What's New in Version 10.1

Summary

List of new features in Version 10.1

CAD

- Labelling volute, impeller and guide vane in CAD
- Node - load text file
- Split face by sketching
- Domain selection for NG mesh
- Loading option for the EDAGS and NG surface mesh
- Export Curve for 2D
- Export CAD Curve to lin
- Extract Blade Profile Curves
- Separate groups for CAD Bodies and Labelled Groups.

Topology

- Run Ggrid on valid labels.
- Interleaved pattern for hole topology creation
- Evaluate center of a circular curve
- Curvature based extrusion
- Option to delete guideline corners in the extrude button
- Option to respect and not respect surface assignment added to the align ui.
- Option to remove all the topology exclusions using remove exclusion button.

Grid

- Merge
- Sync grid faces
- Command line to weld multiple grid faces
- Expansion Ratio in quality metrics
- GridPro GMSH export - higher order
- View super blocks in GUI
- Delete labelled grid blocks

Grid Generation Techniques

- Transfinite Interpolation on CAD

CAD Features

- Buttons to label volute, impeller and guide vane
- Node - load text file
- Sketch Face by sketching
- Domain selection for NG mesh
- Loading option for the EDAGS and NG surface mesh
- Export Curve for 2D
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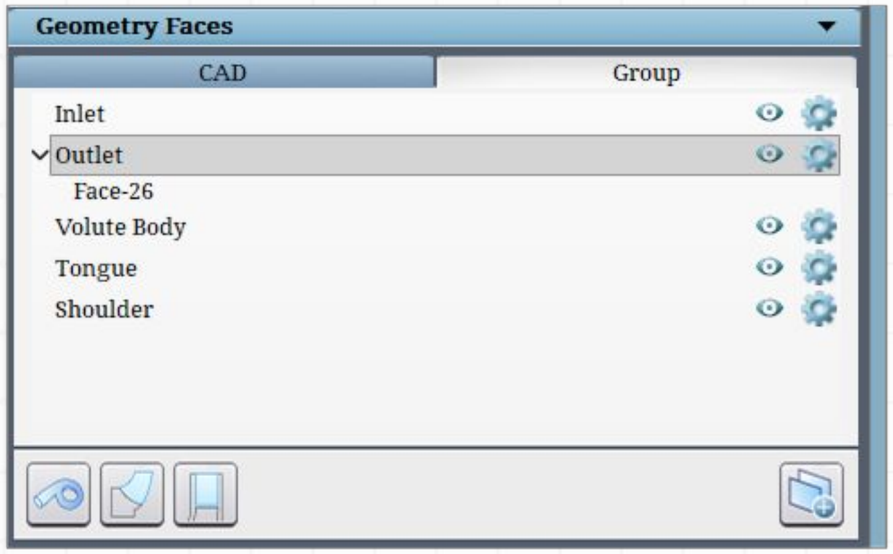
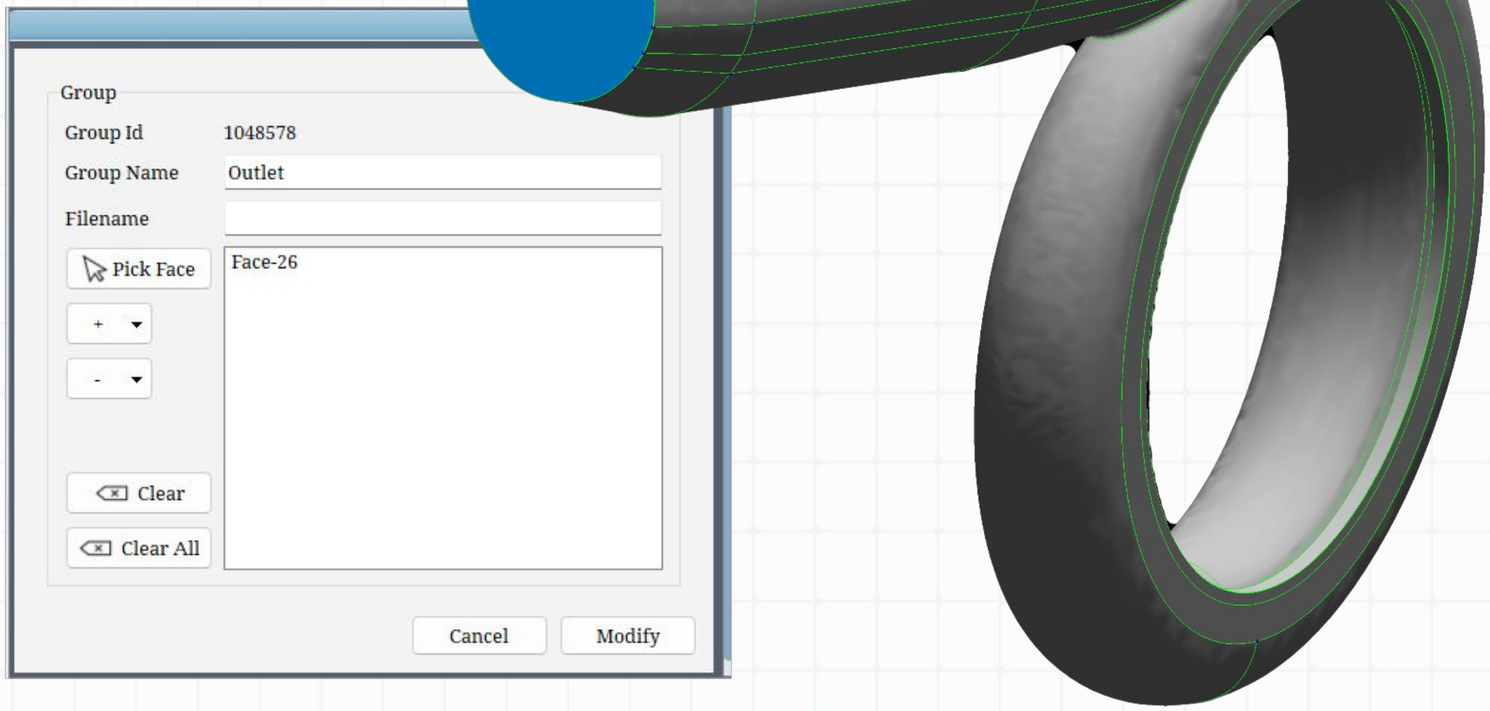
- Extract Blade Profile Curves
- Separate groups for CAD Bodies and Labelled Groups.

Buttons to label volute, impeller and guide vane

Predefined groups are now available in CAD panel for Auto blocking tools like volute, impeller and guide vane , User can associate respective faces in the CAD to inherit later.



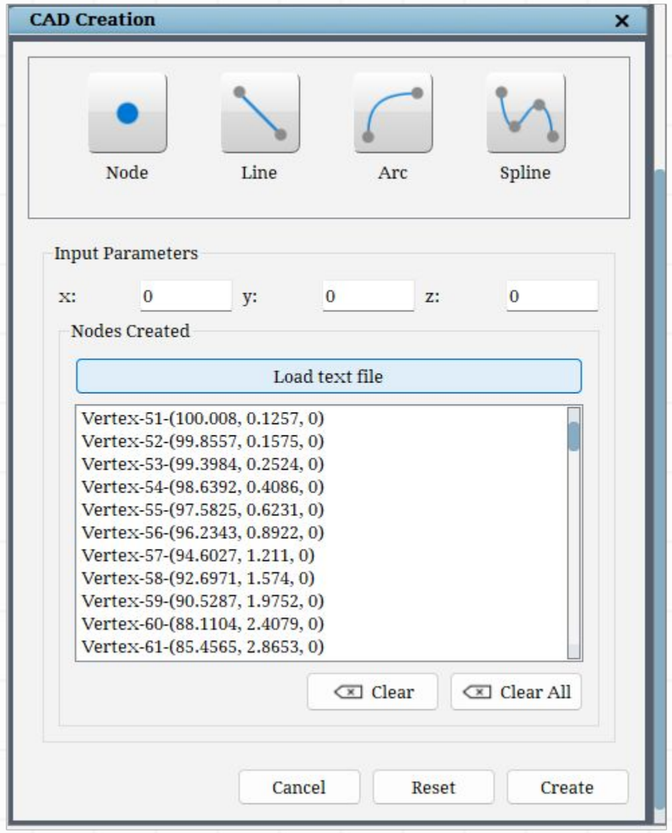
Labelled Volute Groups

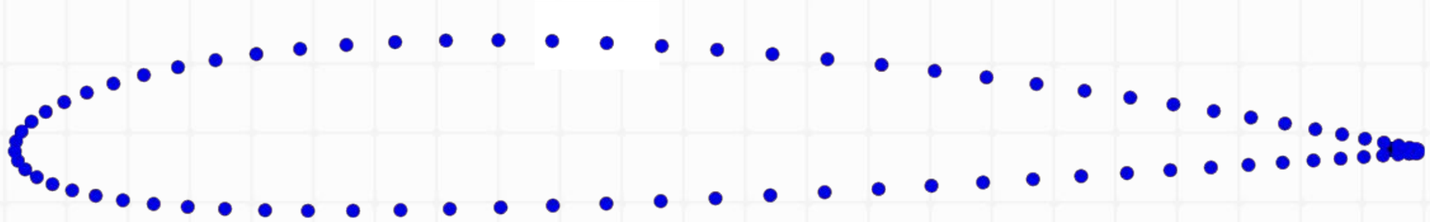


Selecting volute faces for labelling

Node - load text file

Load Text File, imports a text file with X, Y, Z coordinates and creates nodes (vertices) at those locations.

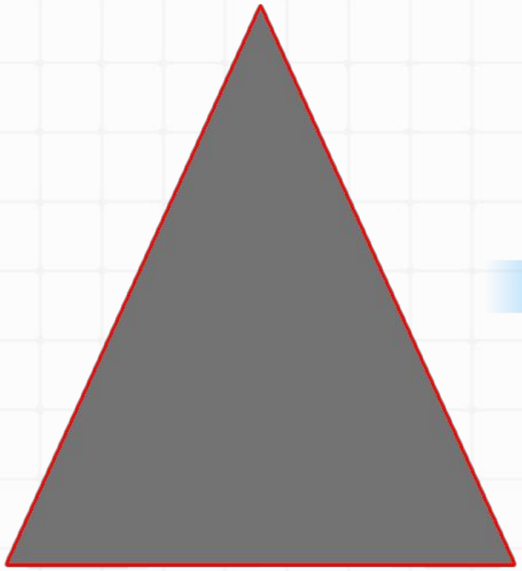




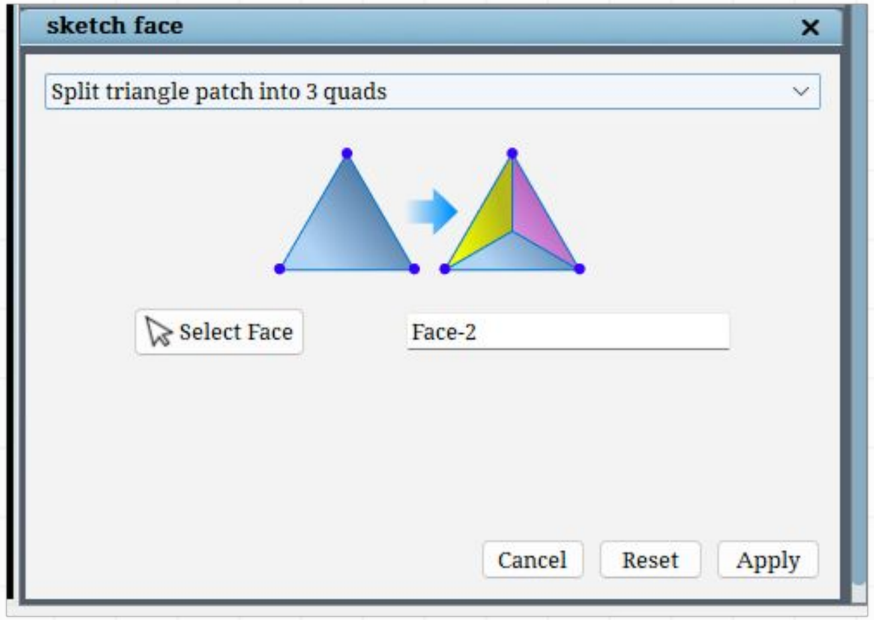
Loaded text file in X, Y, Z coordinate format

Sketch Face

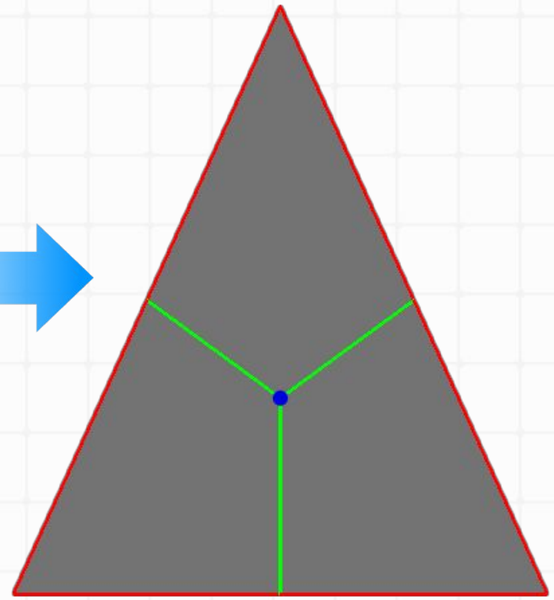
The **Split Face: Split Triangle Patch into 3 Quads,** selecting a triangular face automatically subdivides it into three well-defined quadrilateral patches.



Before Split triangle patch into 3 quads



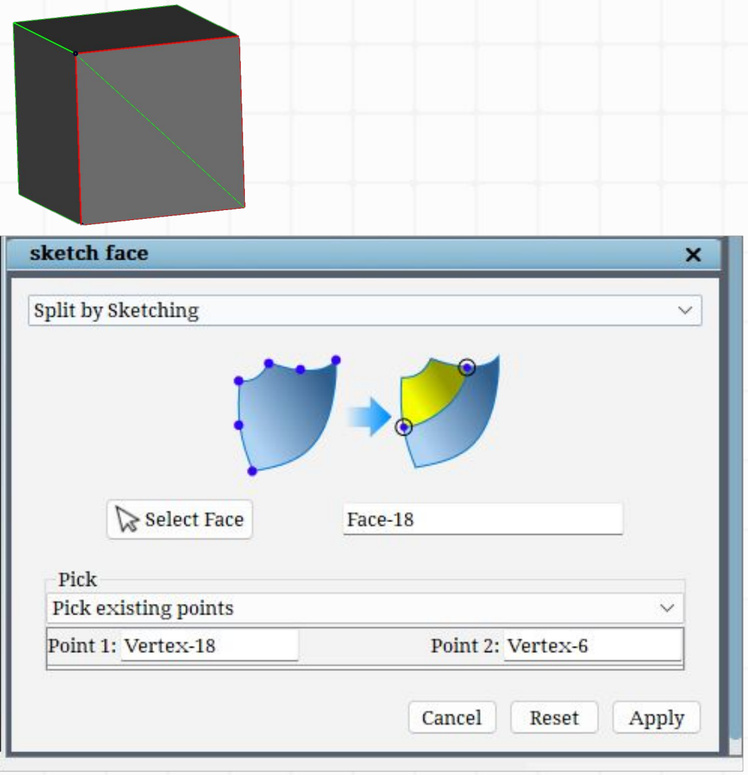
Split triangle patch into 3 quads dialog box



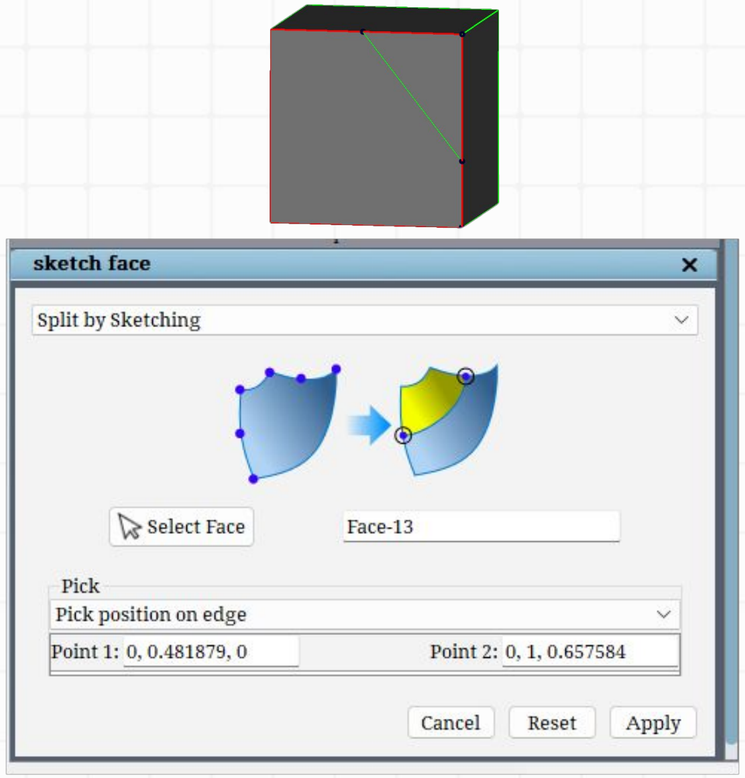
After Split triangle patch into 3 quads

Split Face

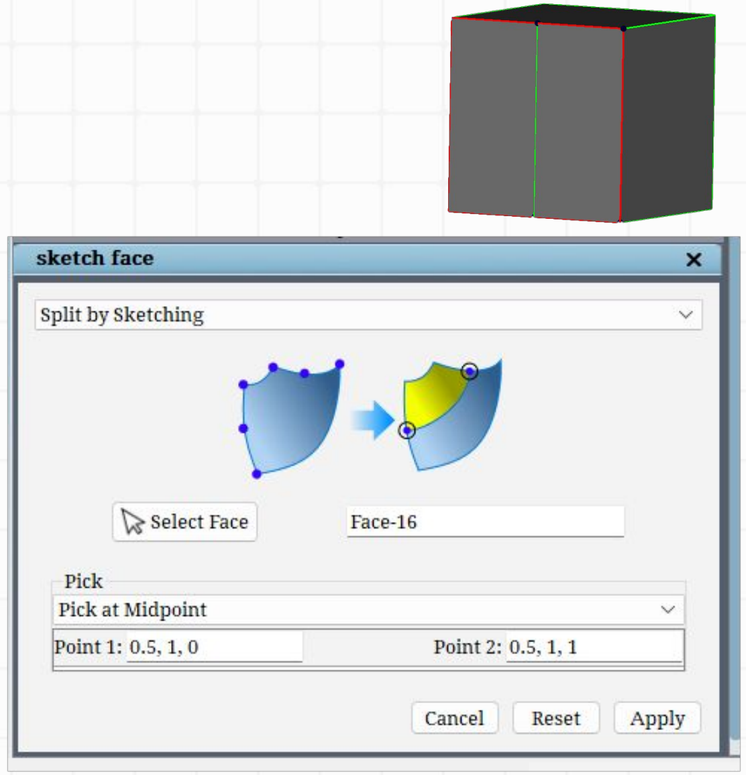
The **Split Face: Split by sketching** tool is useful for precisely dividing a face into segments, enabling better control for geometry editing, feature creation, and localized modifications in CAD.



Pick existing points



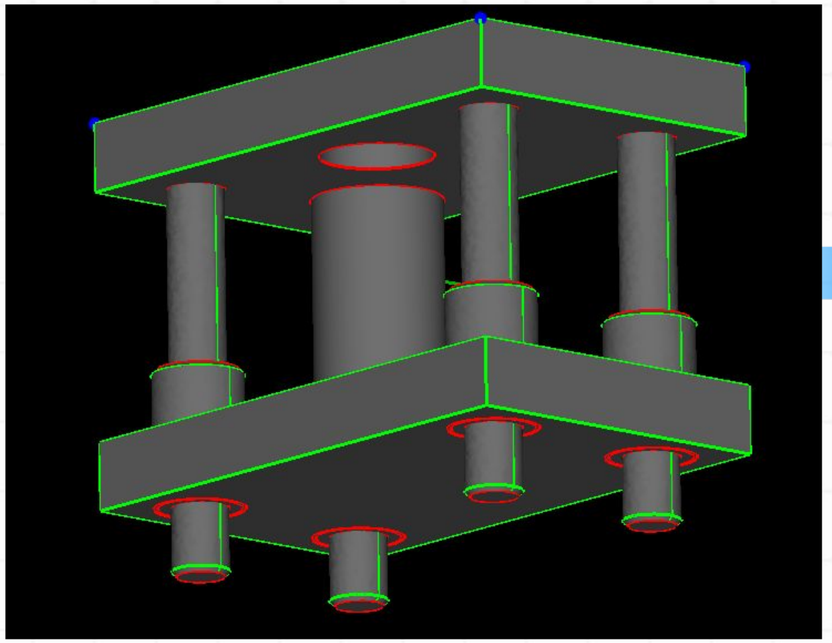
Pick position on edge



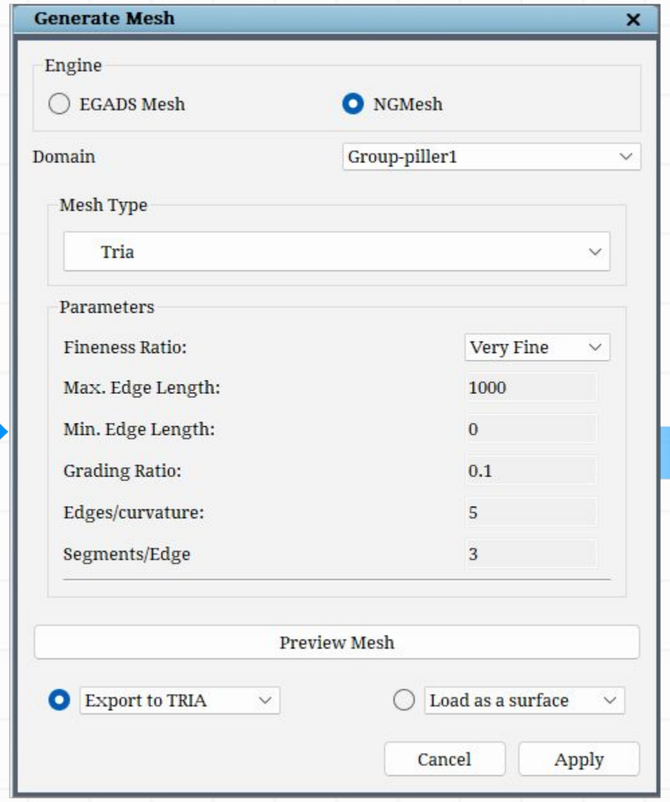
Pick at midpoint

Domain selection for NG mesh

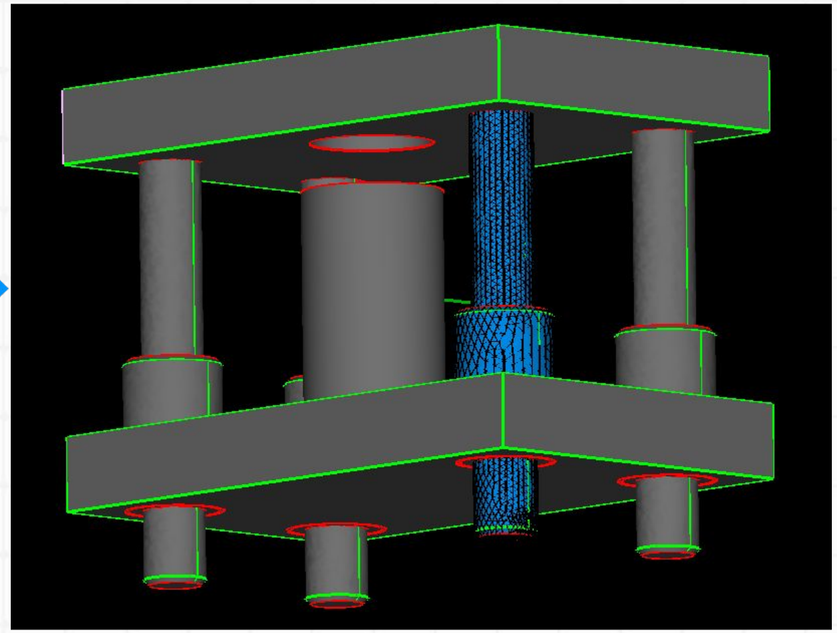
Now the user can choose specific domain to create surface mesh using **NG mesh algorithm along with EGADS.**



CAD assembly



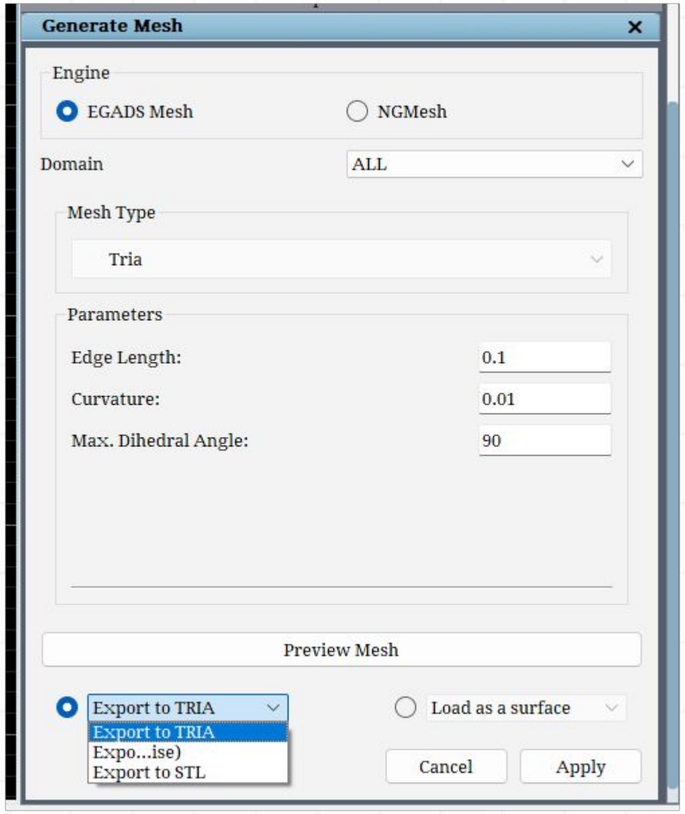
NG mesh dialog box



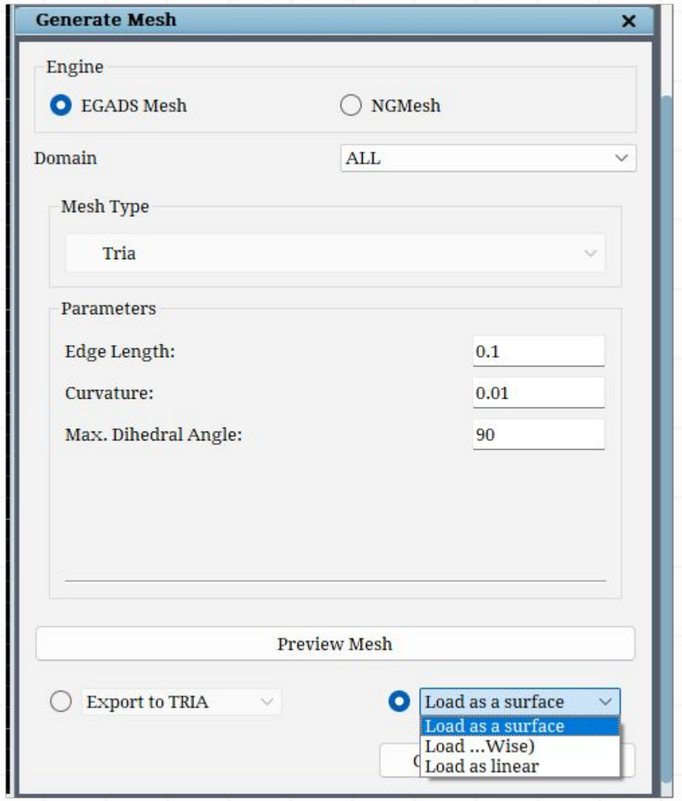
triangulated assembly part

Loading option for the EGADS and NG surface mesh

Separate section added to load/ export surfaces meshes.



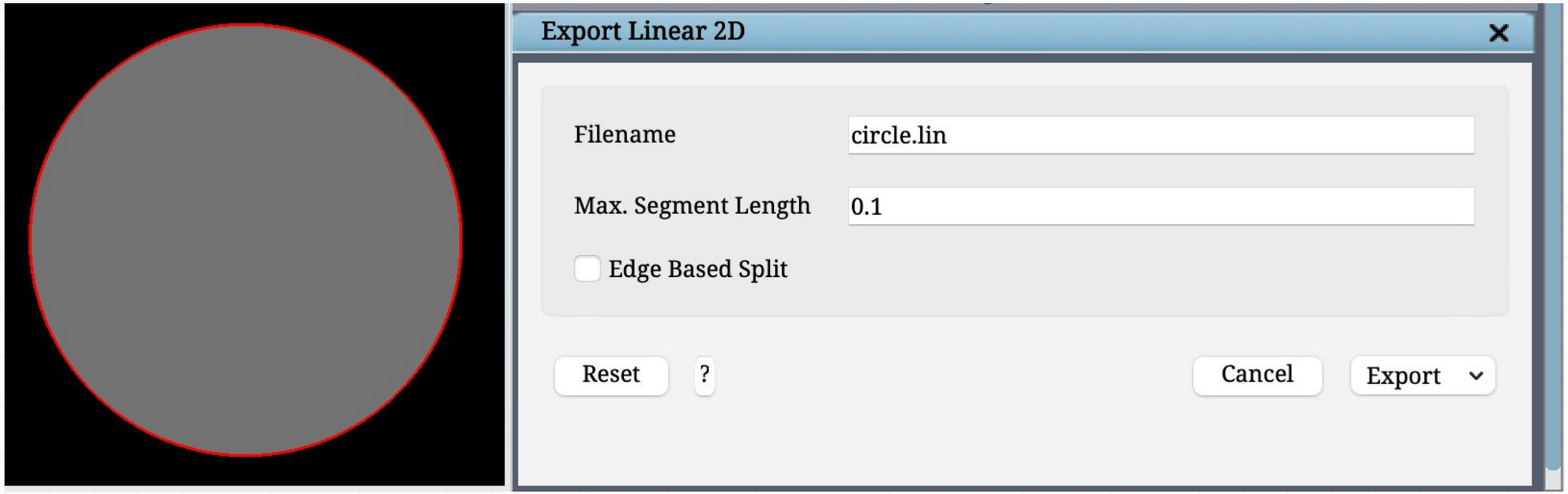
Export surface mesh



Load surface mesh

Export Curve for 2D

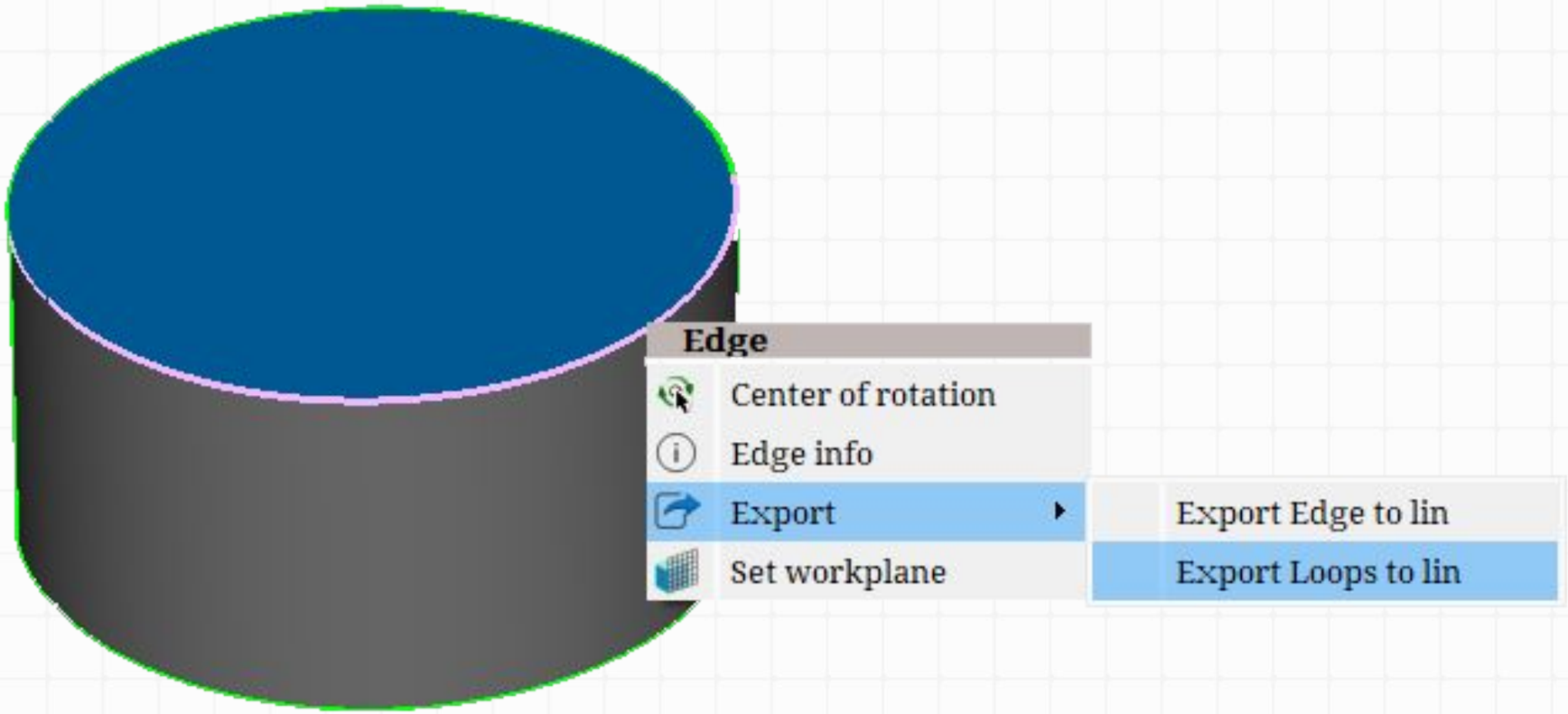
This tool allows to save/export the 2D edges of CAD as linear file. Save/Export CAD curve with specified name.



Export 2D curve dialog box

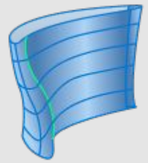
Export CAD Curve to lin

This tool allows to export the edges of CAD as linear file. Export CAD curve with specified name.

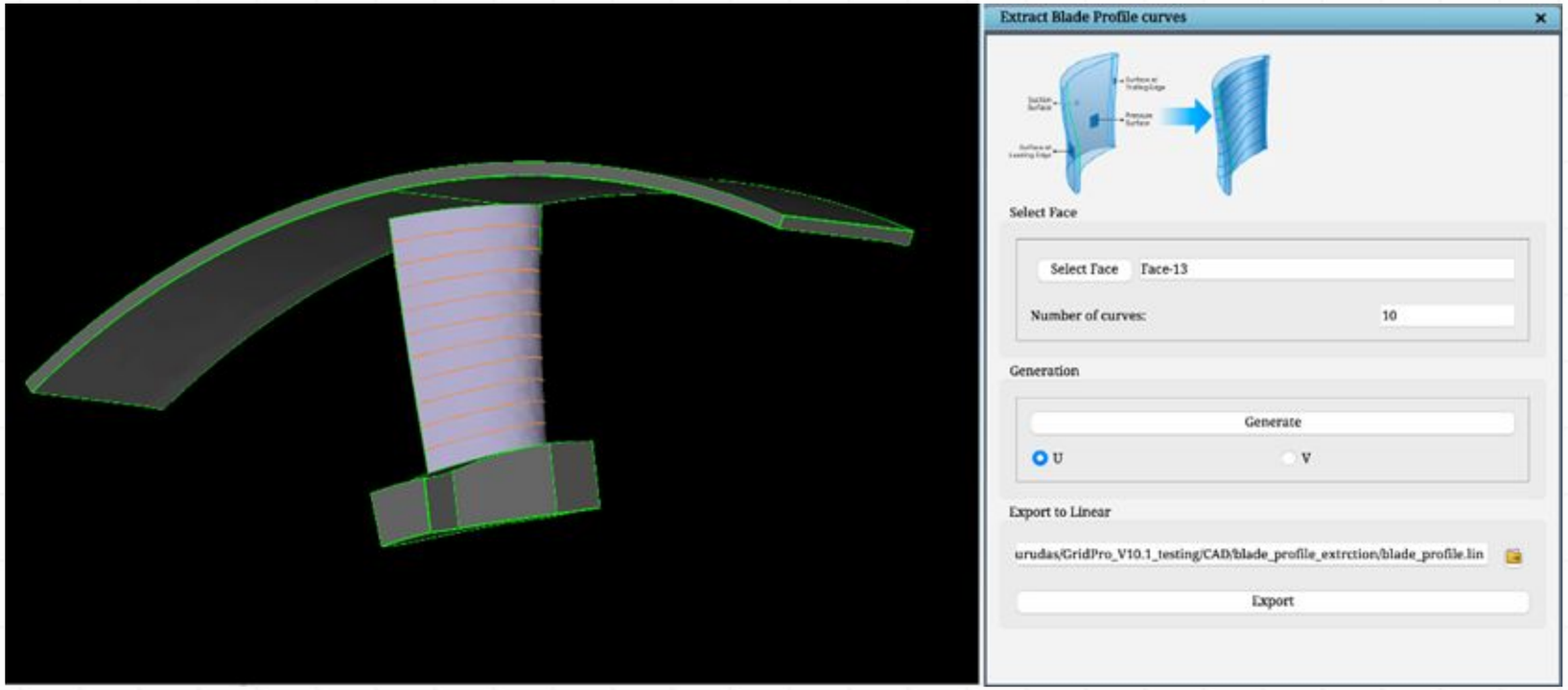


Exporting CAD edge to lin

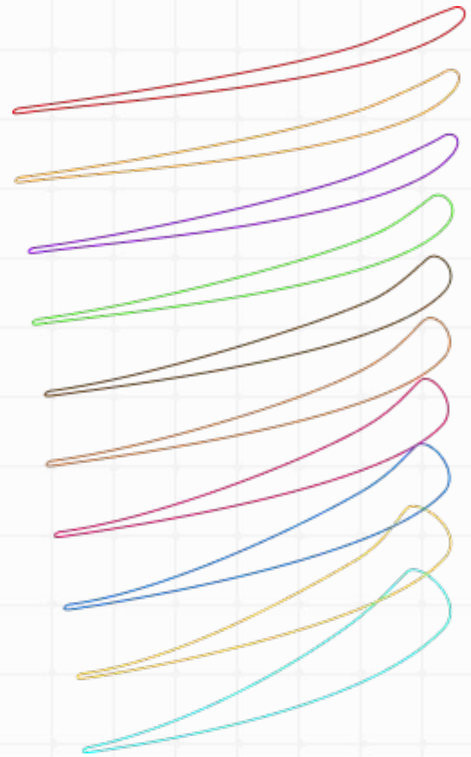
Extract Blade Profile Curves



- Tool is used to **extract multiple 2D blade profile curves** from a 3D blade CAD surface.
- These extracted curves can be used for automation workflows in GridPro's Blade Automation module or for generating 2D grids of blade cross-sections.



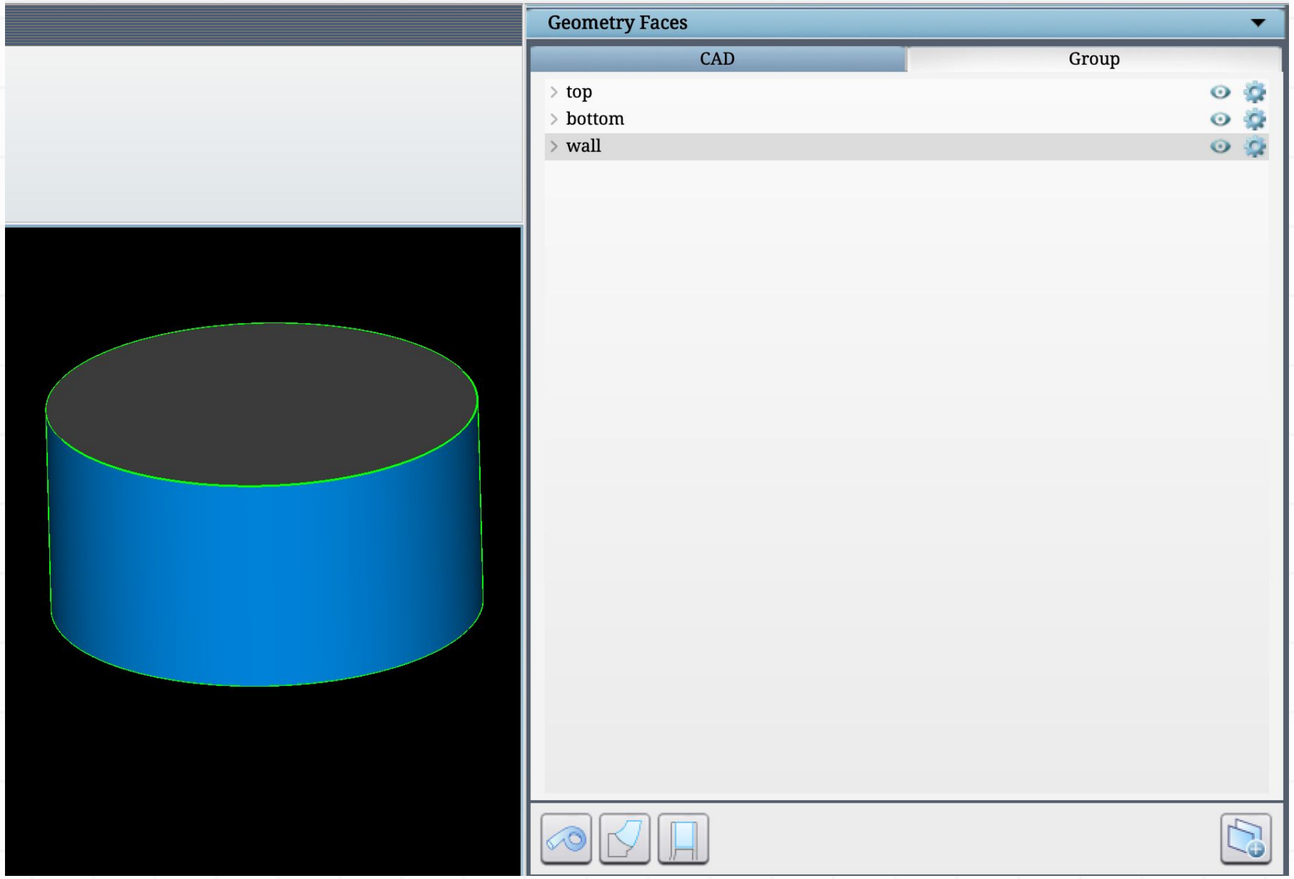
Extract profile dialog box



Extracted profile curves

Separate groups for CAD Bodies and Labelled Groups.

For ease of access and navigating through CAD bodies and Labelled Groups we have segregated them.



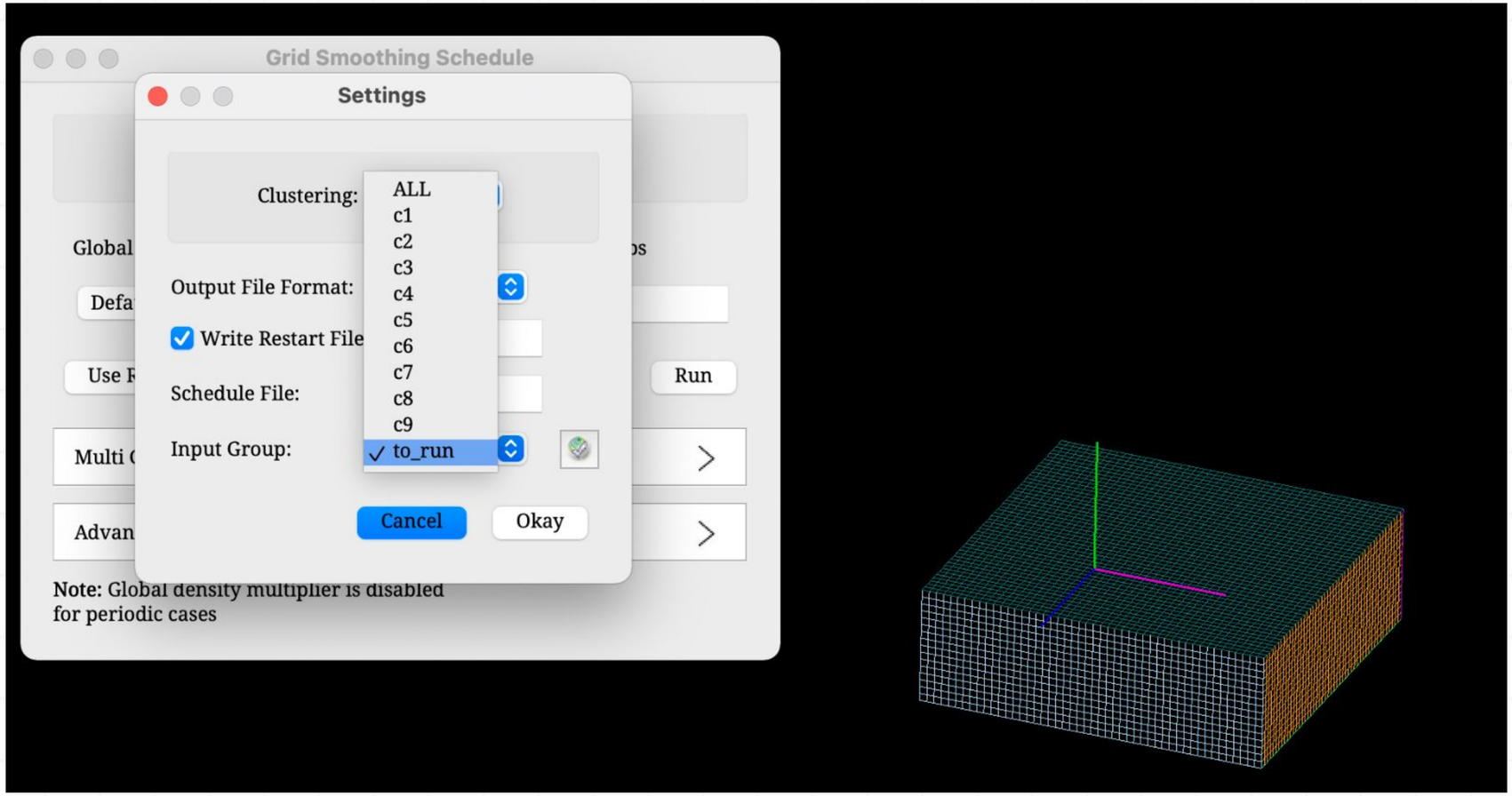
Separate sections for CAD body and Groups

Topology Features

- Run Grid generation on labelled entities.
- Interleaved pattern for hole topology creation
- Evaluate centre of the circular curve
- Curvature based extrusion
- Option to delete guidelines corners in the extrude button.
- Option to respect and not respect surface assignment added to the align ui.
- Remove all the topology exclusion

Run Ggrid on valid block labels

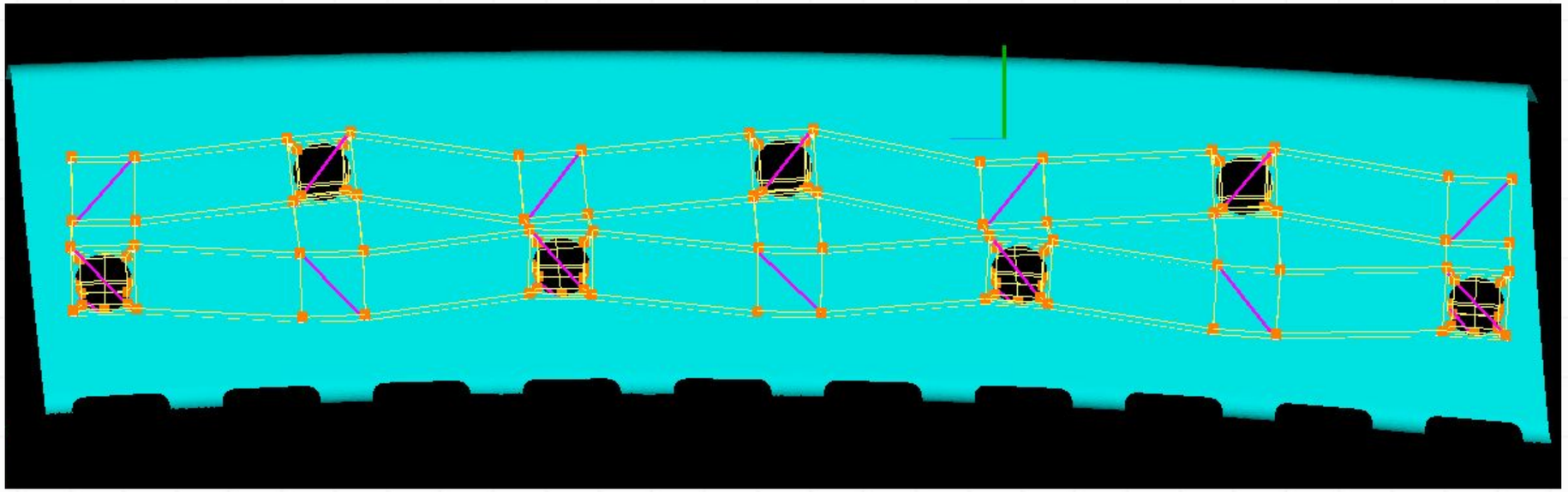
Run Ggrid on the block labels provided that the labelled blocks form a valid disjoint/single topology

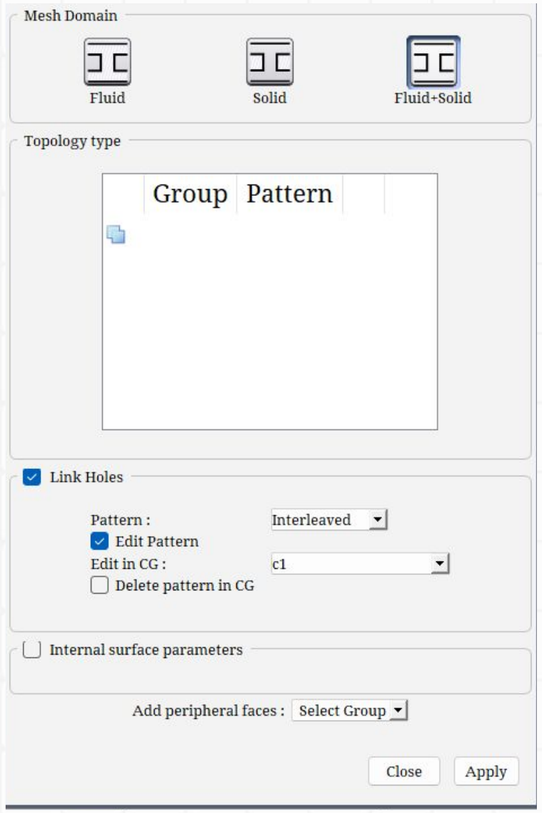


Running grid on label “to_run”

Interleaved pattern for hole topology creation

Interleaved pattern generates the linked block topology.

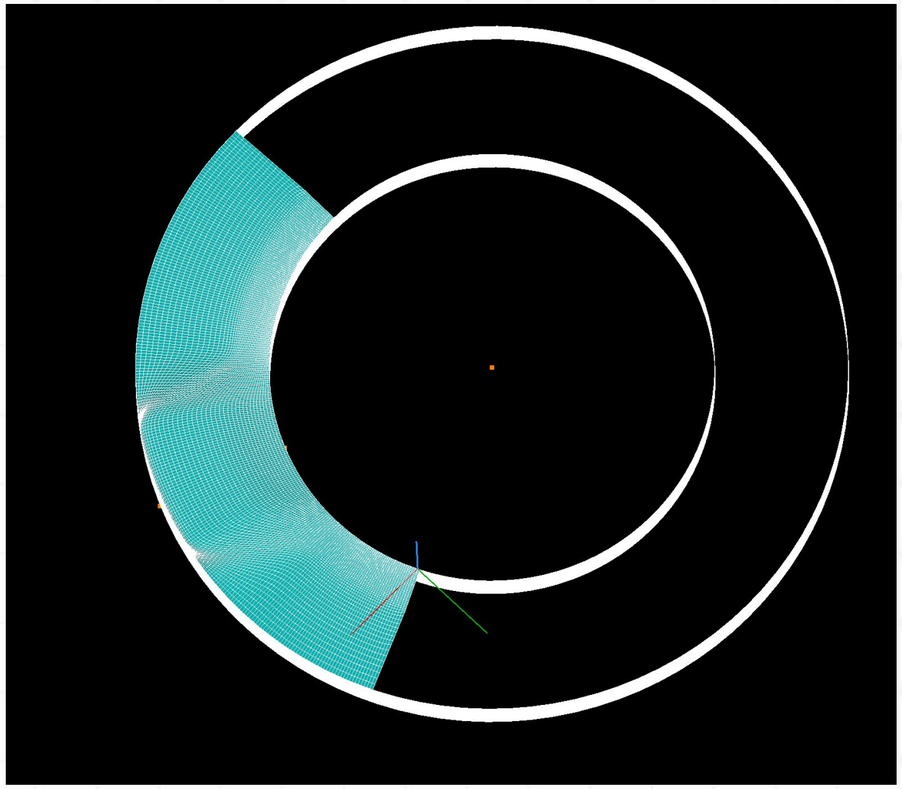


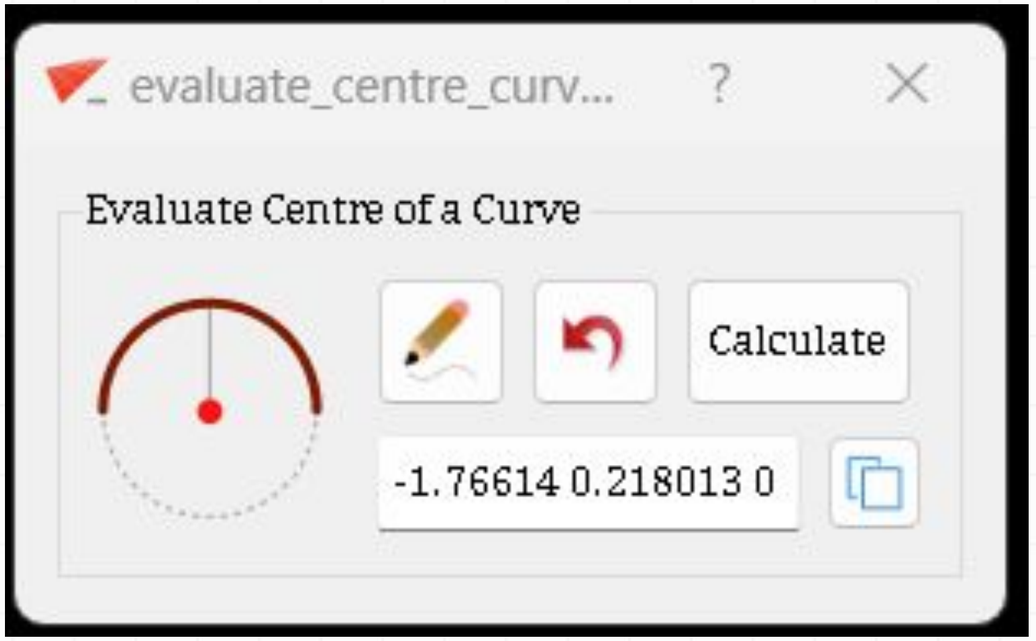


Interleaved pattern with hole topology dialog box

Evaluate centre of a curve

Option to Evaluate curve center using measure button dropdown

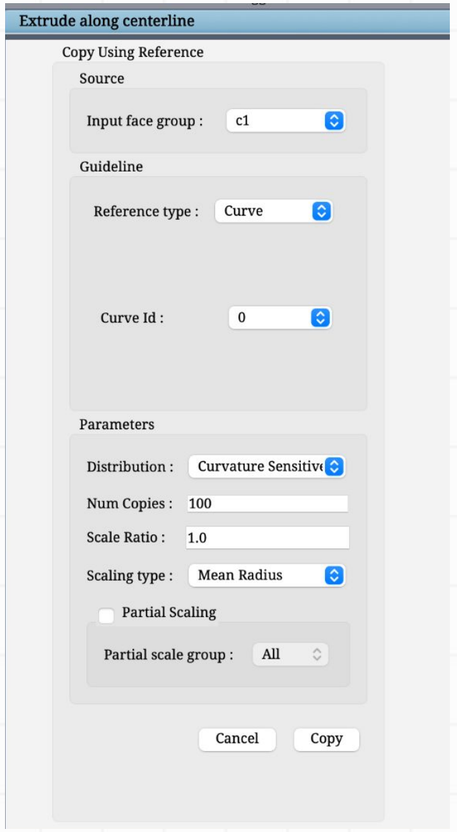




Evaluated and created node at the center of the curve

Curvature based extrusion

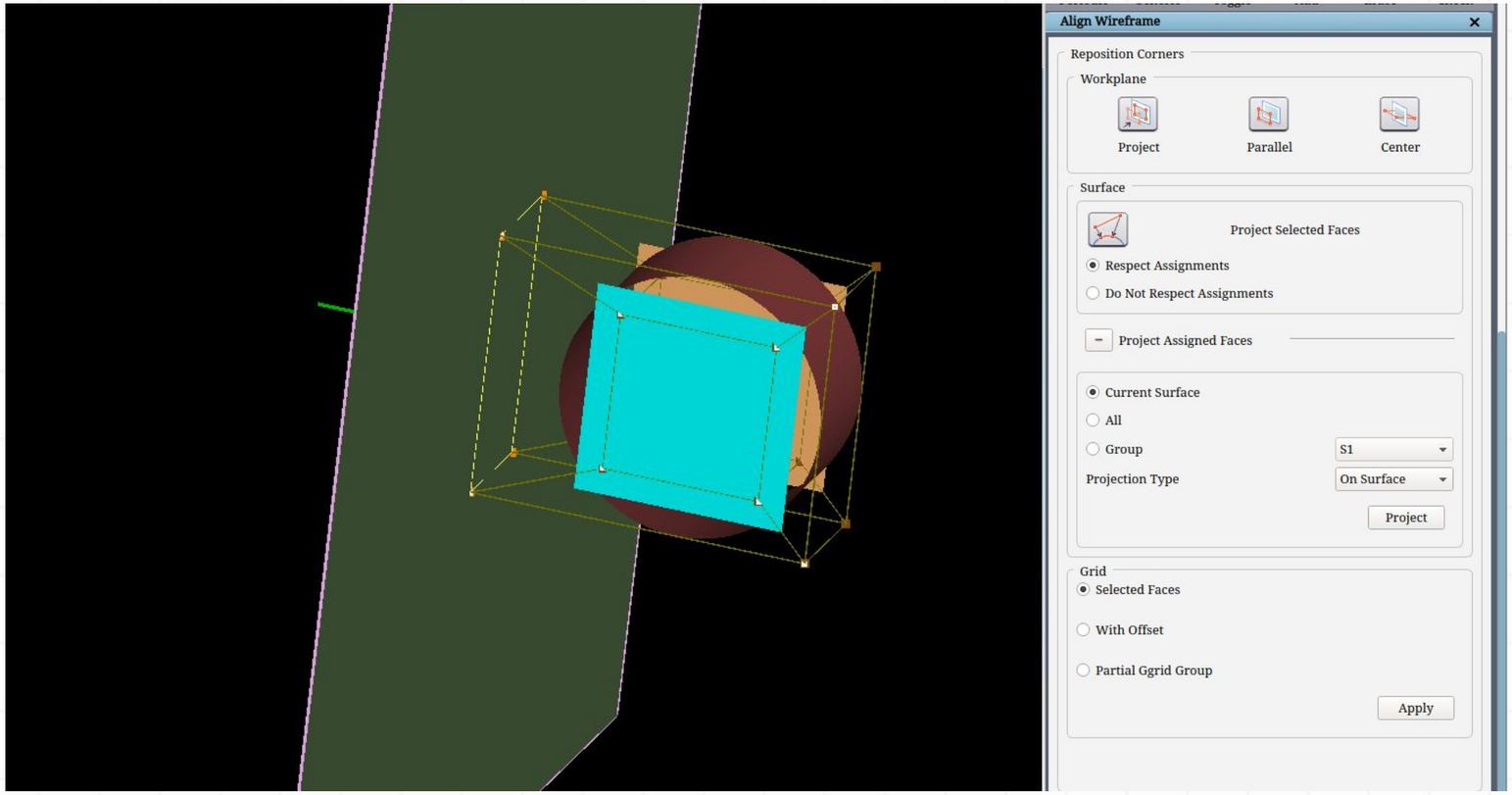
Feature added to extrude the topology by providing curve as a guideline and check box is added to delete the guideline corner in the final topology.



Extruded topology with Extrude dialog box

Option to respect and not respect surface assignment added to the align UI.

Respect surface assignments can be used to project corners on the surface taking care of surface assignments and clicking on **Do not respect assignments** ignores the assignments.



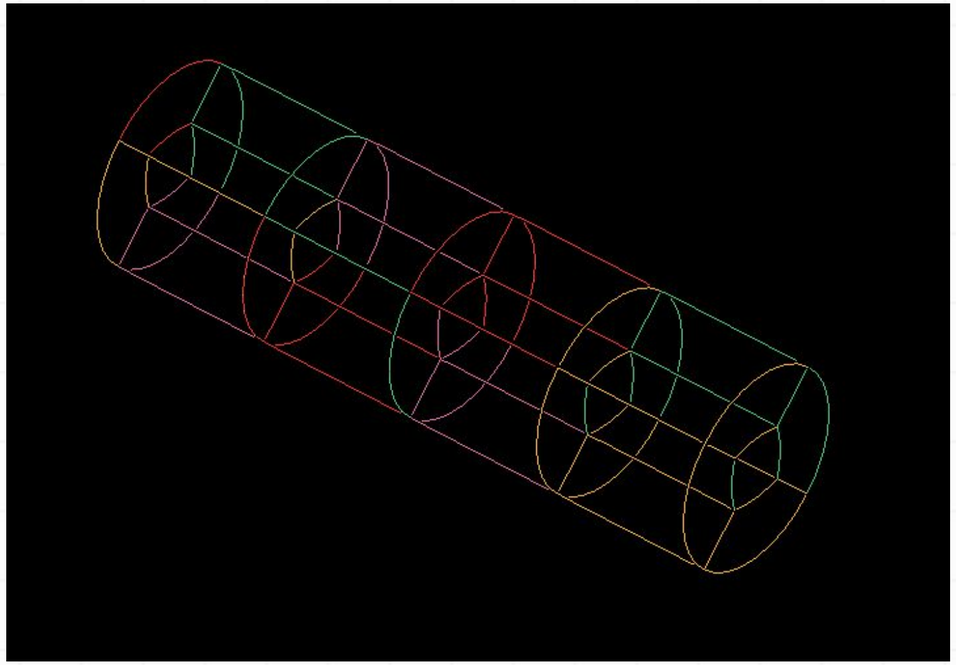
Projected corners with align dialog box

Grid Features

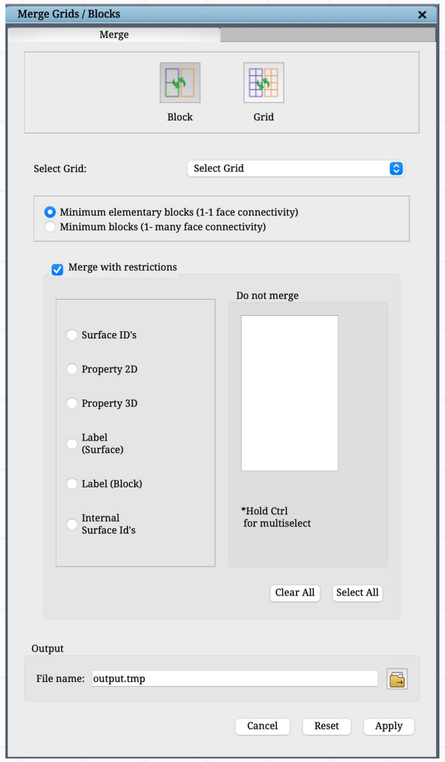
- Merge
- Sync Grid Faces
- Command line to weld multiple grid faces
- Expansion Ratio in quality metrics
- GridPro GMSH export - Higher Order
- View super block grids in the GUI

Merge - Minimum Elementary Blocks (1–1 Face Connectivity)

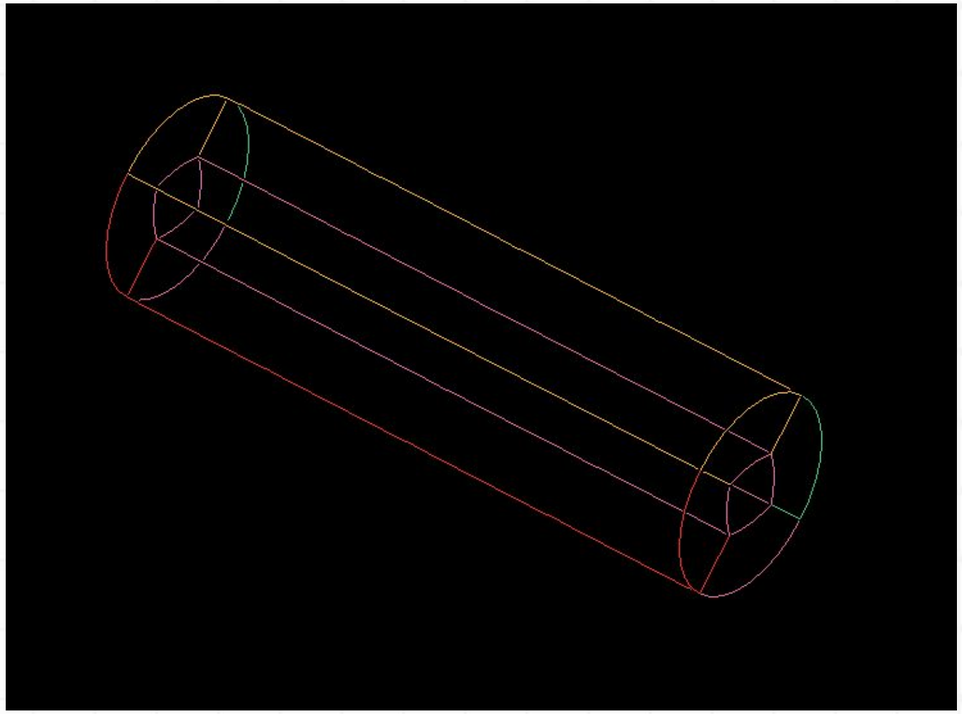
- Using this option, grid blocks within a single grid can be merged to reduce the total number of blocks.
- This option reduces the grid blocks of grid and creates an output grid with the minimum number of blocks. This is particularly useful when exporting grids to solver formats that require minimal block structures for import.



Input grid blocks (No of blocks = 20)



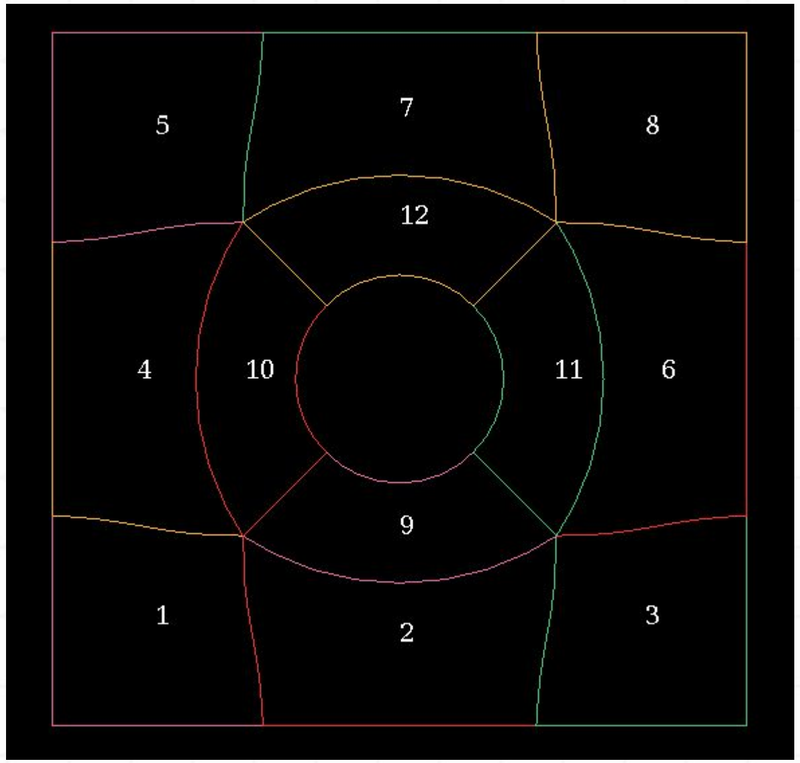
Merge dialog box



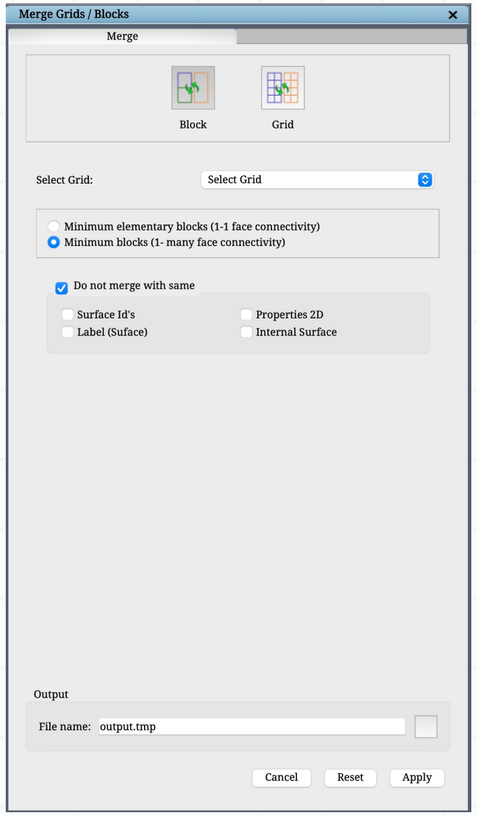
Output grid blocks (No of blocks = 5)

Merge - Minimum Blocks (1–Many Face Connectivity)

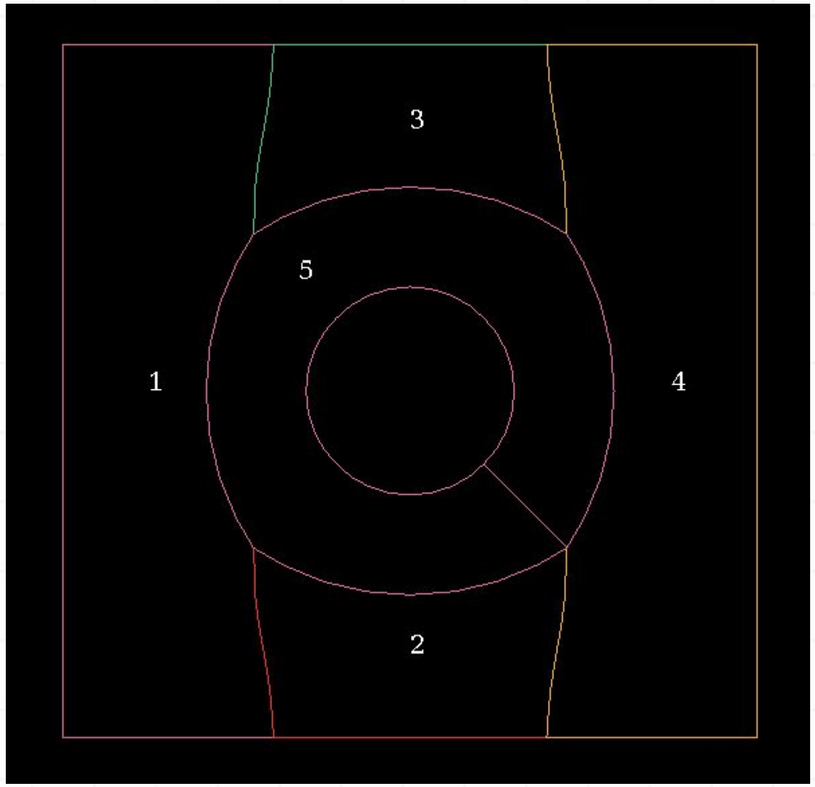
- This option merges an elementary block grid and outputs super-block grids.
- The **Do Not Merge option** can be used to can be used to control the merging of blocks as desired.



Input grid blocks (No of blocks = 12)



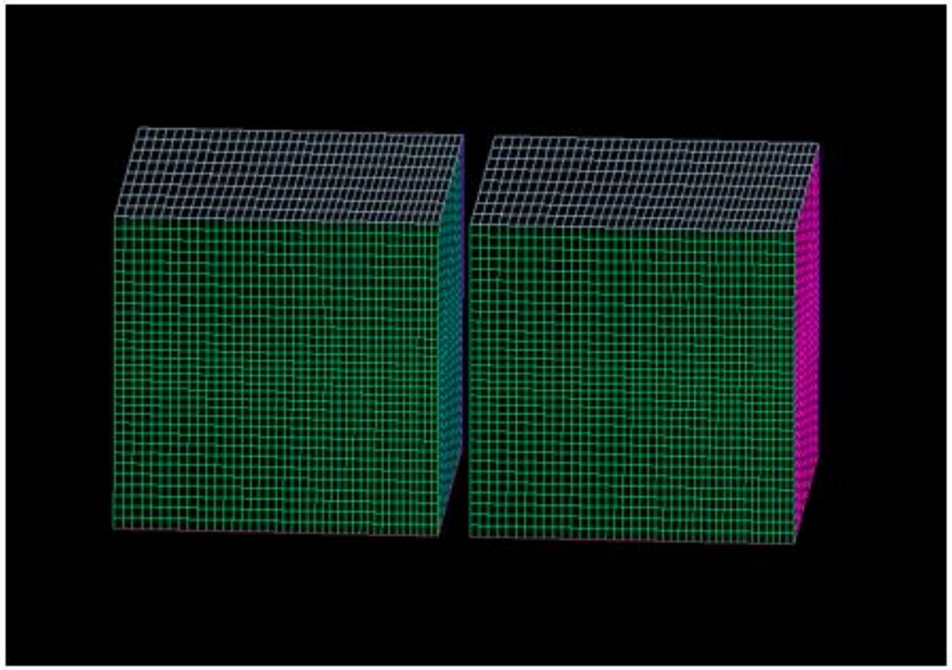
Merge dialog box



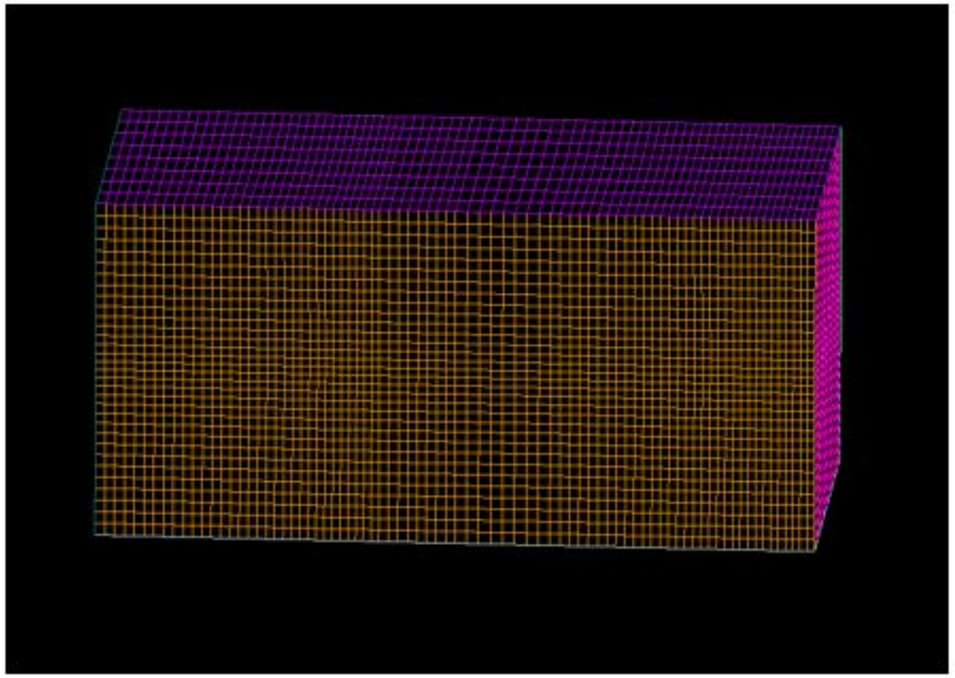
Output grid blocks (No of blocks = 5)

Merge - Merging Two Different Grids (Weld

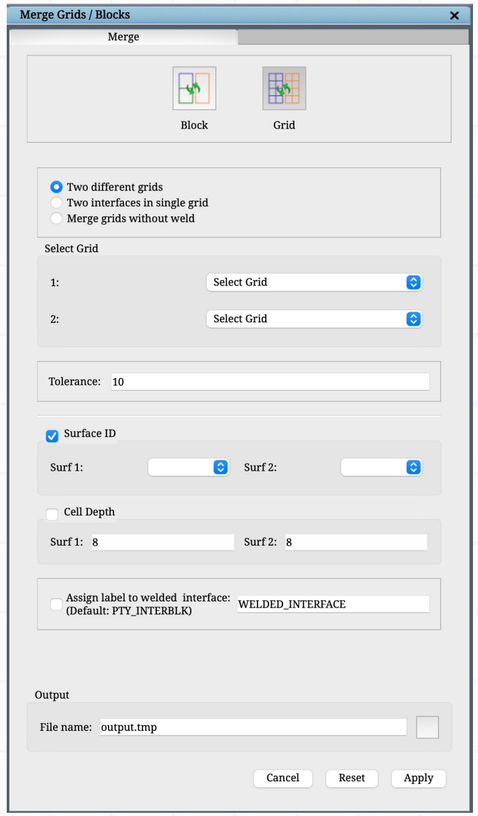
Merging two different grids at any number of interfaces is now possible. The new GUI is enhanced with more options and controls.



Input grids before merging



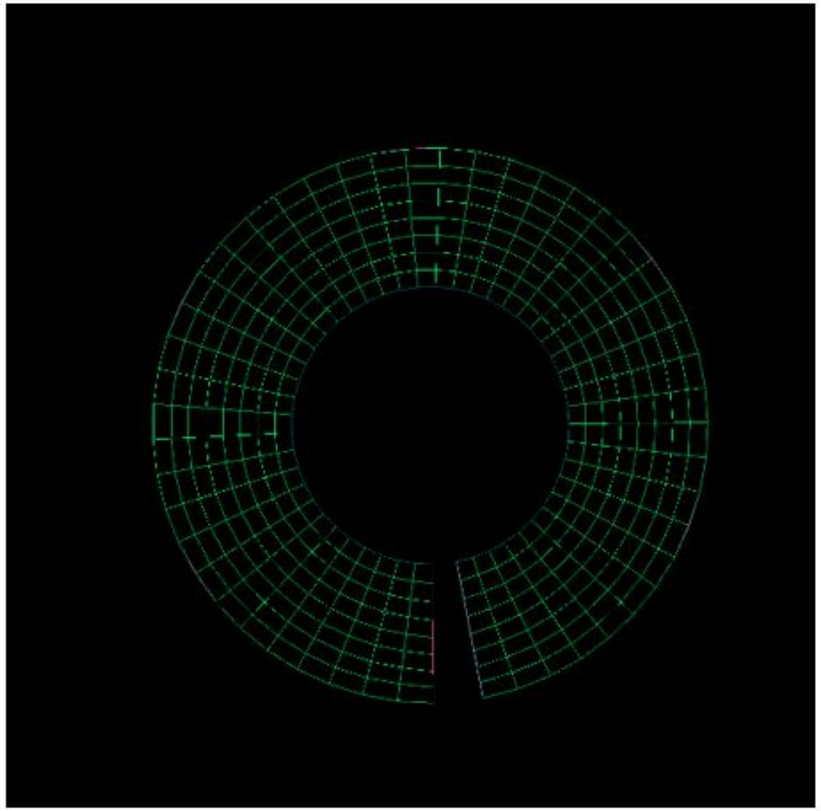
Output grid after merging



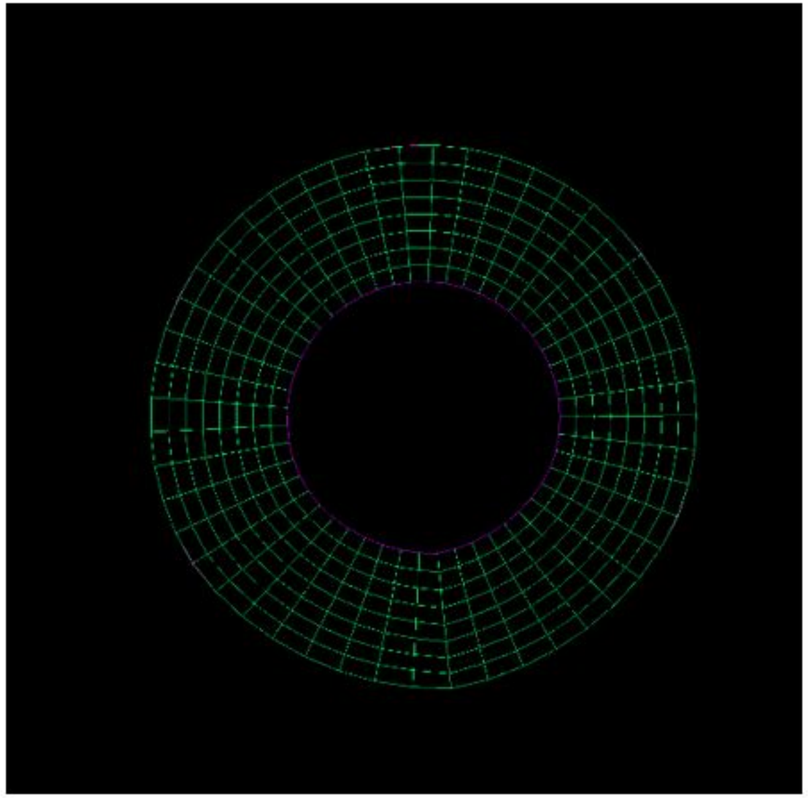
Merge dialog box

Merge - Merging Two Interfaces within a Single Grid

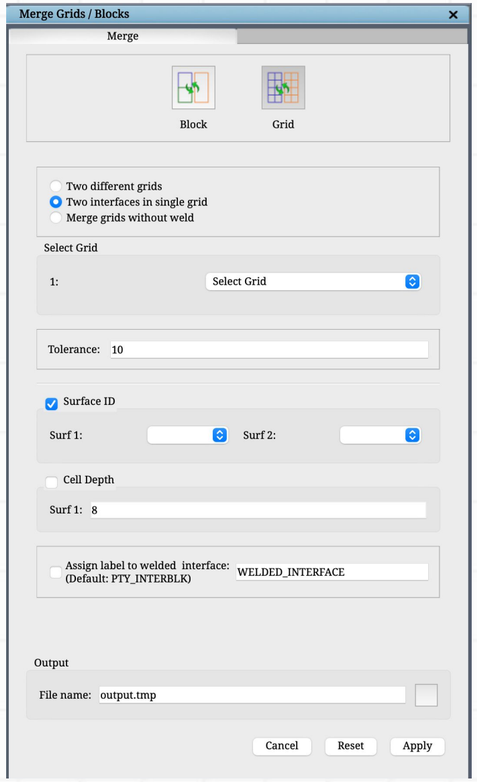
A single grid file is selected and two disjoint grid sheets within the grid are merged. This is useful in cases such as horseshoe-shaped grids, where users may want to merge open-end interfaces.



Input grid before merging



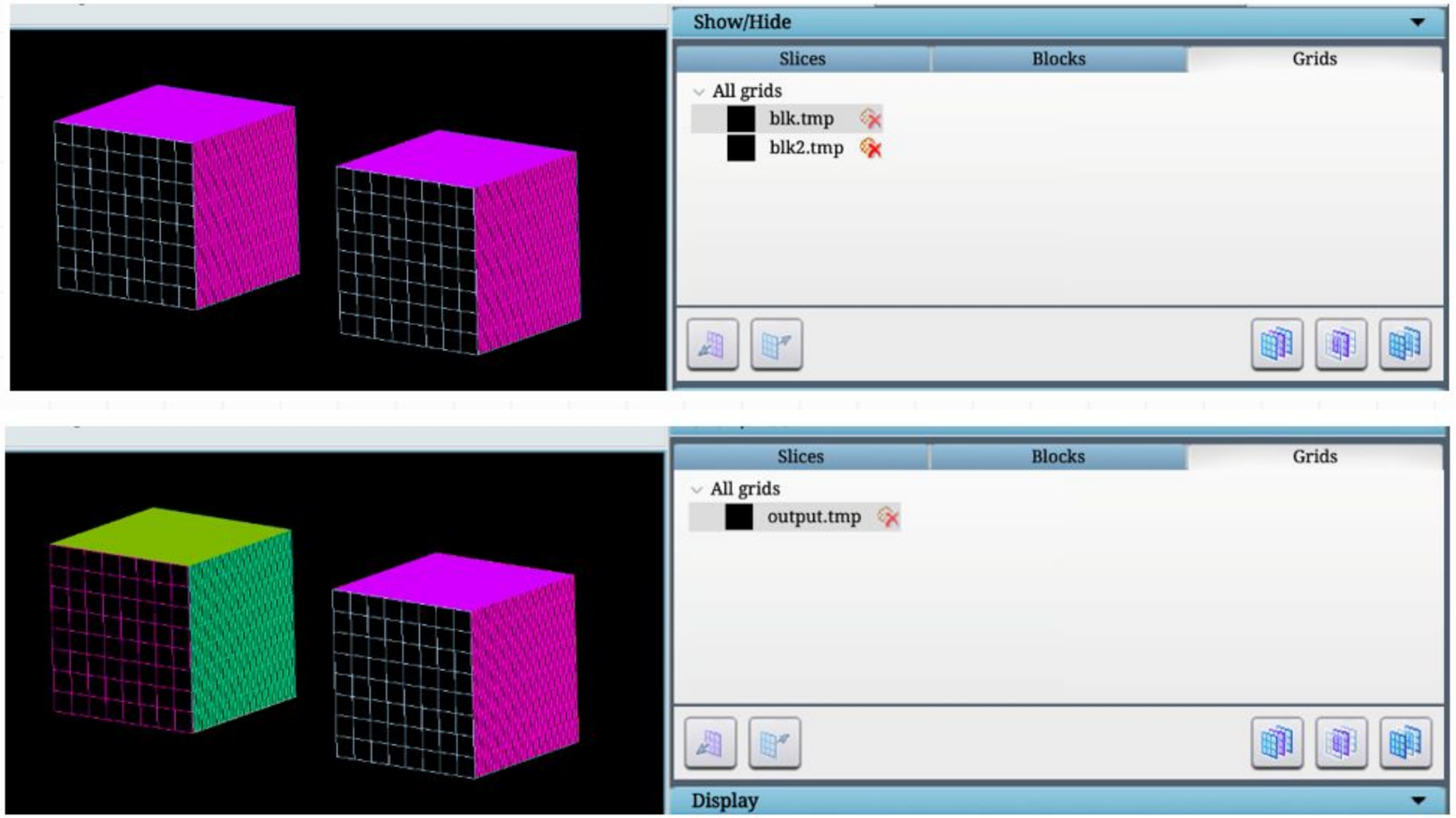
Output grid after merging



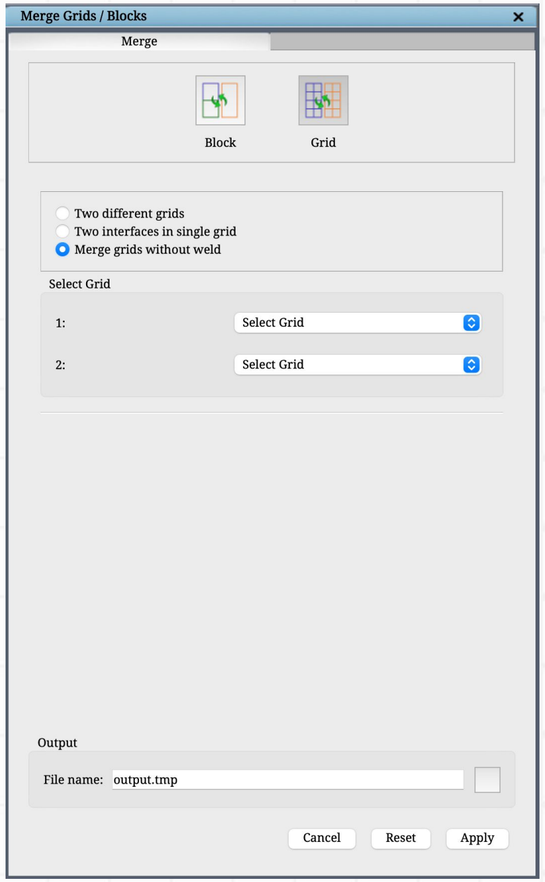
Merge dialog box

Merge - Merge Grids Without Weld

This option allows two loaded grids to be saved as a single grid file without welding.



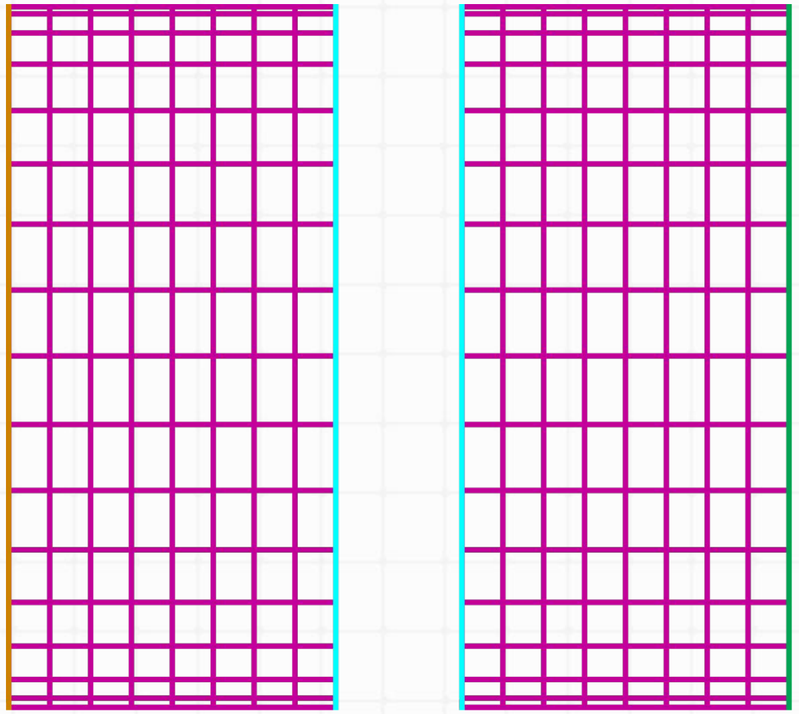
Input grids before merging into single file



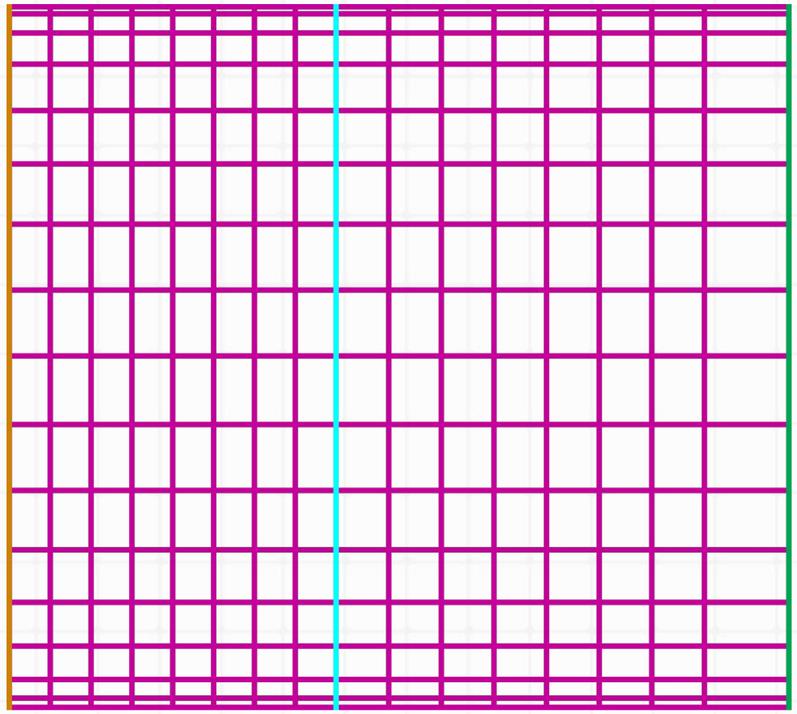
Merge dialog box

Sync Grid

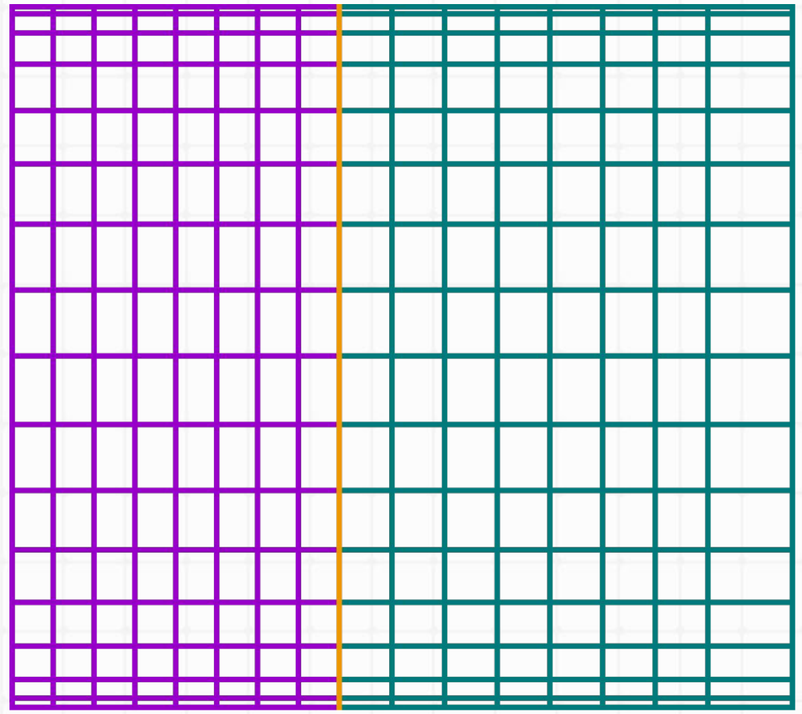
The Sync Grid Faces tool is used to synchronize the grid nodes between two different grid sheets. It aligns the one-to-one connected grid nodes of the selected sheets so that they lie at the same location across the interface. Unlike weld, the two grids will be disjoint after syncing



Input grids before merging into single file



output grids synced at the interface

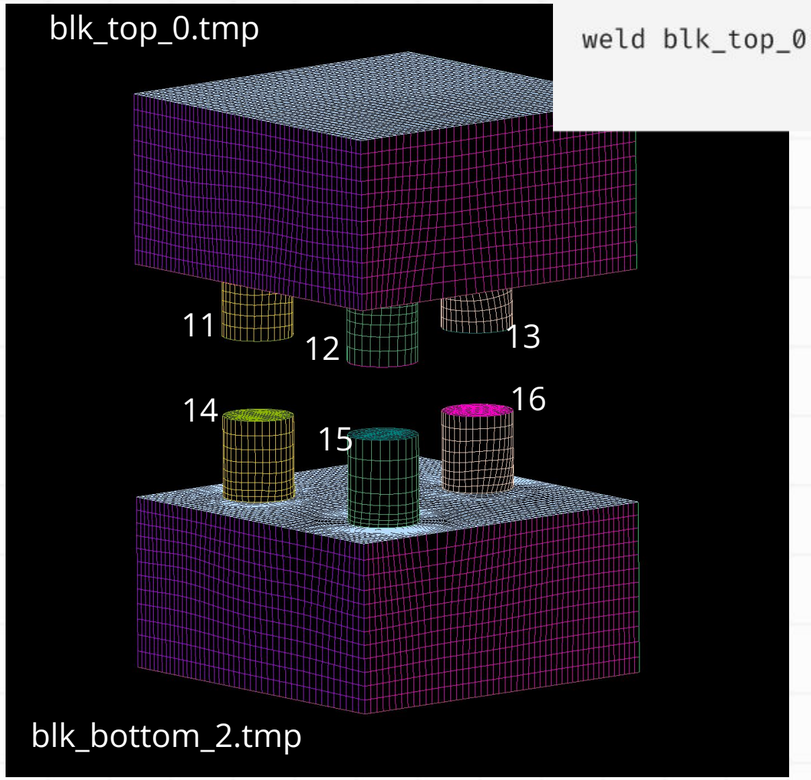


output grids synced at the interface (2D sheet view)

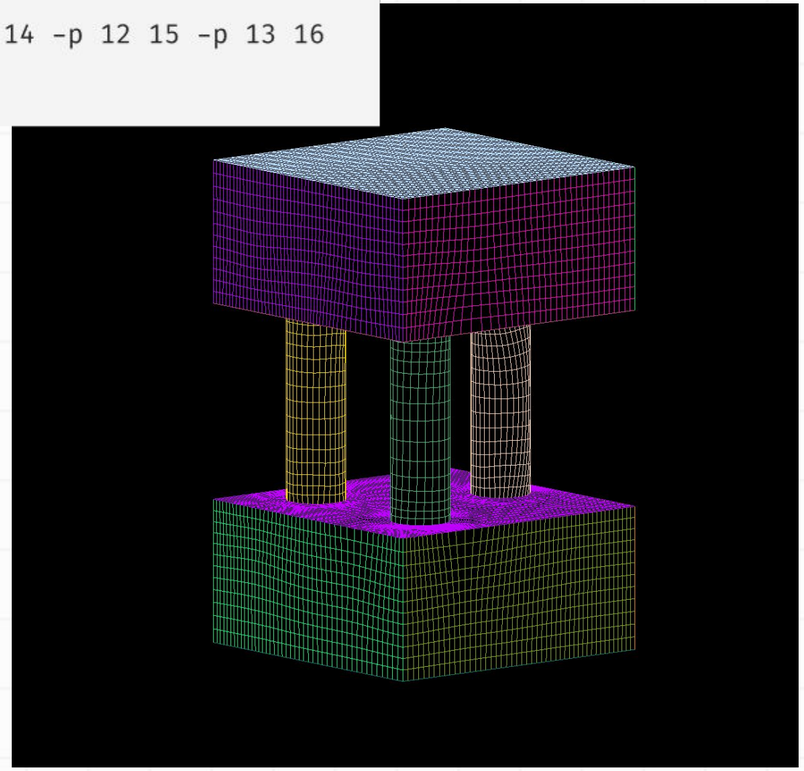
Command line to weld multiple grid faces

Weld multiple interfaces simultaneously.

```
weld blk_top_0.tmp blk_bottom_2.tmp -p 11 14 -p 12 15 -p 13 16
```



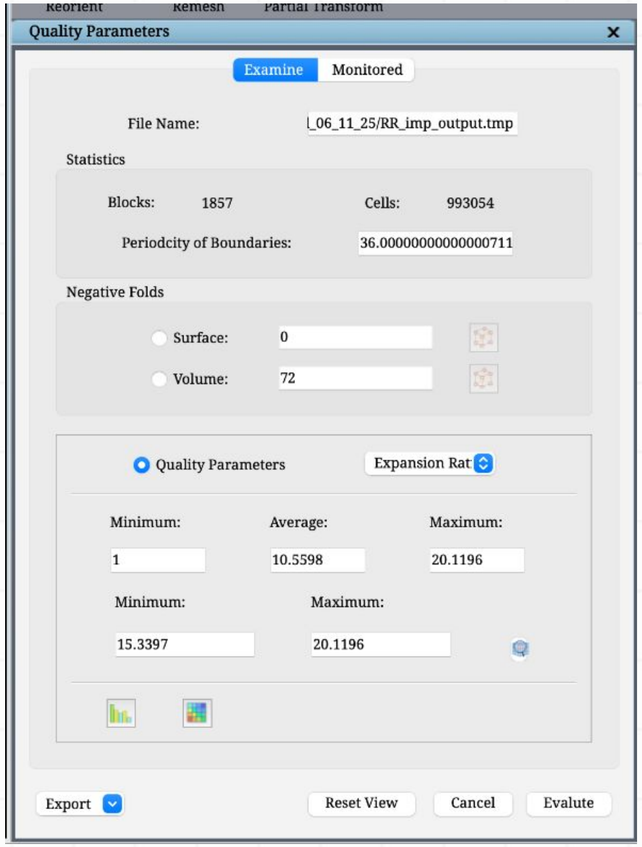
Input grids before welding



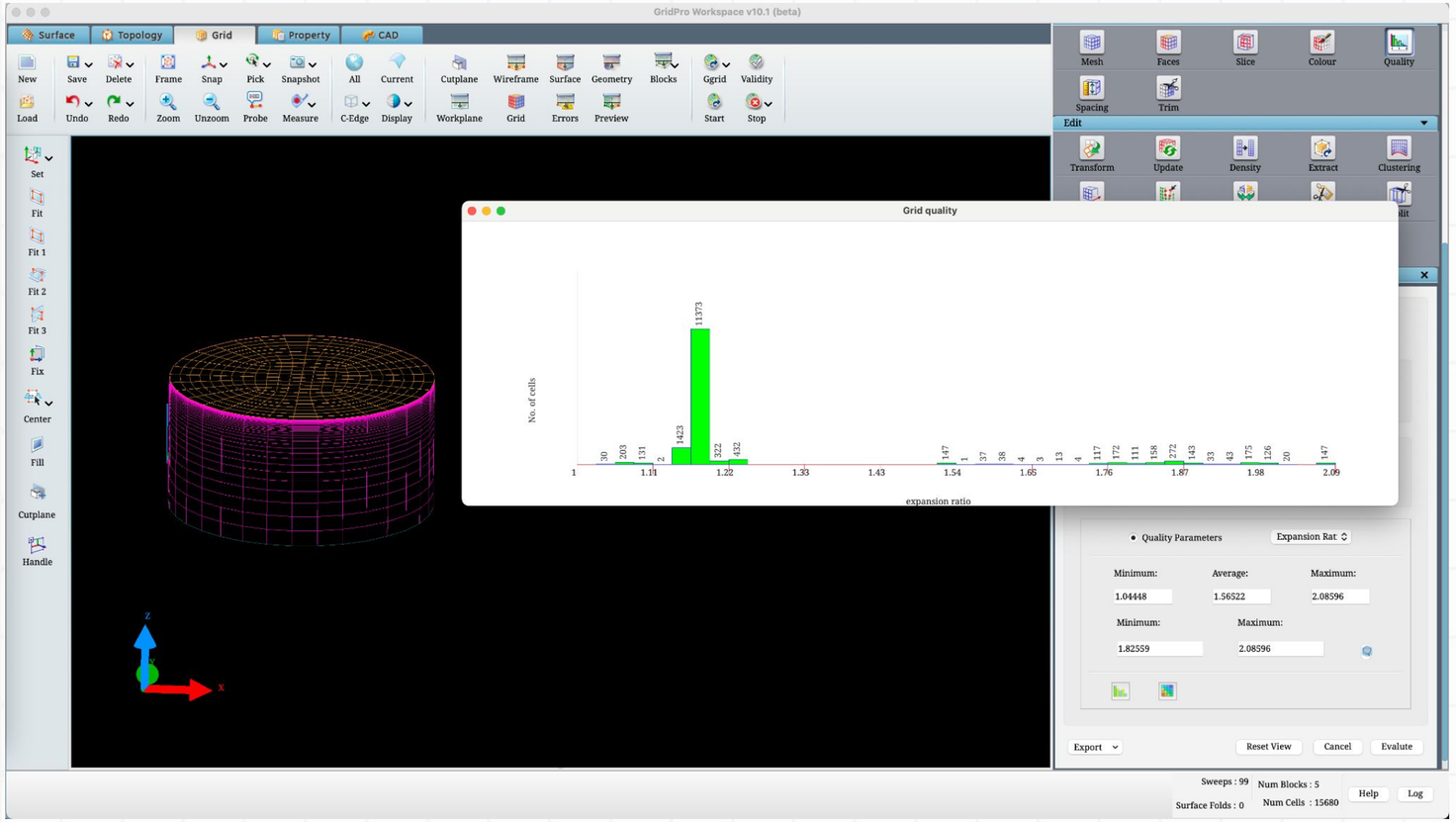
Output grid after welding

Expansion Ratio added to quality metrics

Expansion ratio added to quality metrics to visualize cell expansion ratio. This can be viewed in the GUI and can be viewed as histogram visualization in the quality graph.



Grid quality dialog box

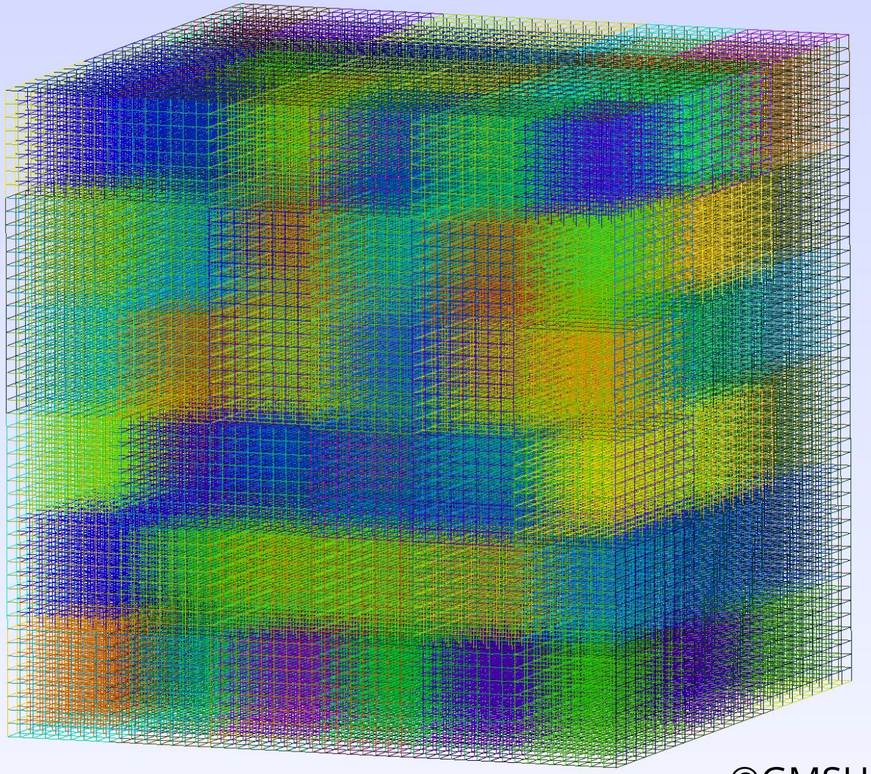


Expansion ratio quality plot

GridPro GMSH Export - Higher Order

Use the command line to export the grid to GMSH higher order

```
ws change_format -ifn <blk.tmp> -outfn <out.gmsh> -hoe 4
```



©GMSH

GMSH higher order export

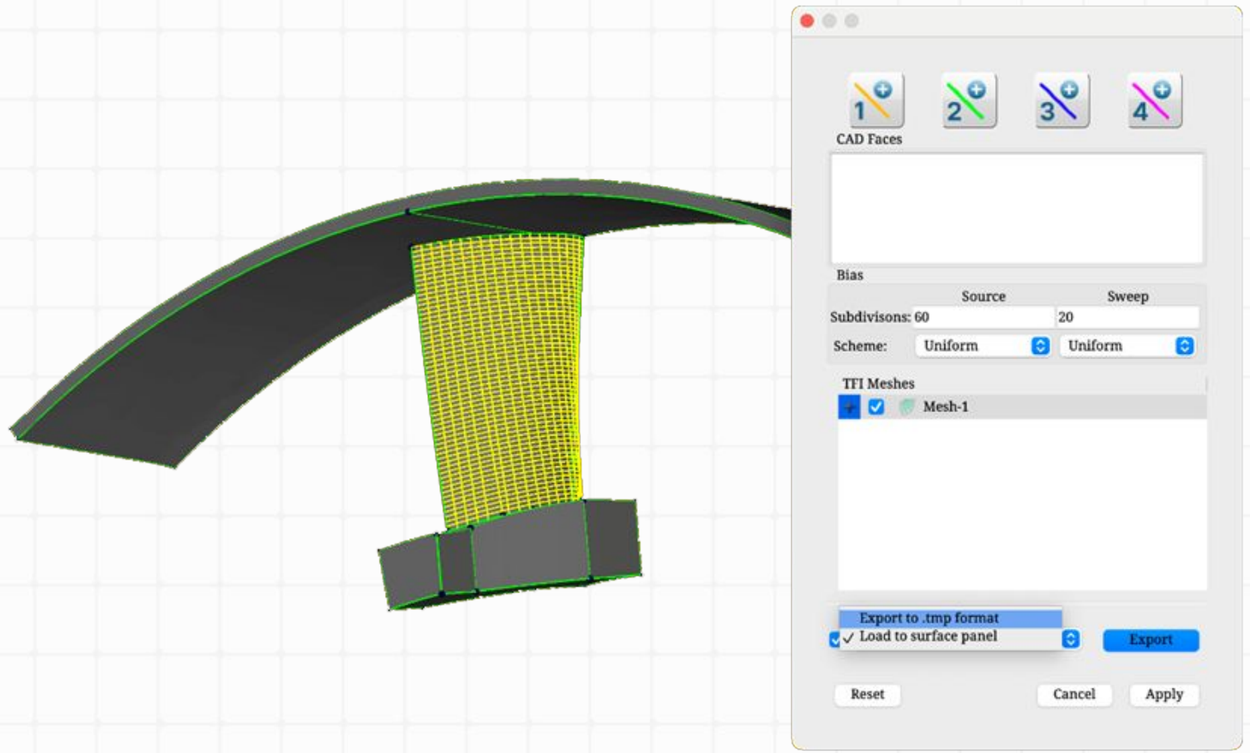
Grid Generation Techniques

Transfinite Interpolation on CAD

TFI(Transfinite Interpolation)

TFI is a structured mesh generation technique that creates a grid between boundary curves or surfaces using mathematical interpolation.

How It Works: TFI generates interior mesh points by interpolating between the boundary definitions. The boundary curves define the shape, and TFI fills in the interior points smoothly and predictably.



TFI mesh with dialog box