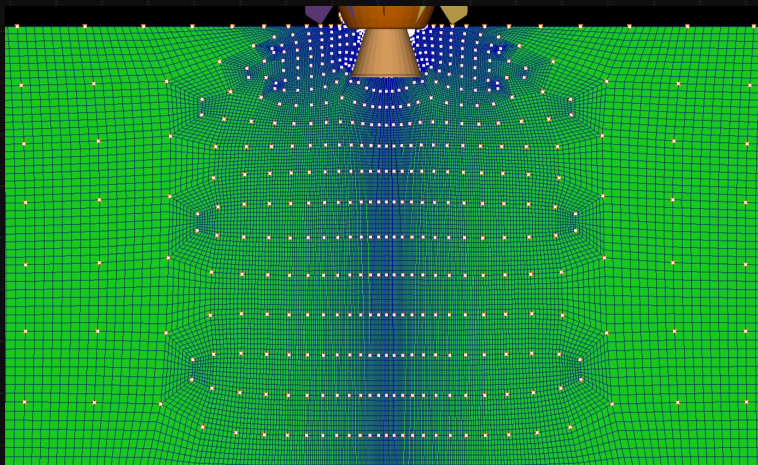
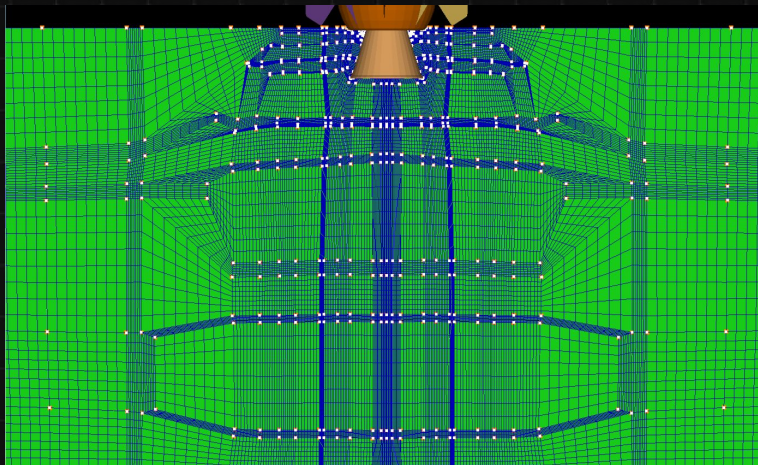
☒ Preview

Cancel Reset Apply



# Advanced topology smoother

Smoothen a loosely positioned topology.

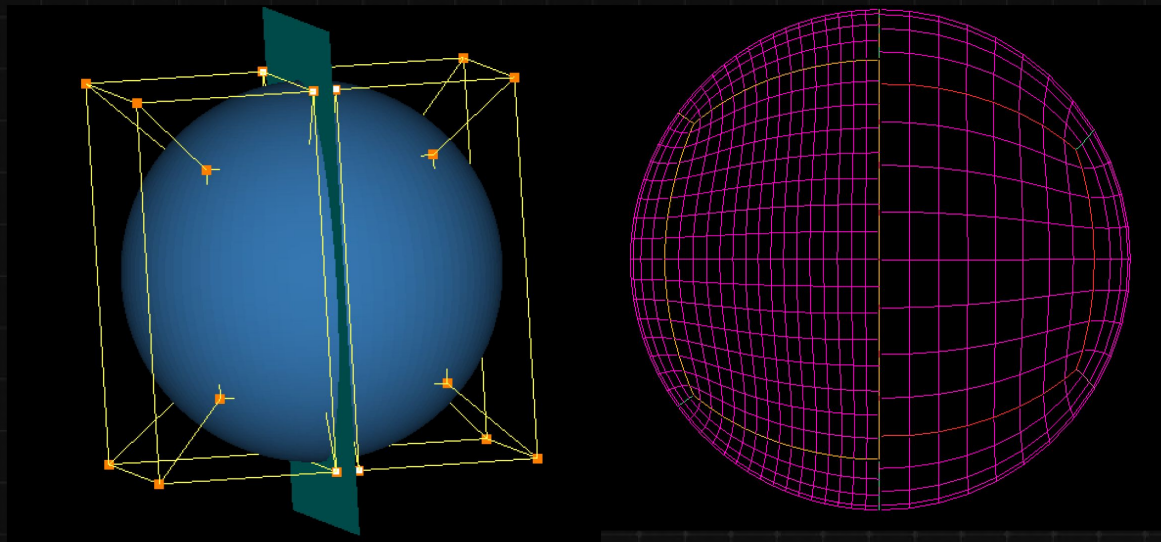


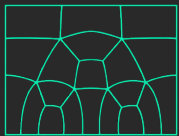


# Split and run two independent topologies

A single topology can be split into two disjoint topologies.

The grid smoother generates on both and writes to single grid file.

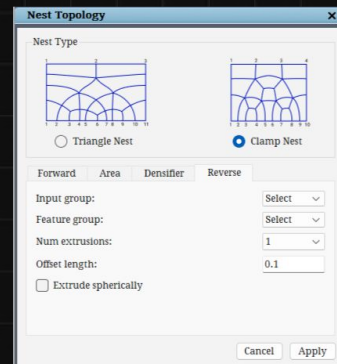
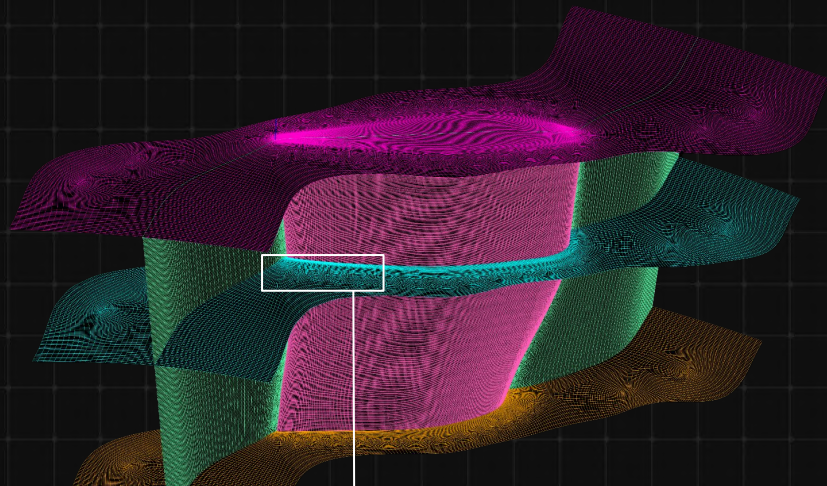
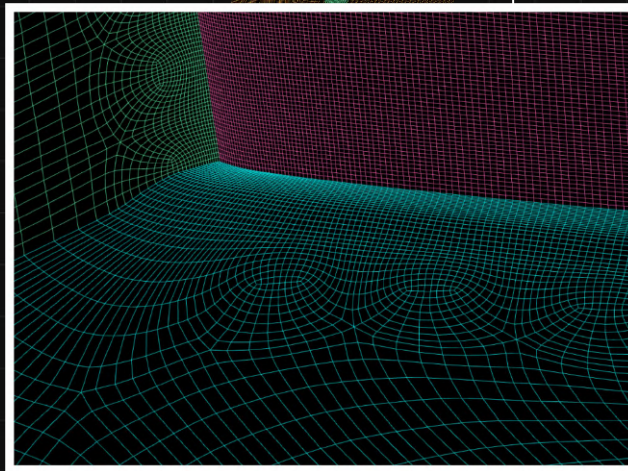




## Clamped Nesting

Create clamped nested block structure automatically in addition with the existing triangular nesting.

Clamp nesting aggressive refines mesh in the close proximity to the geometry and coarsens outside of the region.

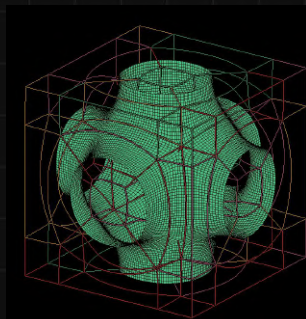




## 3D Array

Blocking can be created for a single periodic section and extended in X, Y and Z directions.

A triply periodic region of a Schwarz-p surface is blocked and extended to create a 3/3/3 structure.



3D Array

Additional array

Columns:	Rows:	Level:
2	2	2

Distance between

Columns:	Rows:	Level:
4	4	4

Total distance

Columns:	Rows:	Level:

Base array

Corner group: c1

Surface group: s1

Face assignment settings

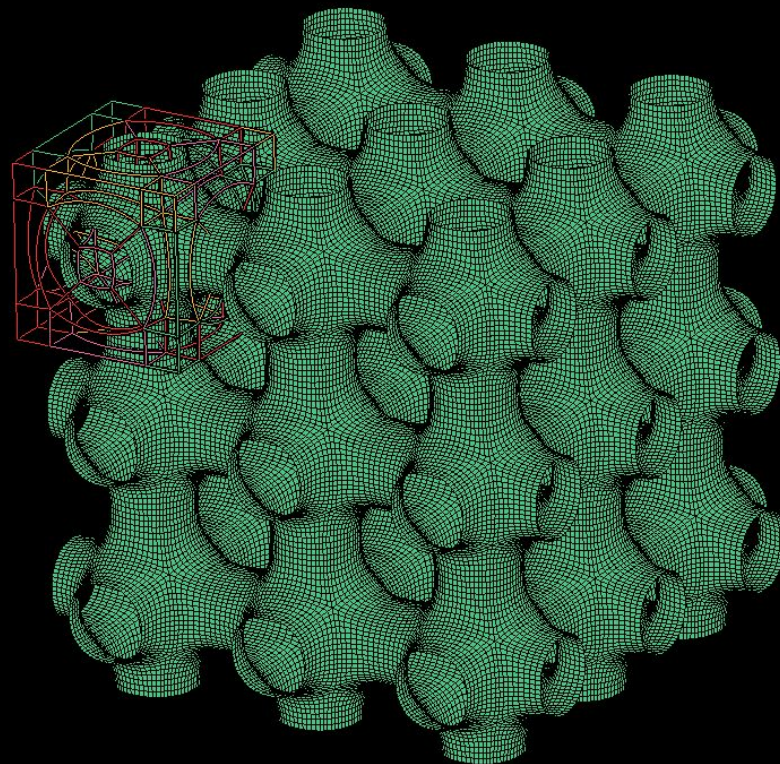
Inheritance flag: Smart Inheritance

Link flag

☐ Without link ☐ Link ☒ Merge

Columns:	Rows:	Level:
c1	c4	c7
c2	c5	c8

Reset Cancel Apply





# Grid Features

- | Grid schedule with advanced features to speedup smoothing

- | Scaled boundary layer clustering using scale planes

- | Grid block smoother

- | Load multiple grids at once

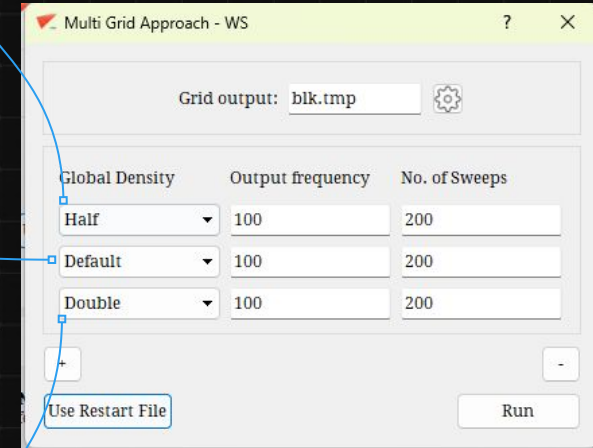
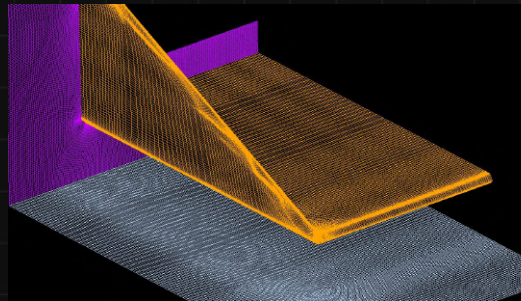
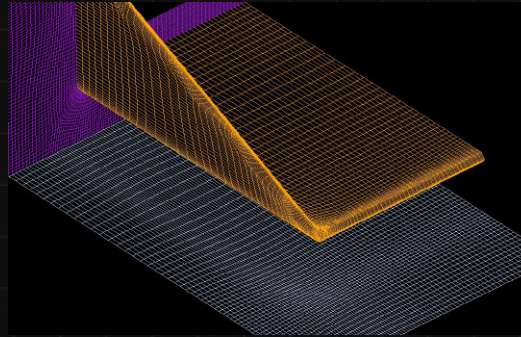
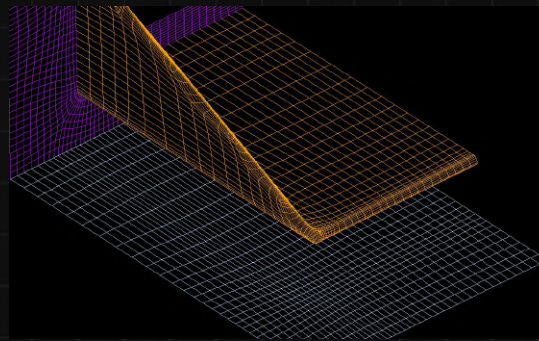
- | Split blocks using grid sheets

- | Extrude block faces - Enhancement



## Faster Smoothing Schedule

Grid schedule with advanced features to speedup smoothing by exploiting the multi gridability of Structured meshes



Scaled boundary layer clustering

# Variable Boundary Layer Clustering

Scale planes allows users to create a boundary layer clustering which can be increased along one or two directions.

scalePlane - WS

☒ Unidirectional ☐ Bidirectional

Surface: 1

☒ Parameters:

First cell height:

☒ Number of cells:

☐ Growth rate:

Define Scale Plane

Direction of cluster: 1

Work Plane

Get workplane coordinate

Centre:

x: 0 y: 0 z: 0

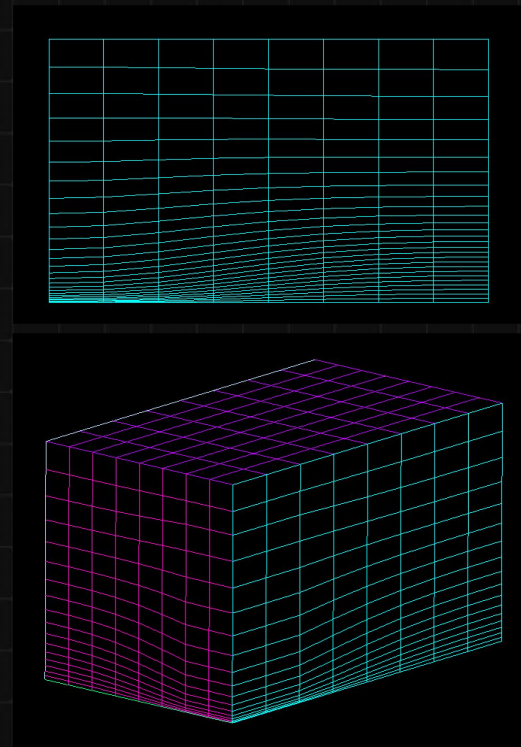
Normal:

x: 0 y: 0 z: 1

Cluster scaling factor: 1

Create

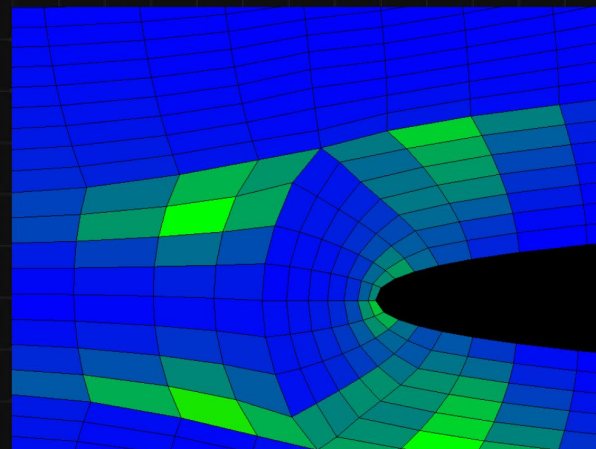
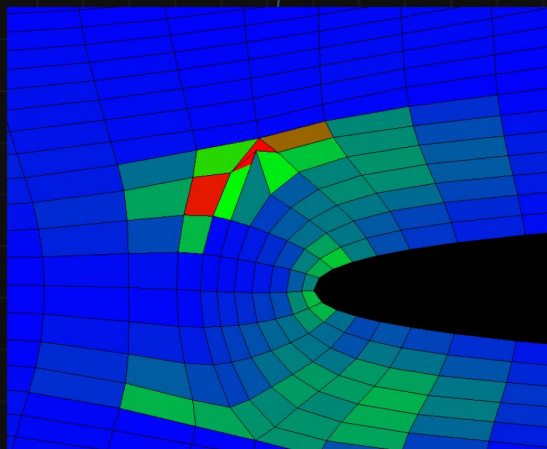
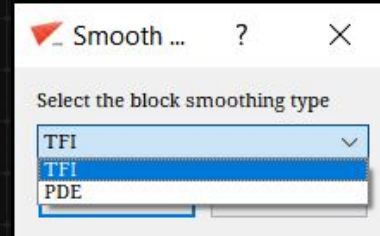
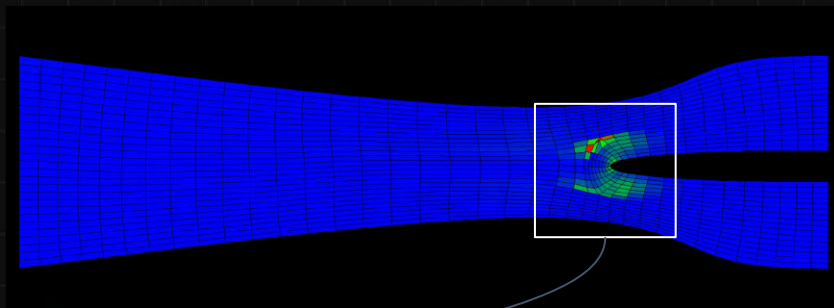
Cancel Reset Apply



Grid block smoother

# Mesh Smoothing - Post

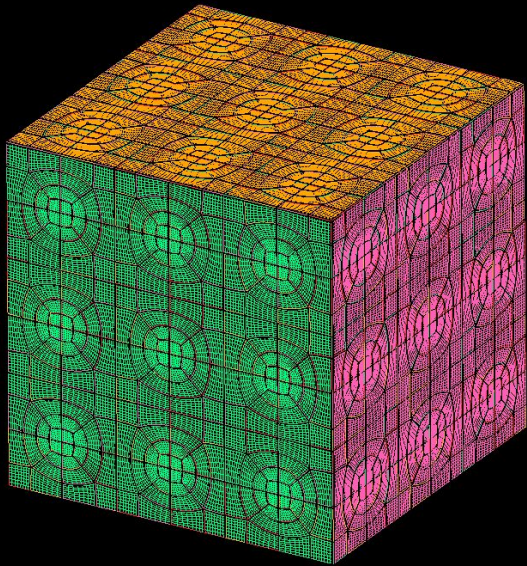
New TFI and PDE based smoothing are available for smoothing Grid as a post process to improve folds or increase quality of a/many selected blocks



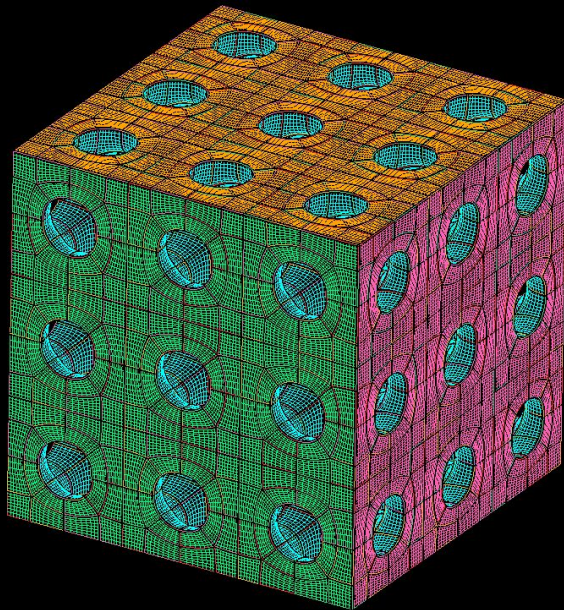


# Export grids based on Material Properties

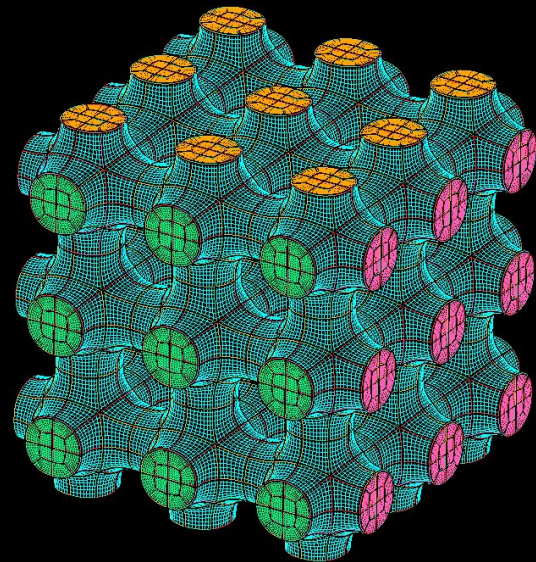
A Grid sheet can be selected to split the mesh into different material properties and exported for CFD or FEA simulations.



Main Grid



Solid Grid



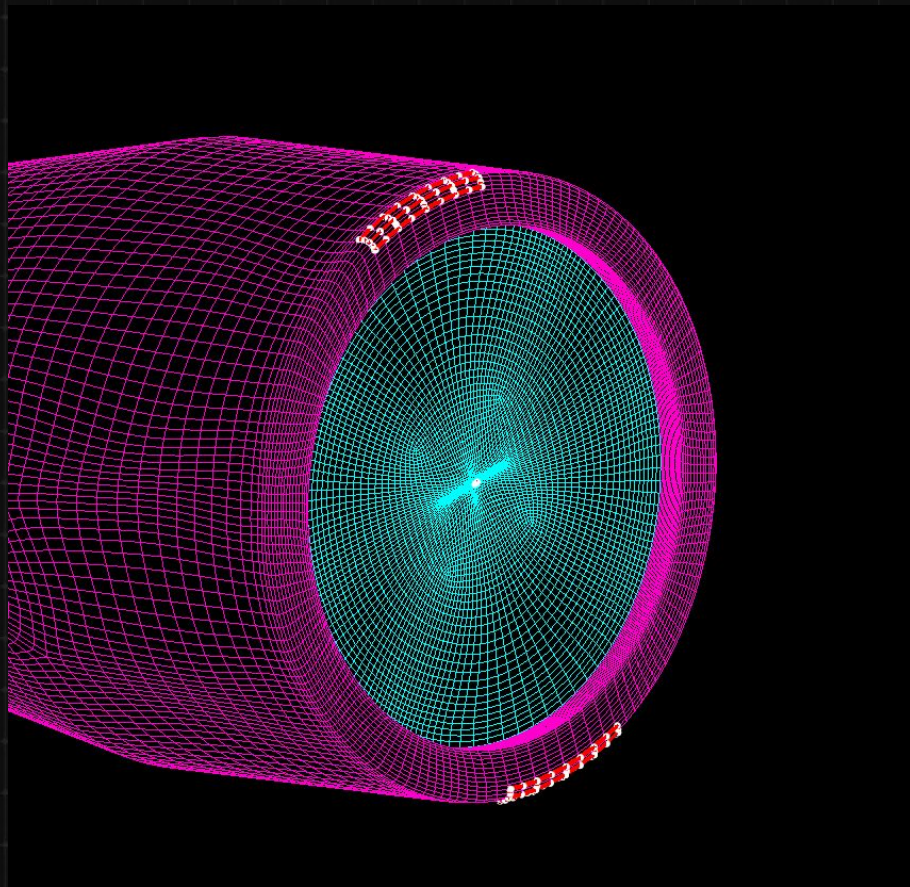
Fluid Grid





# Higher Order Mesh quality checker

The Jacobian of the higher order elements are evaluated and can be viewed with respect to the linear mesh.



# Other Features

- Multiple Cut planes to create sectional view

- Preview feature for wireframes

- Improved GL features

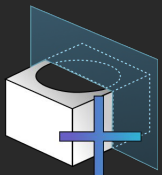
  - New Picking

  - New Surface selection

- Python 3 support on Linux and MAC

- Qt Upgradation to 5.x

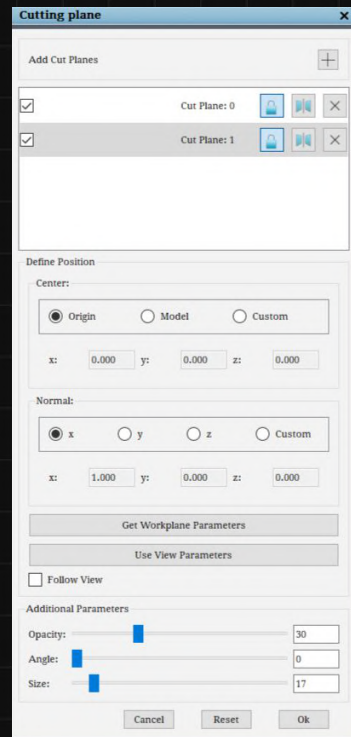
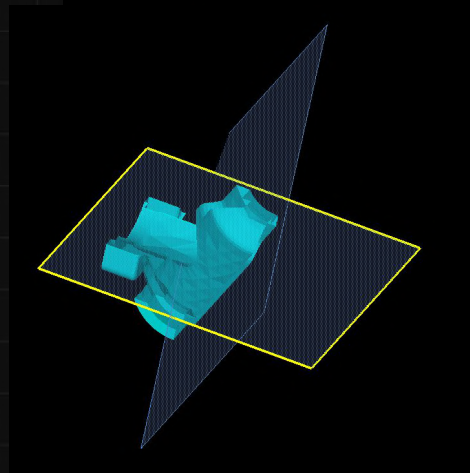
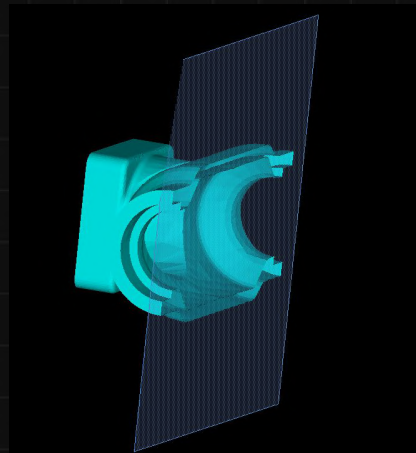
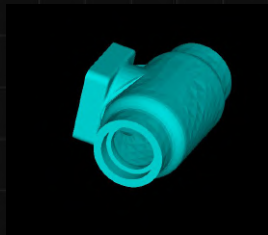




Other Features

# Improved Cut planes

Multiple cut planes to create sectional view



# Verticals

AutoMesh Volute

AutoMesh Nuclear Rods

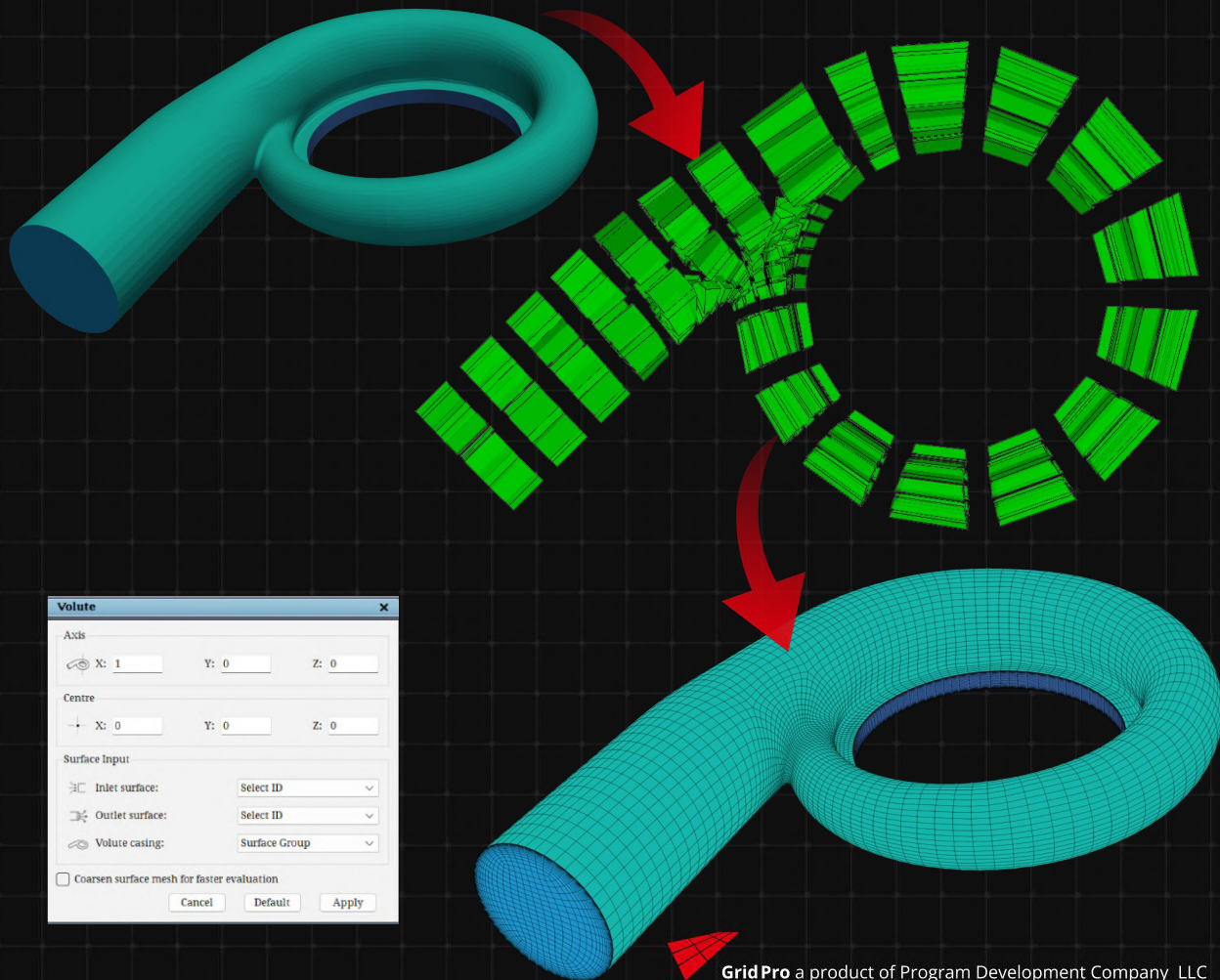




Verticals

# Automesh Volute

Automatically generate a topology and then mesh.

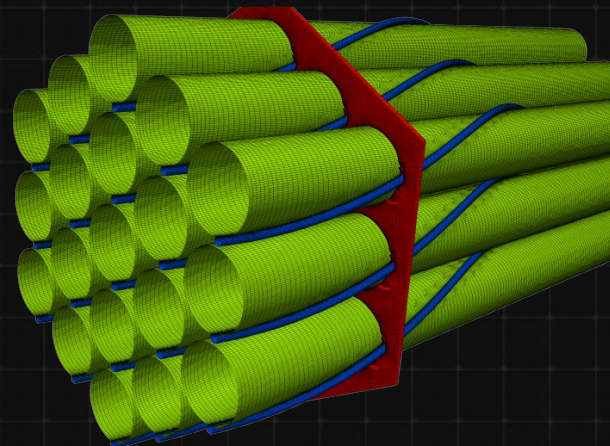
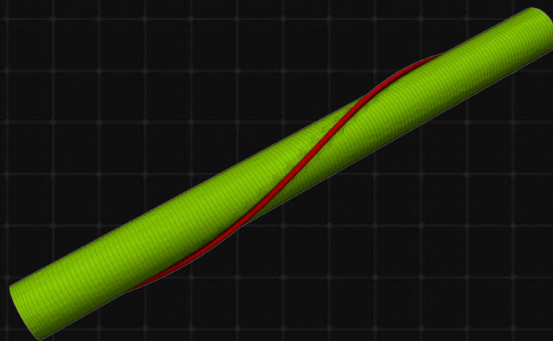
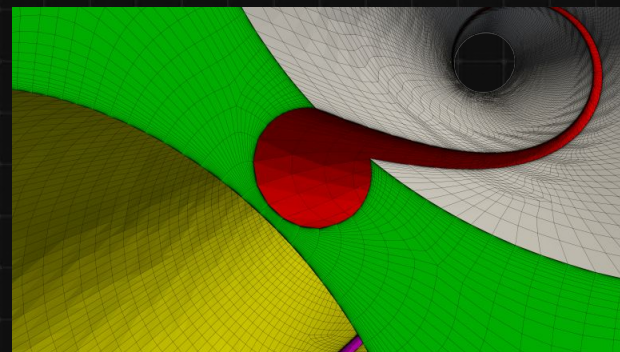
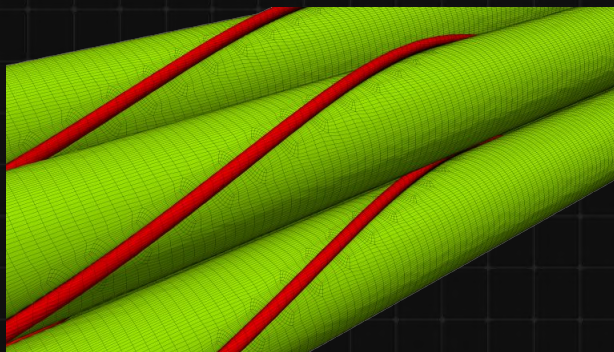




Verticals

# Automesh Nuclear Rods

Automatically generate a topology  
and then mesh.



Grid Pro a product of Program Development Company LLC

For additional new features, bug fixes and performance improvements please refer to the GridPro version 9 release notes.

