CADfix DX 13/SP1

“What’s new”

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Q4 2024

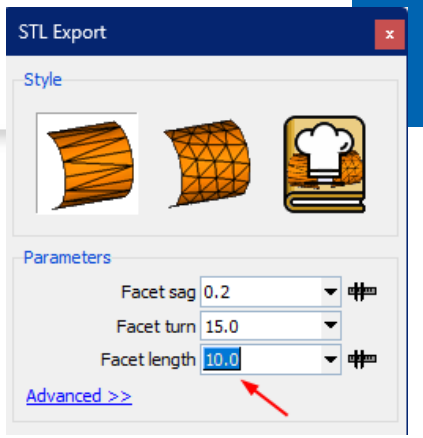
CADfix DX 13/SP1 Summary

- Import/Export
  - Latest CAD versions supported
  - New USD export for AR/VR/XR
  - New STL export controls for better sizing
- Assemblies
  - Better performance for large assemblies
- Wizard
  - Transform: New Mid-surface simplification tool
- Morph
  - New option for handling non-aligned meshes
- Mid-surfaces (new)
  - New automatic mid-surface generation tool
  - Extruded or revolved bodies
  - Smart profile simplification options
- 2nd order Tri/tet Meshing (new)
  - New high quality quadratic tet meshing
  - Parallel tet meshing for multi-solids
  - Smart mesh sizing
  - Automation through custom mesh recipes
- Hex Meshing app (new, beta)
  - New tools for structured hex meshing
  - Powerful tools for cutting complex bodies
  - Automatic surface quad splitting
  - High quality hex mesh generation

DX13/SP1: Import/Export

- CAD version support updates
  - CATIA V5-6 R2024
  - NX 2406
  - Creo 10.0
  - SolidWorks 2024
  - SolidEdge 2024
  - Inventor 2024
  - Parasolid 37.0
  - ACIS 2024
- STL export
  - Curvature style now respects max length size
  - New option to detect and re-mesh intersecting facets (e.g. thin walls)
  - Major enhancements for CFD simulation
- Mesh export: New 2nd Order Tets
  - Robust high quality 2nd order tet mesh generation
  - Smart sizing and adaptivity to ensure valid elements

STL Export: Enhancements for CFD



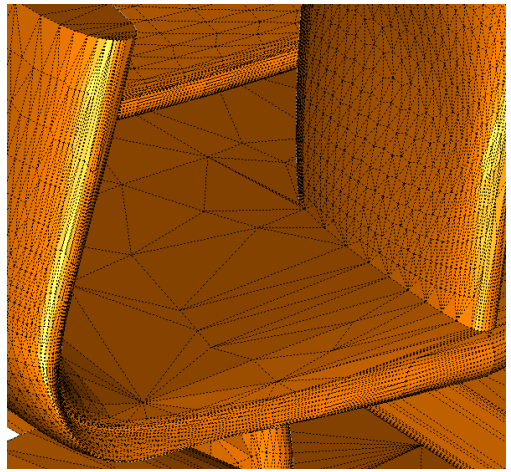
New max. length limit on minimal curvature style

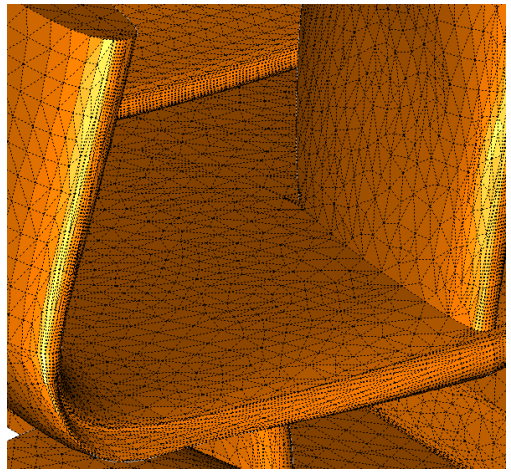
- The minimal curvature-based style can produce very high aspect ratio facets
- The “Facet length” control now limits the interior sizes of the facets, reducing aspect ratio

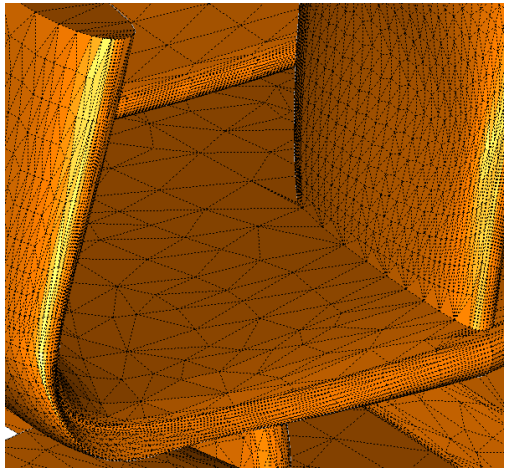
Improved capture of tightly curved leading edges

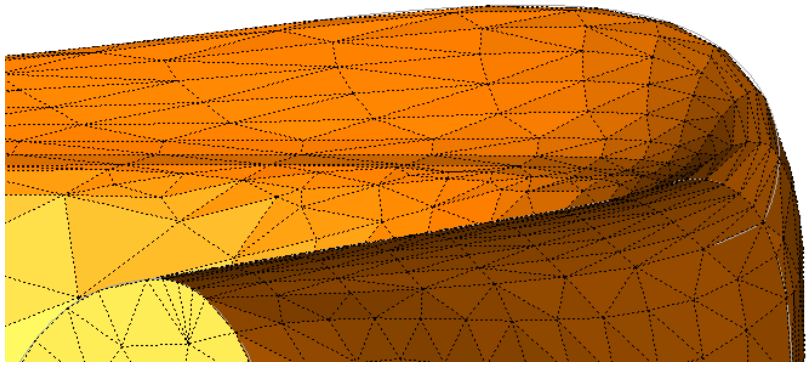
- Adaptive refinement drives size down to user specified sag level, guaranteeing capture

Major improvements for STL export for CFD e.g. via OpenFOAM





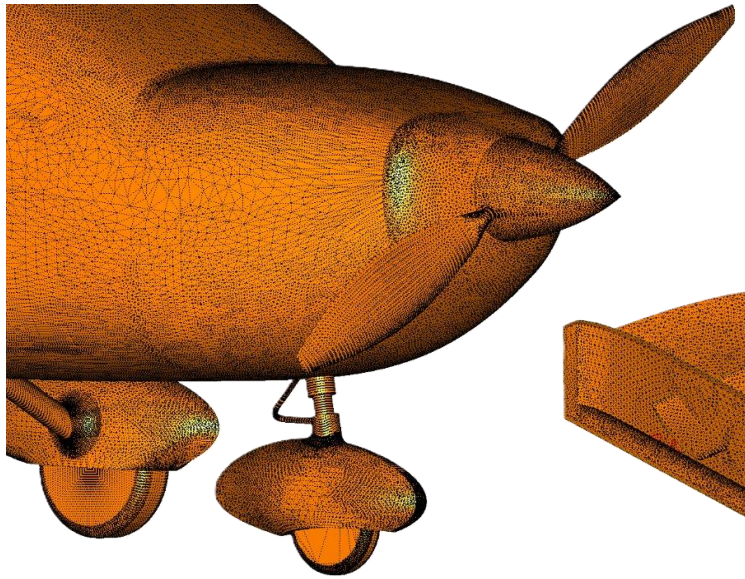


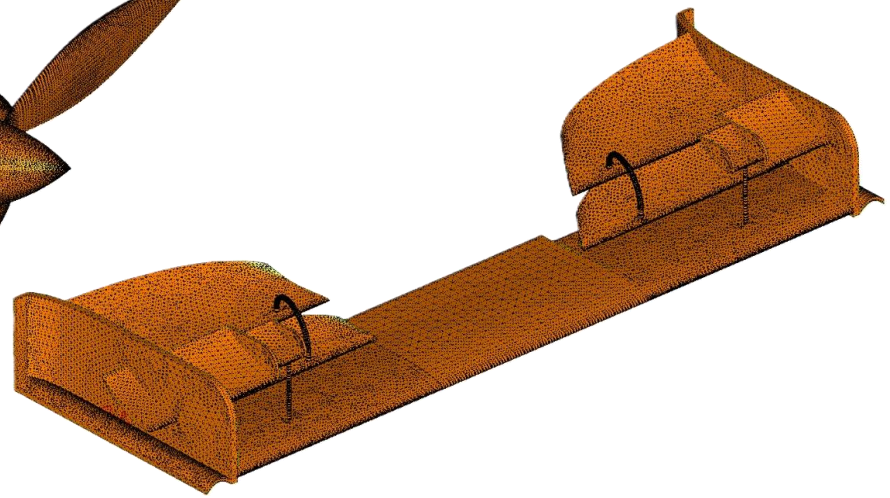


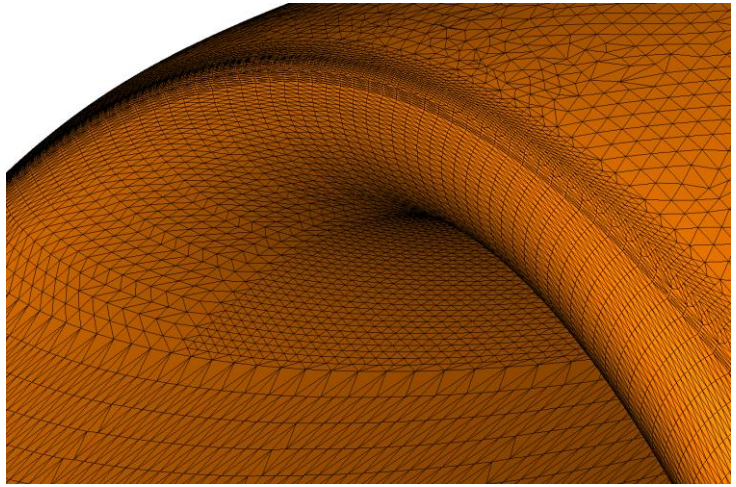
STL Export: Enhancements for CFD

Extended customisation and batch automation

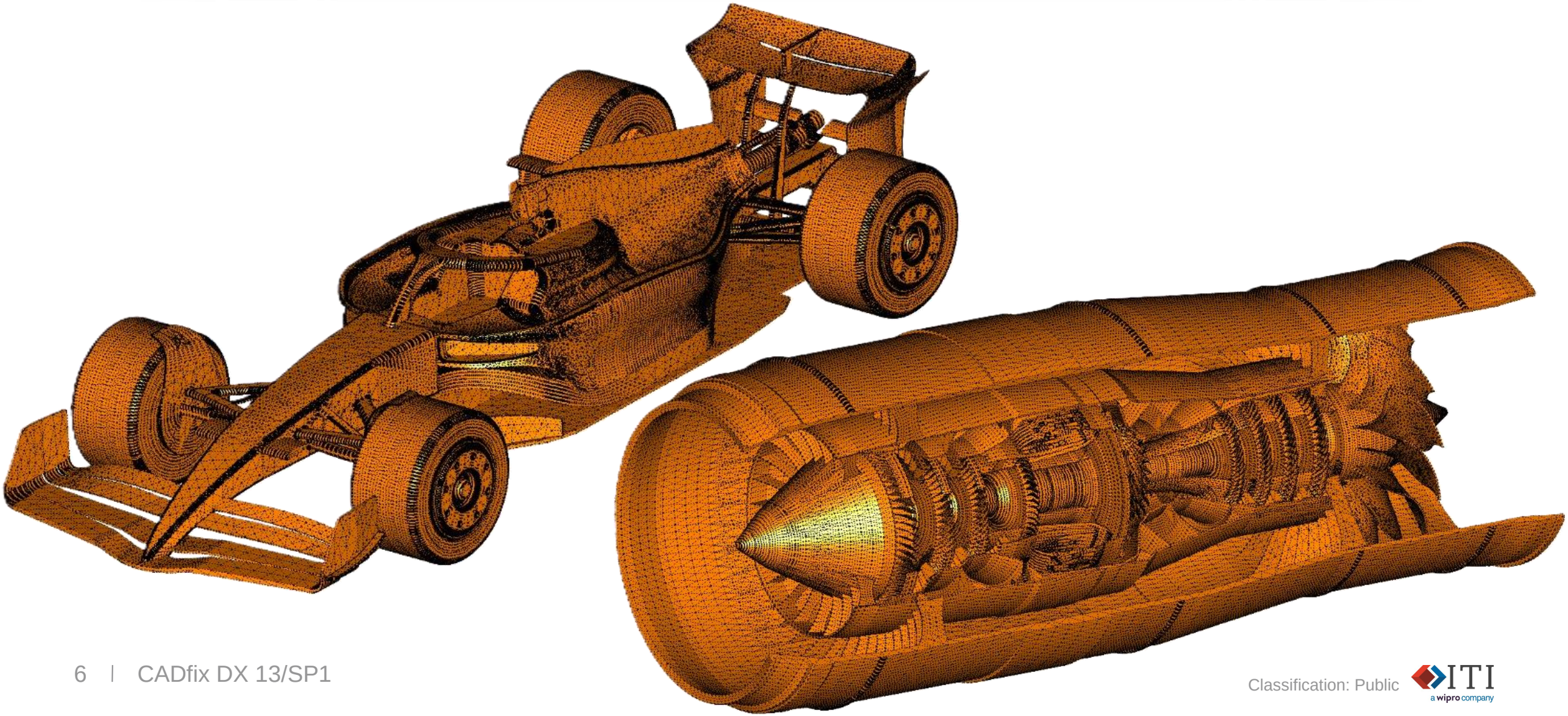
- **Powerful recipe mechanism to capture complex STL meshing workflows**
- **Recipes can drive batch Wizard STL runs**
- **Recipes support automatic localised sizing using CAD labels, etc…**







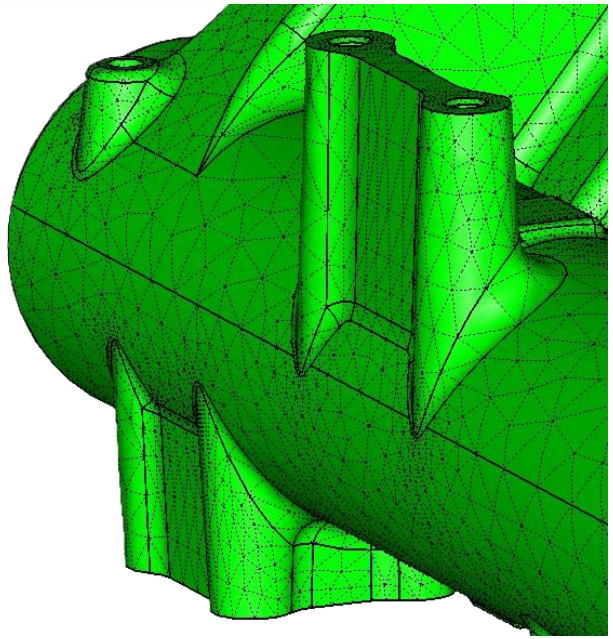
STL Export: Enhancements for CFD

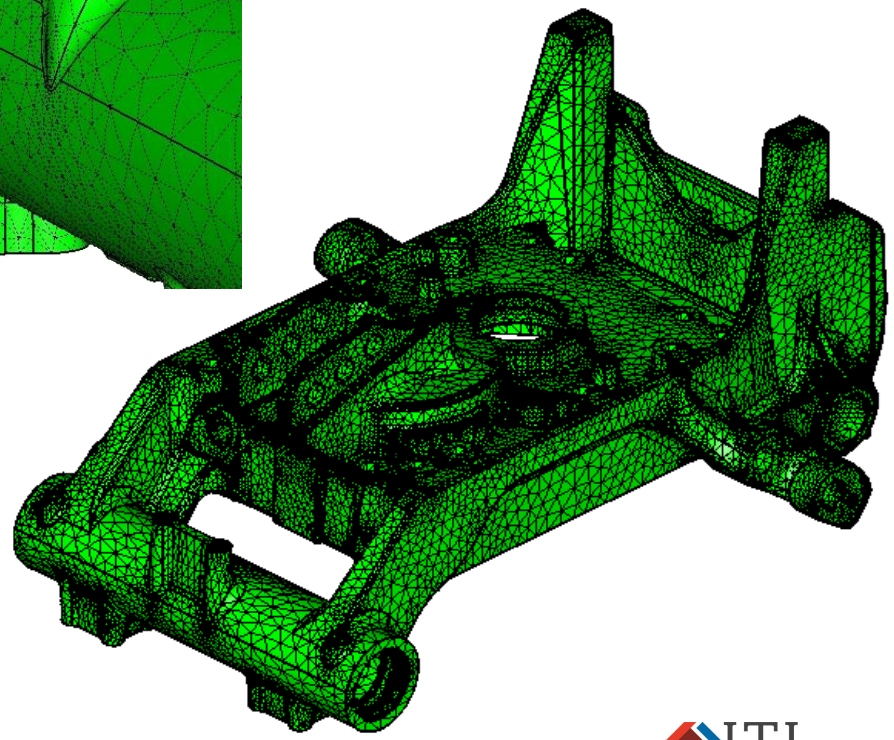


Mesh Export : New 2nd Order Tri/Tet CAE

Robust automatic 2nd order Tri/Tet meshing

- Smart geometry-based sizing
- Auto-proximity refinement
- Auto-thin wall refinement
- Auto-defeaturing of small CAD features
- Multi-solid contact supported
- Parallel mesh generation for multi-solids
- Custom recipes for applying user-defined sizing rules
- Element quality assessment
- Available in batch for automation
- Exports to Nastran/ABAQUS/…
- **Mesh preview available to all CADfix users** (exports require purchase)

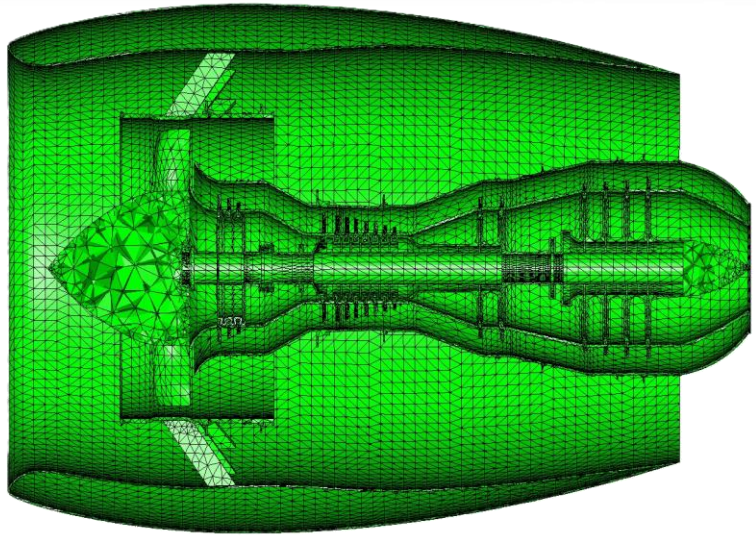


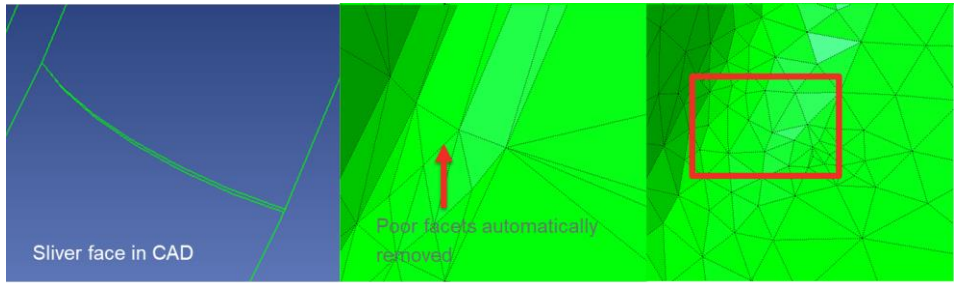


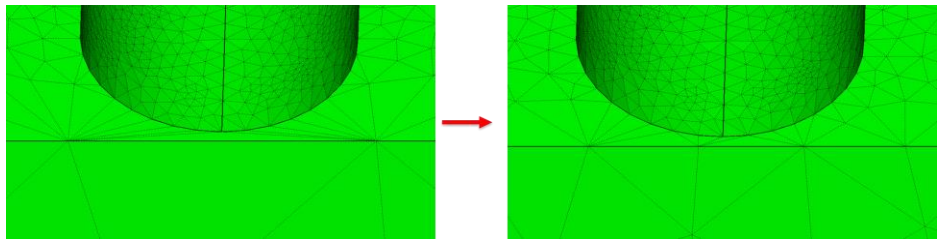
Mesh Export : New 2nd Order Tri/Tet CAE

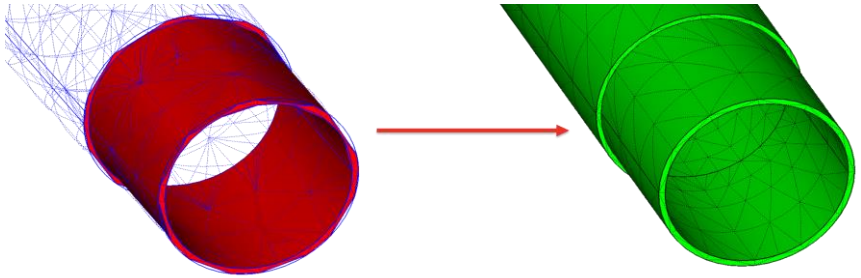
Examples

- **Automatic CAD cleanup and simplification**
- **Parallel tet meshing for faster multi-solid meshing**
- **Jacobian-driven adaptivity**
- **Automatic defeaturing**
- **Smart proximity refinement**
- **Adaptive thin-wall refinement**

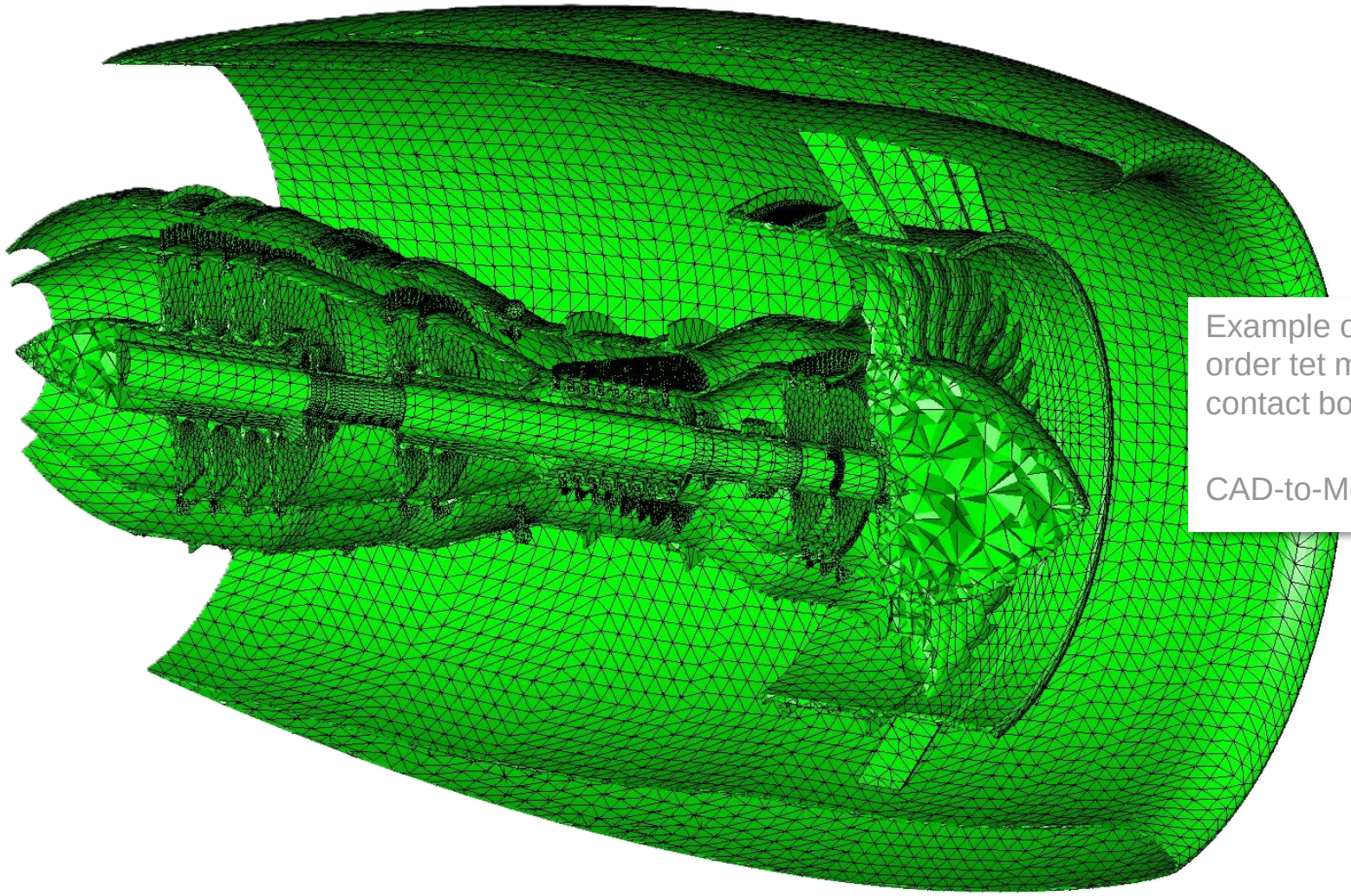


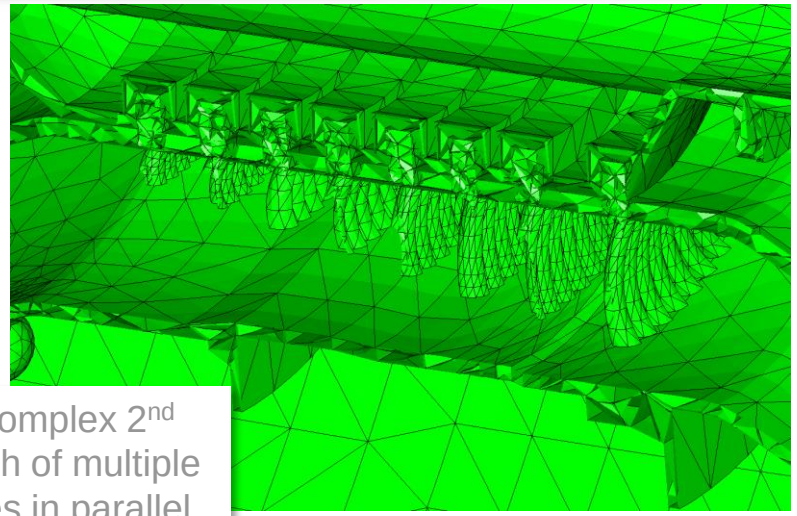


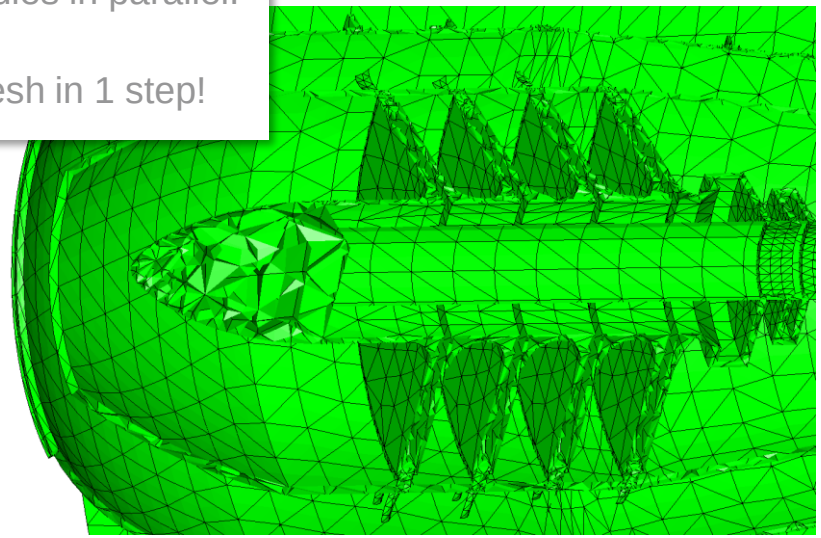




Mesh Export : New 2nd Order Tri/Tet CAE



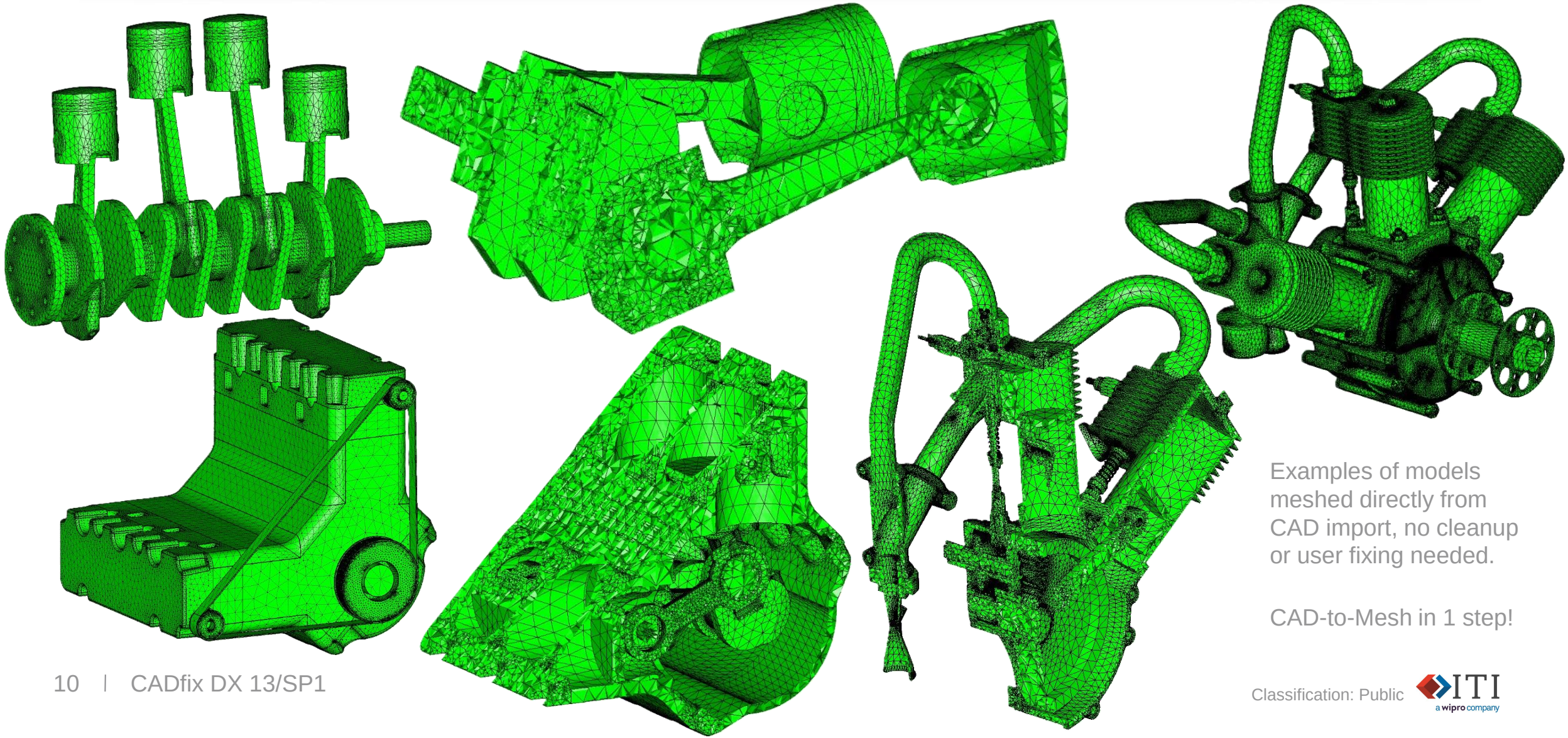




Example of complex 2nd order tet mesh of multiple contact bodies in parallel.

CAD-to-Mesh in 1 step!

Mesh Export : New 2nd Order Tri/Tet CAE



Examples of models meshed directly from CAD import, no cleanup or user fixing needed.

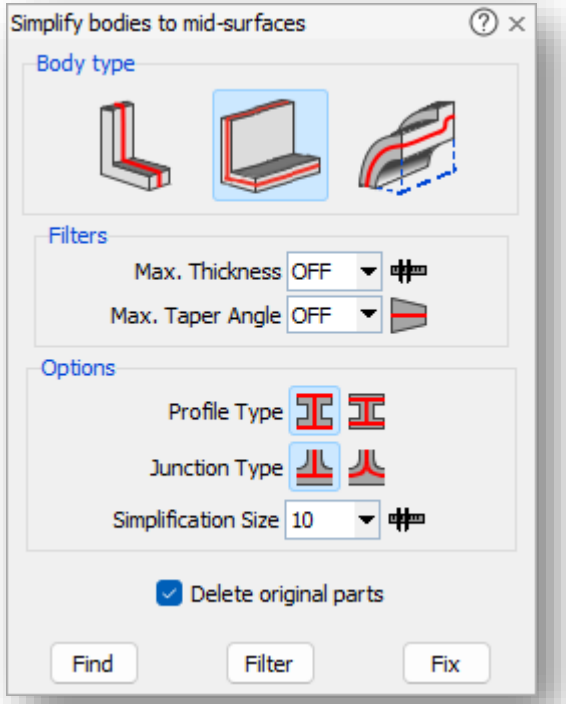
CAD-to-Mesh in 1 step!

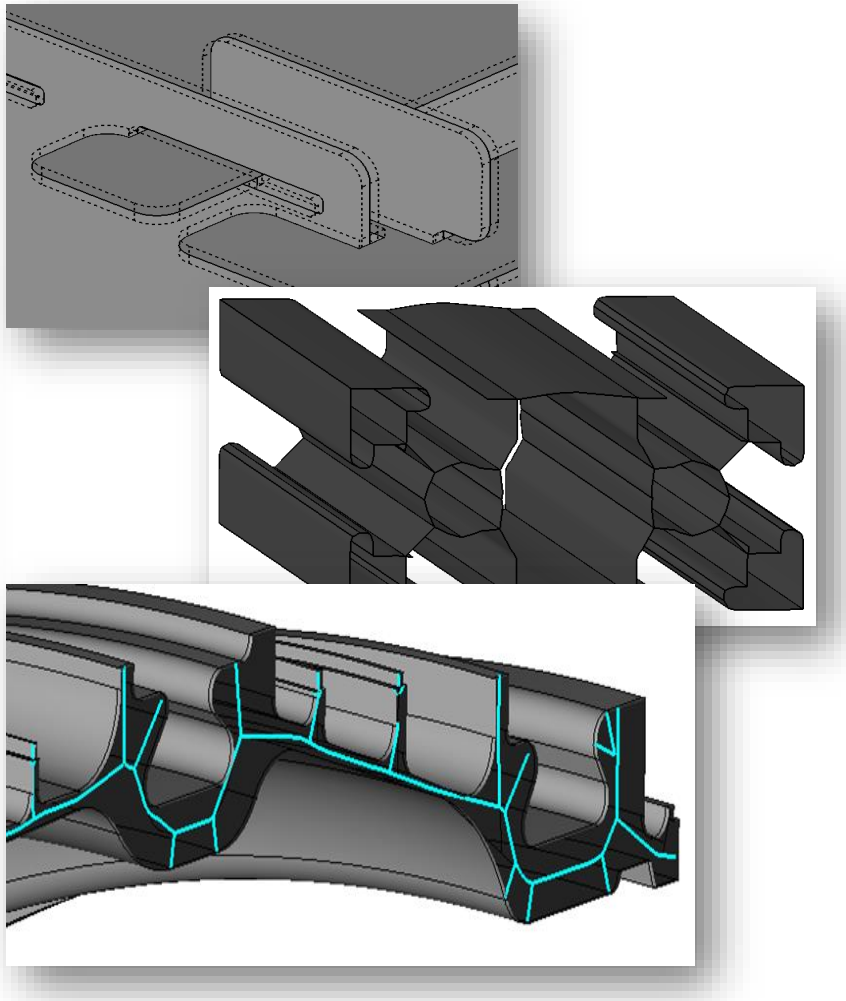
ITI a wipro company

13SP1: New Mid-Surface Tool

New tool to simplify bodies to a mid-surface approximation

- Automatic mid-surface generation for extruded and revolved solids
- Fully automatic generation from complex solids
- User controls for:
  - Snapping to inner/outer faces
  - Auto-simplification
  - T-junction handling

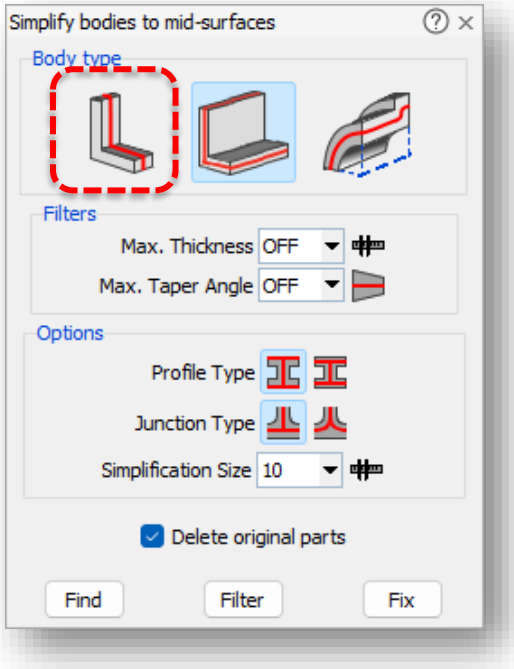


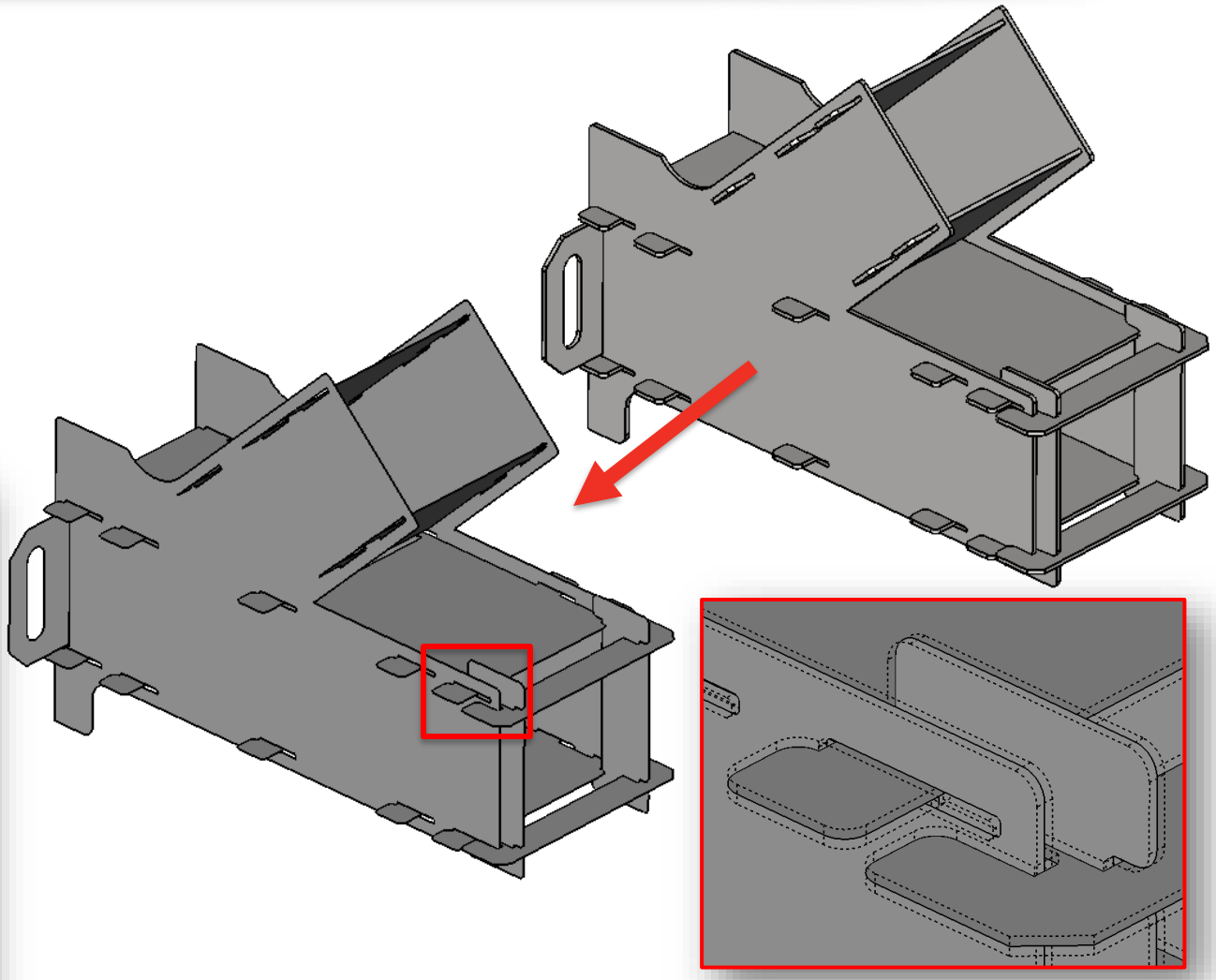


13SP1: New Mid-Surface Tool

Extruded Bodies – Thin Sheets

- Thin sheet extruded bodies automatically detected and the mid-surface is generated from the cross-section
- Planar and **non-planar** thin sheets handled

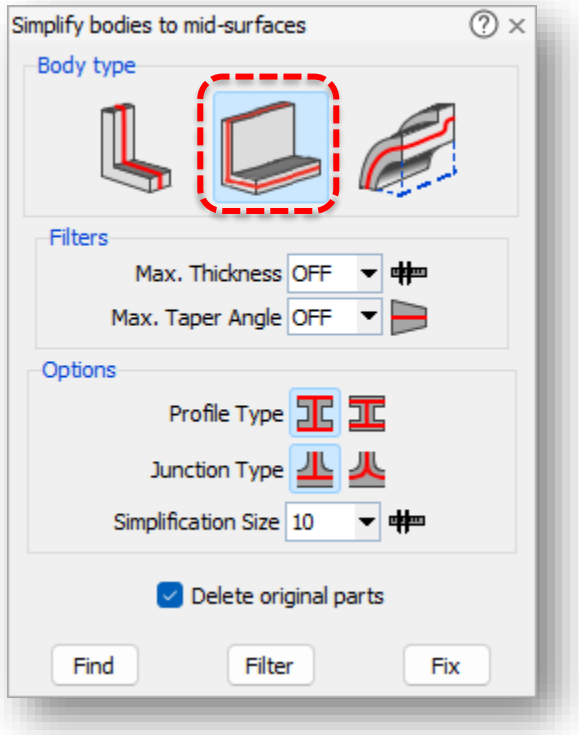


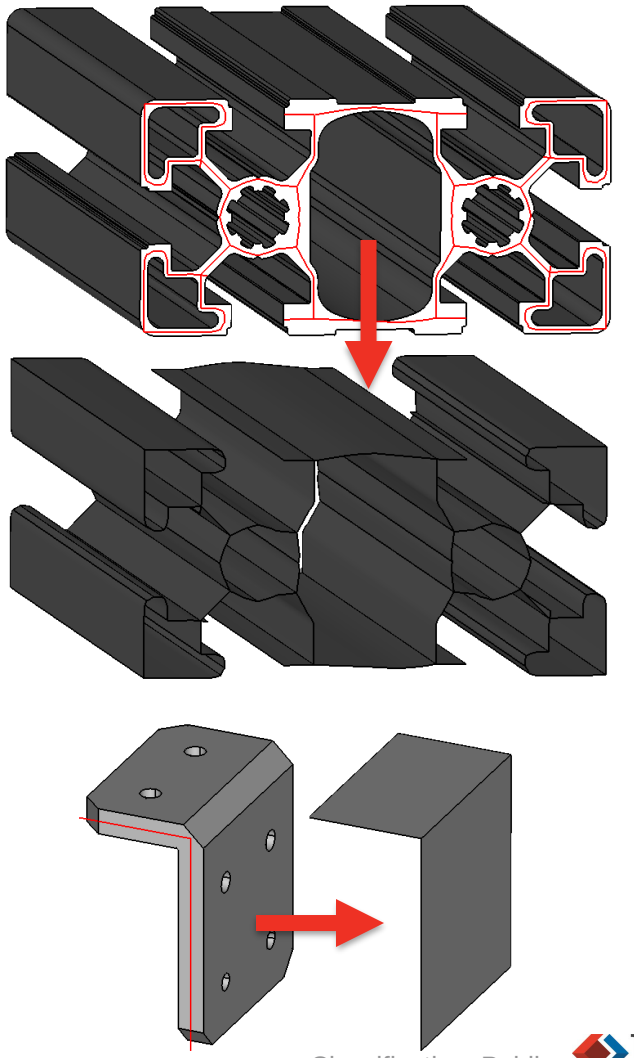


13SP1: New Mid-Surface Tool

Extruded Bodies – Long/Slender

- Long slender extruded bodies automatically detected and the mid-surface is generated from the extrusion cross-section
- Non-perfect extrusion features automatically removed, such as holes, chamfers,…
- Controls to filter based on max. thickness or variable thickness taper angle

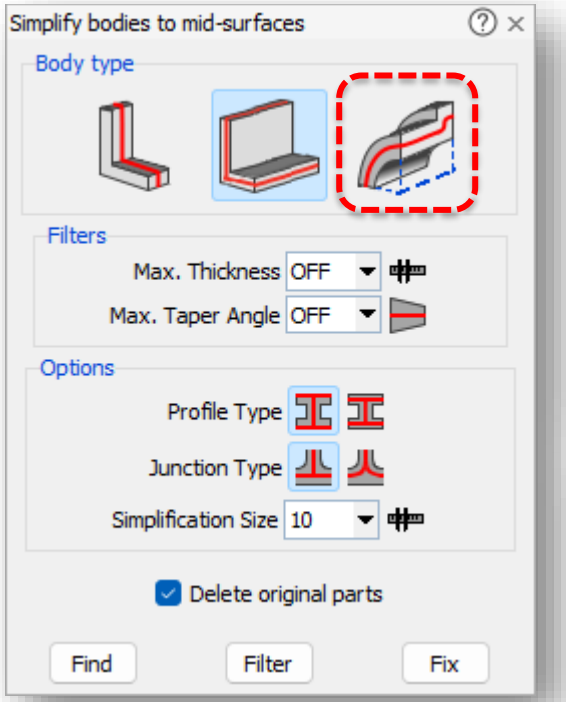


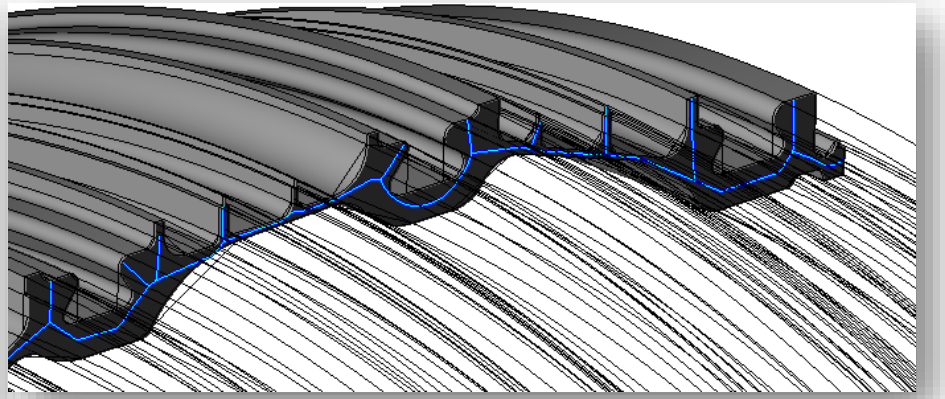


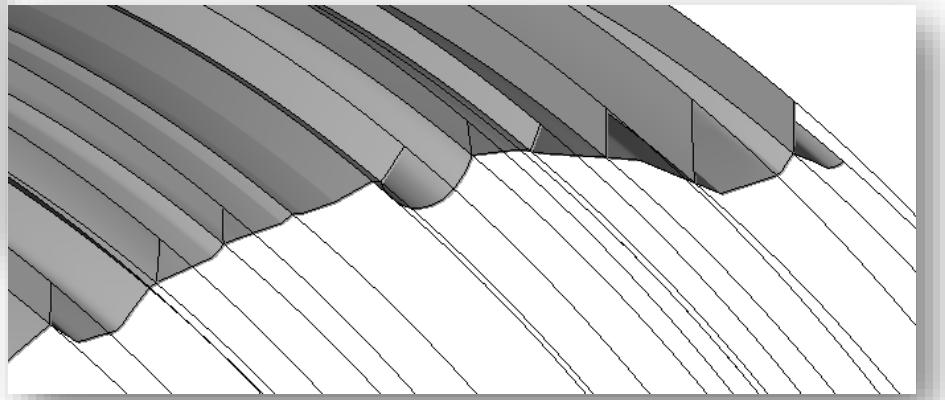
13SP1: New Mid-Surface Tool

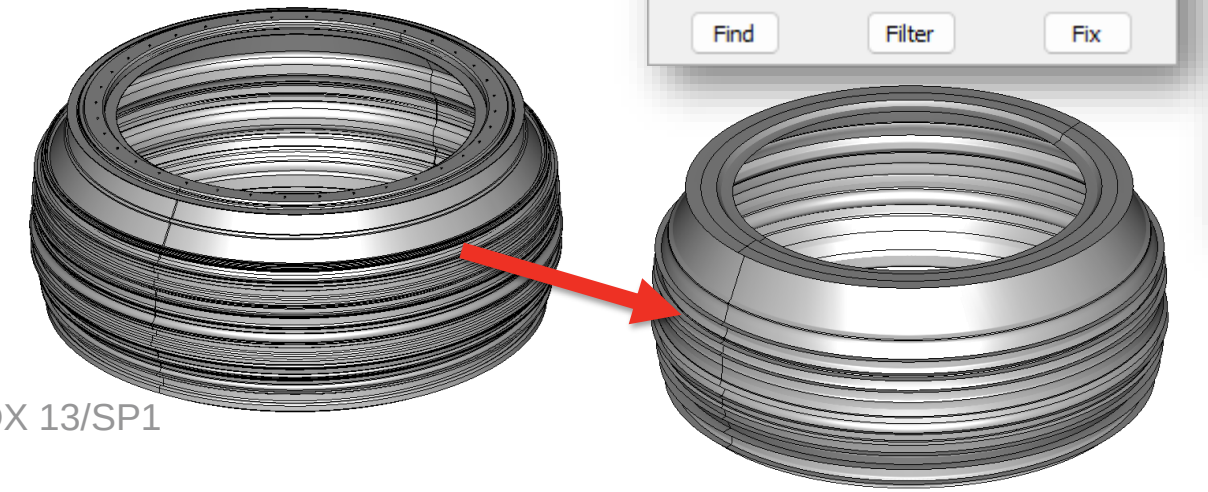
Revolved Bodies

- Revolved bodies automatically detected and the mid-surface is generated from the revolved cross-section
- Revolved profile detection ignores small non-revolved features, such as small bosses/holes





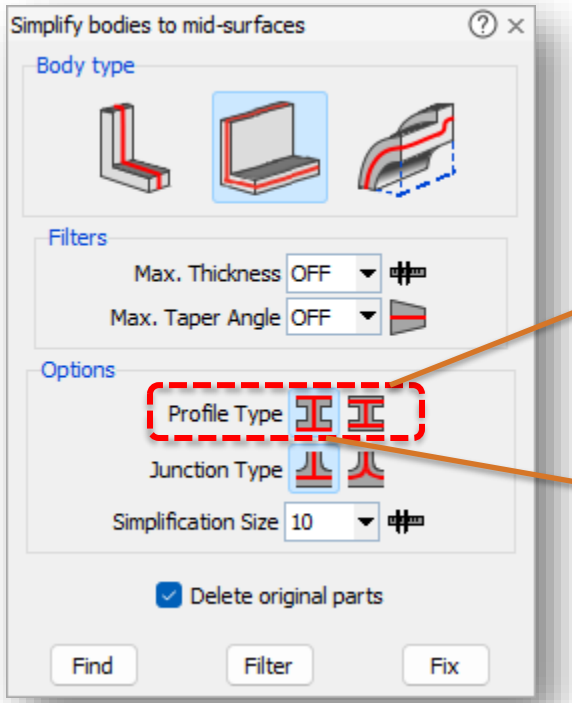


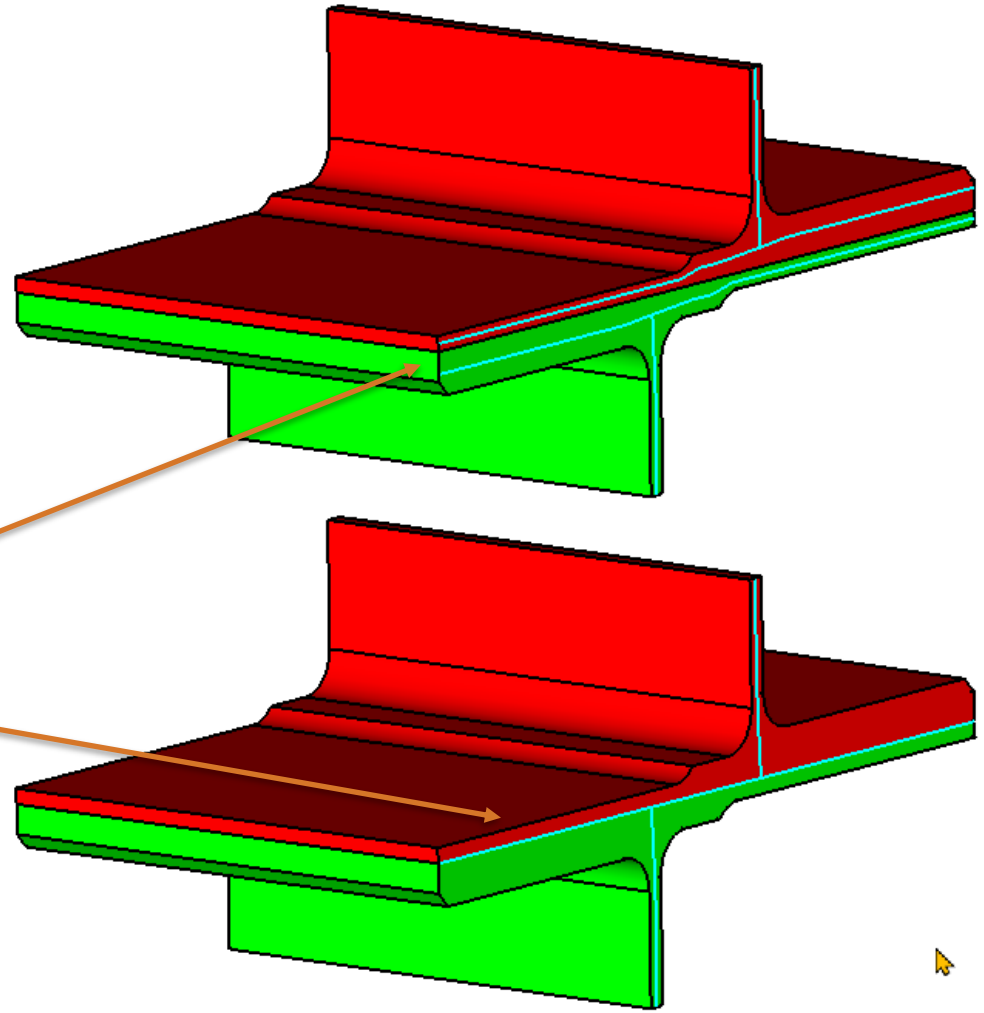


13SP1: New Mid-Surface Tool

Options– Profile Type

- Option to control if mid-surface snaps to the outer boundary
- Important for multi-solid models with contact
- Produces coincident mid-surfaces that can be connected using other CADfix tools

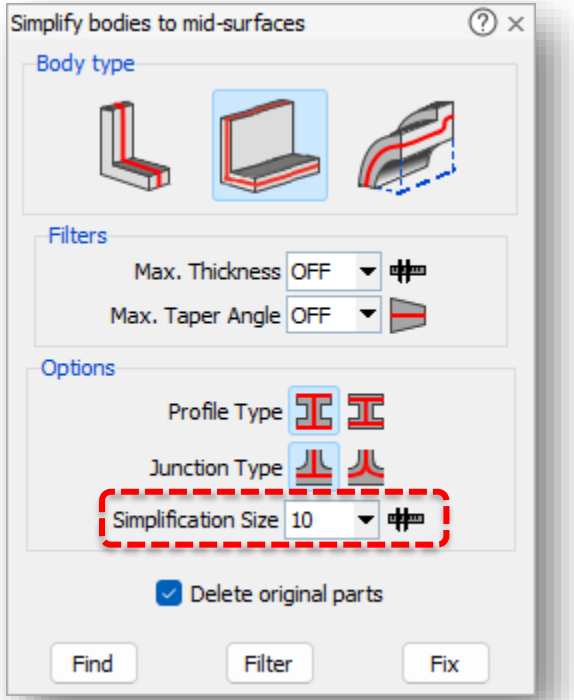


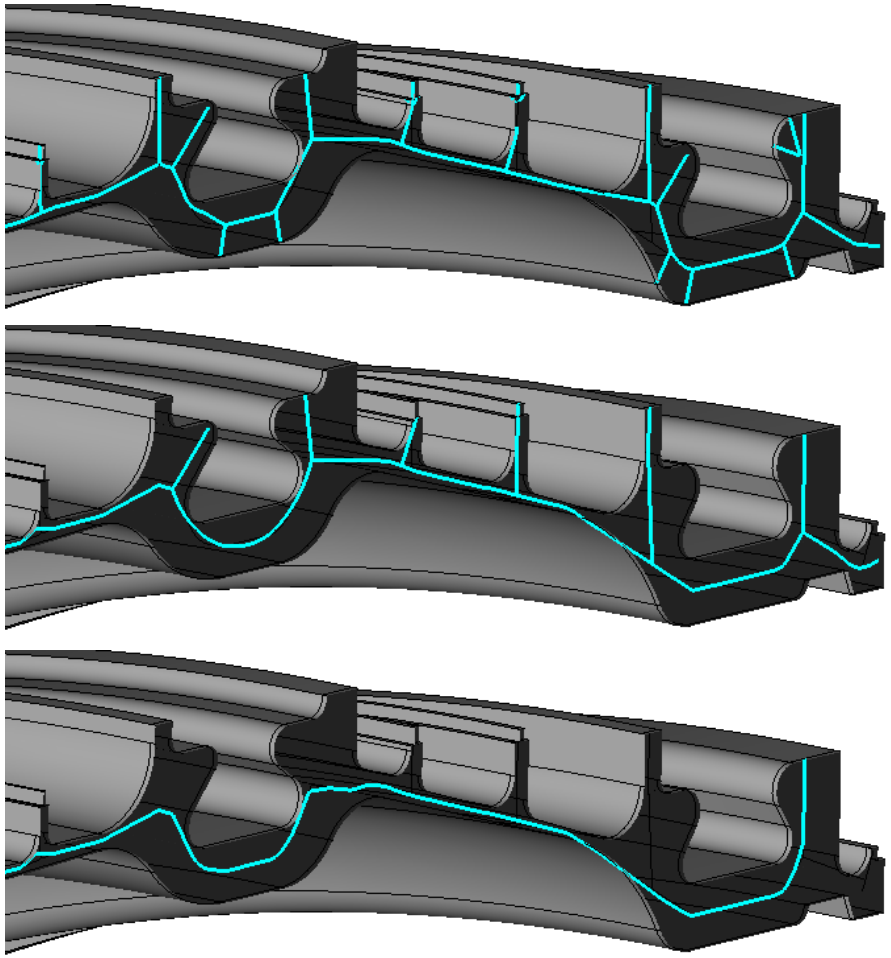


13SP1: New Mid-Surface Tool

Options– Profile Auto-simplification

- Option to automatically defeature the mis-surface profile before generating the surface geometry
- Small holes or protrusions can be suppressed using the user defined size control

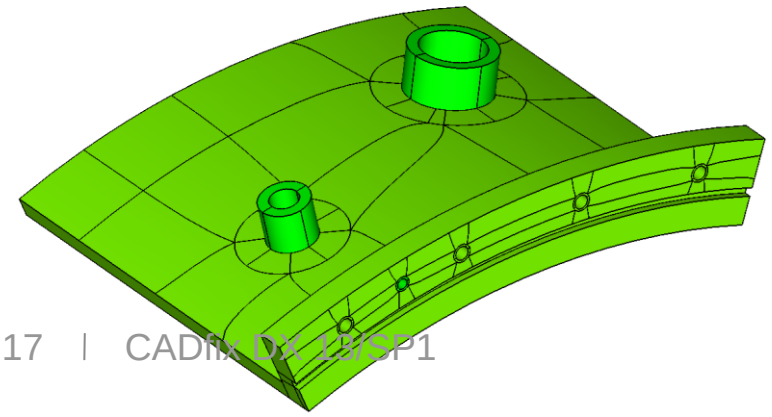


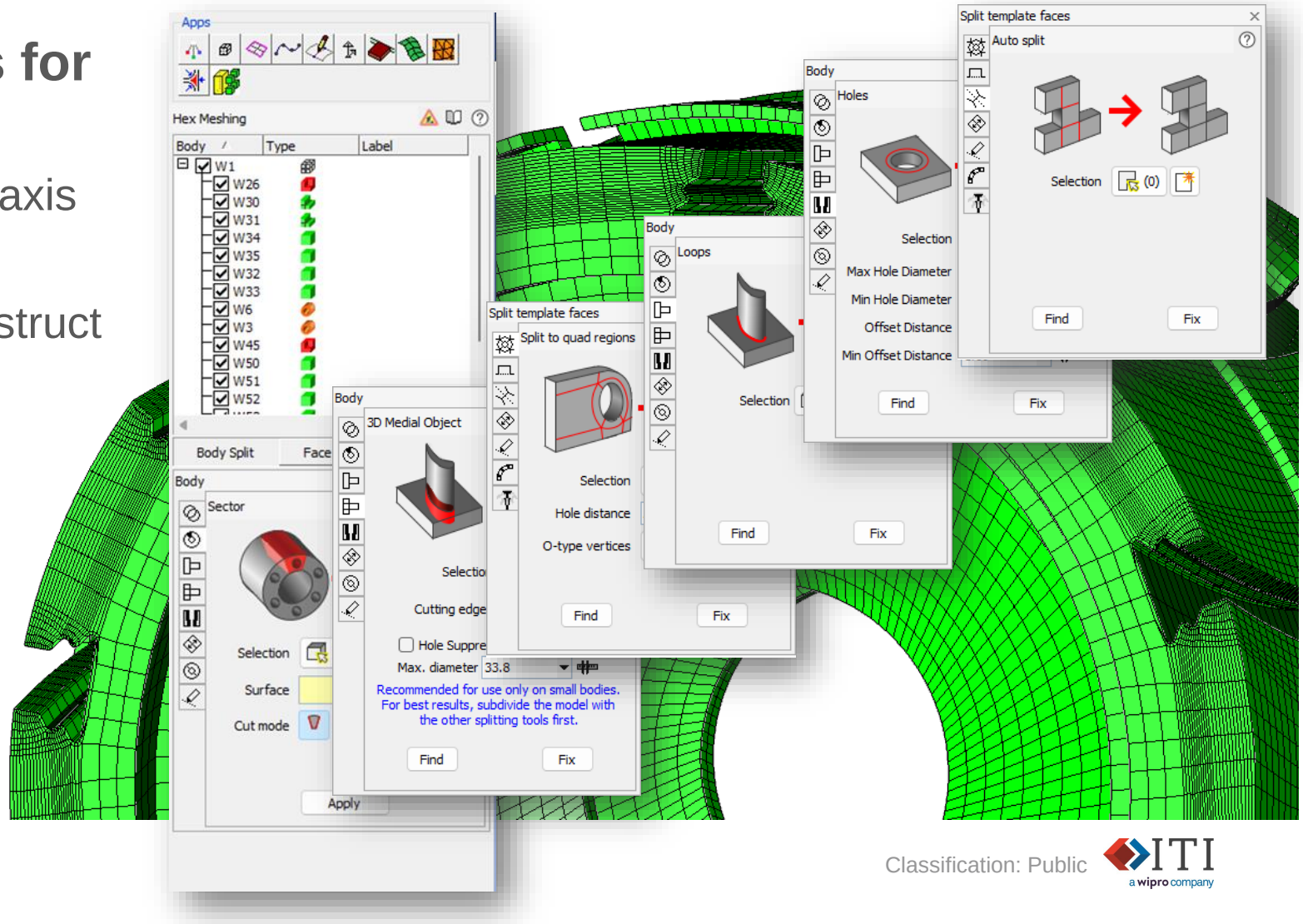


13SP1: New Hex-Split App (beta)

Powerful collection of tools for high quality hex meshing

- Body splitting using 3D medial axis
- Face splitting using cross-field
- Dynamic tools to manually construct splitting geometry
- Recipe-based hex meshing
- Smart sizing and balancing

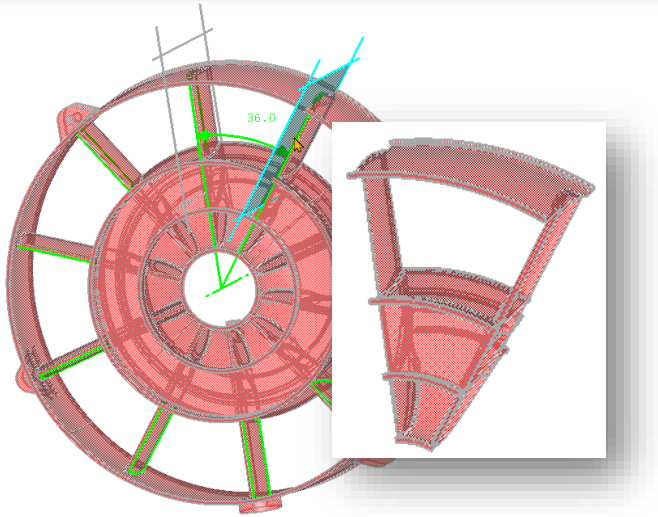




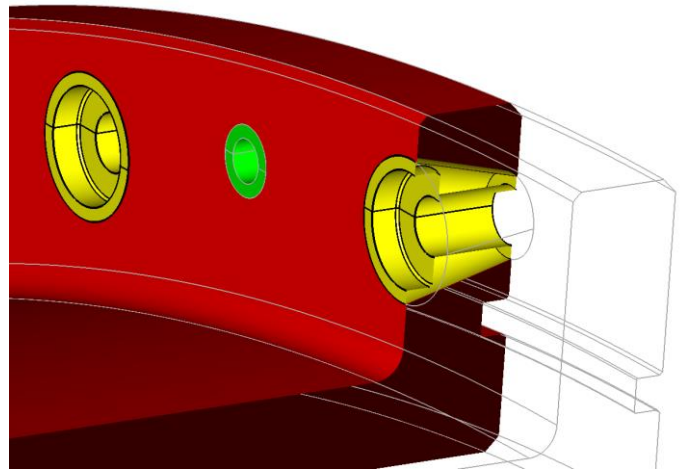
13SP1: New Hex-Split App (beta)

Intelligent Body Splitting

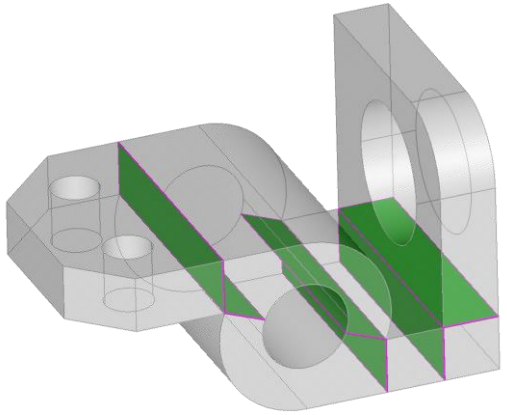
- Sector cuts
  - Automatic detection of symmetry
  - Interactive selection of split location
- Circular / Loop / 3D medial cuts
  - Automatically break off sections at concavities.
- Hole cuts
  - Enclose complex hole profiles with collar partitions
- Surface cuts
  - Split with existing surface
  - Interactively create offset surfaces
- Sketching cuts
  - Manually build cut surfaces



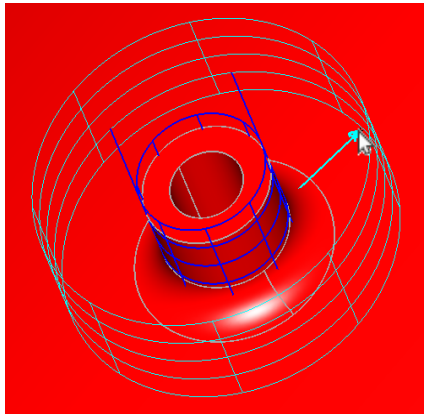
Dynamic sector cut



Hole cut



3D medial cuts

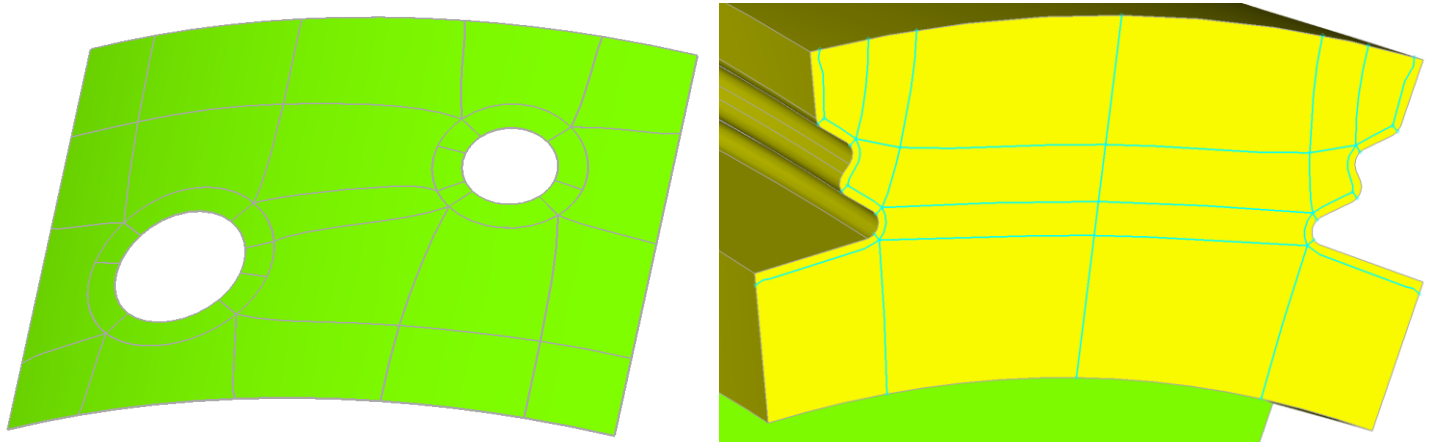


Interactive offset surface

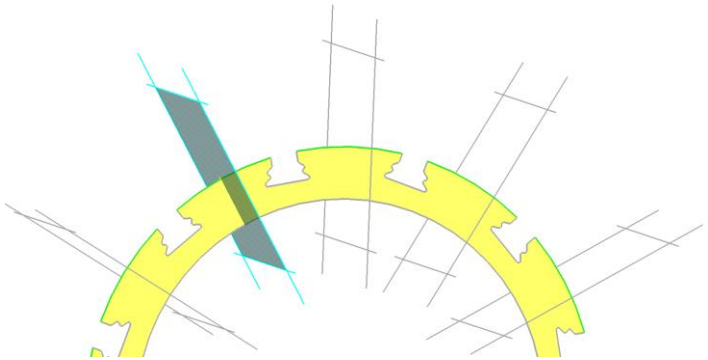
13SP1: New Hex-Split App (beta)

Intelligent Face Splitting

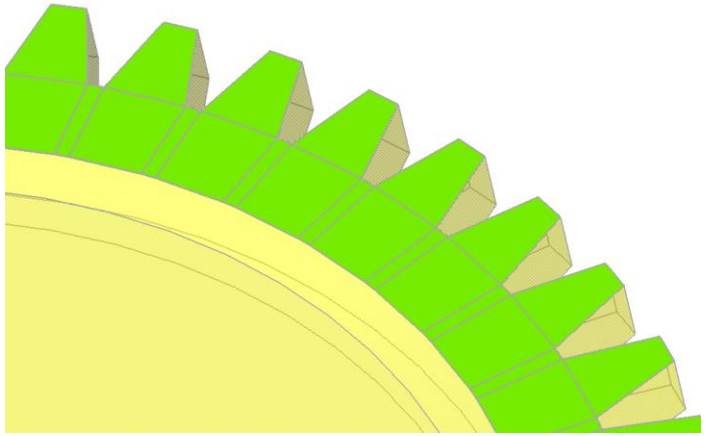
- Quad splits
  - Automatic quad partitioning
  - Precise control around holes
  - Automatic symmetry and periodicity
  - Avoidance of spirals
- Protrusion splits / 2D medial splits
  - Automatic splitting at concavities
- Surface splits
  - Use existing 3D surfaces or dynamic offsets to split faces.
- Sketching splits
  - Manual partitioning of faces
- Pattern splits
  - Planar splitting with automatic symmetry.
- Imprint splits
  - Topology matching to support sweep meshing.



Quad splits



Pattern splits

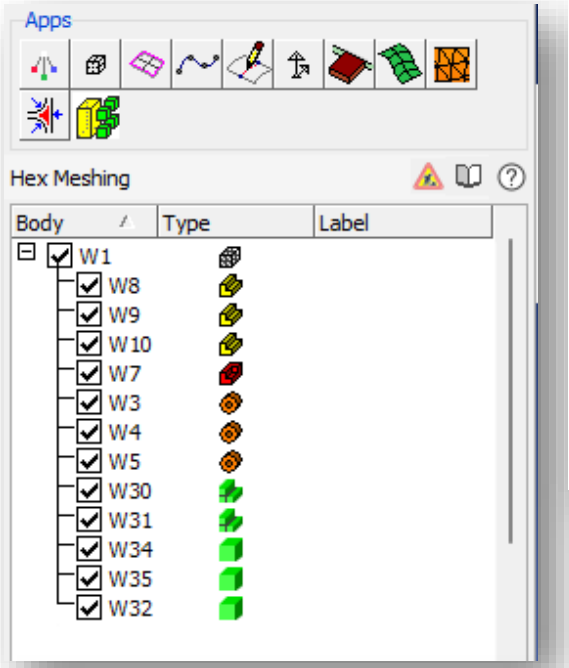


2D medial splits

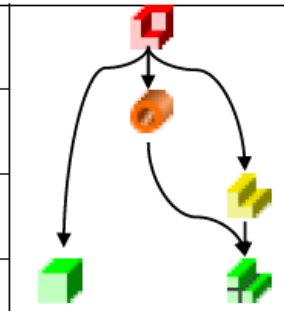
13SP1: New Hex-Split App (beta)

Smart model tree guides workflow

- Colour coded bodies indicate how hex meshing status
- Split operations update body statuses. An all-green model can be hex meshed with a combination of grid and sweep meshing.



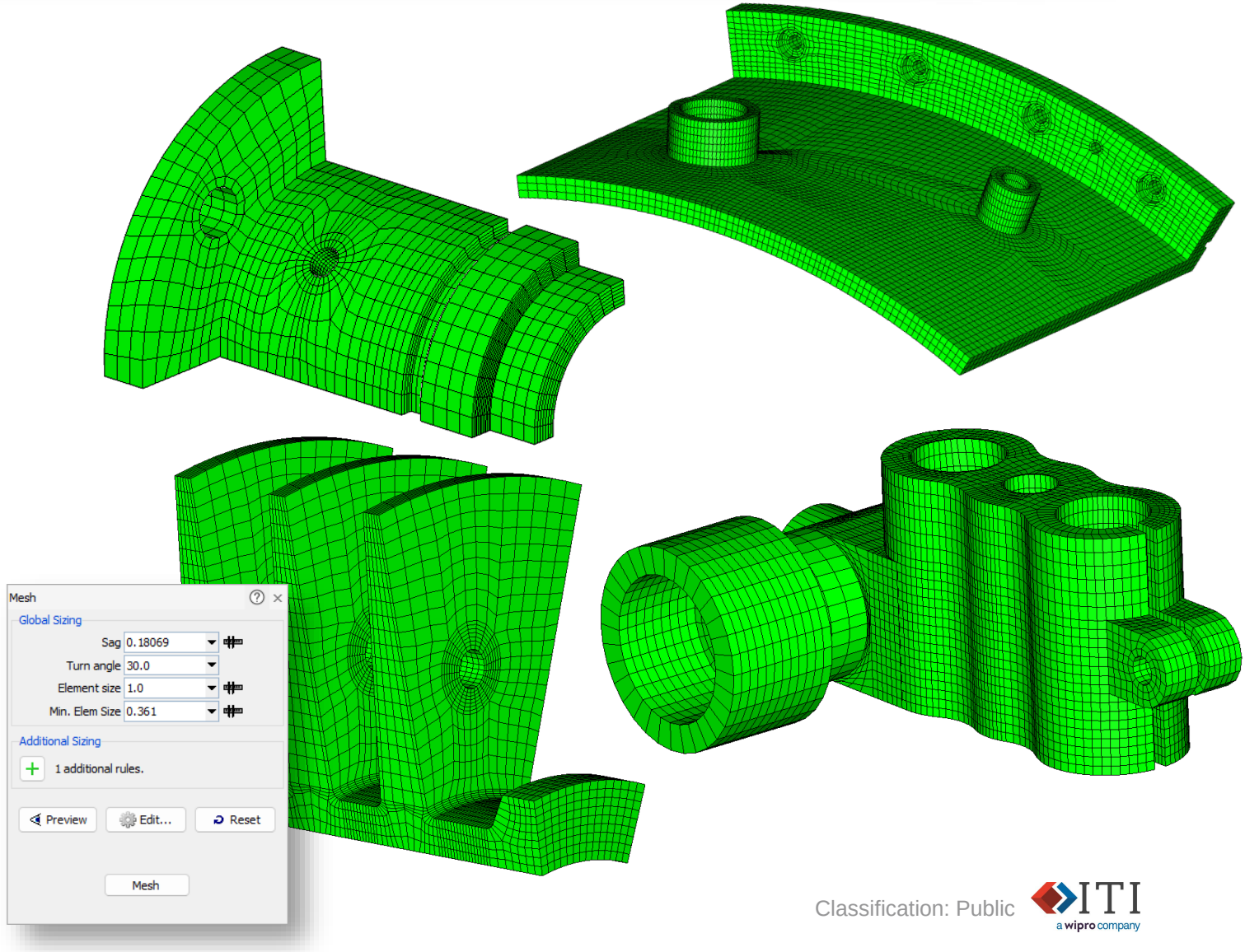
Icon	Description
	The combined (top-level) body containing the partitions.
	The partition is not yet suitable for hex-based meshing. This partition requires further sub-division before a hex-based mesh can be achieved.
	The partition is a 360° spun form and is not yet suitable for hex-meshing. The partition will need to be split into two 180° halves to give a template face.
	The partition is a swept form but may not necessarily be suitable for hex-meshing. The partition's template face needs subdividing into quad regions.
	Extruded partition that is suitable for hex-meshing.
	Partition is recognised as a hexahedron partition, and is suitable for hex-meshing.

Non-meshable		The section needs subdividing using the body-splitting tools
Spun section		The section needs to be split into two halves using the 'Revolved Bodies' tool.
Extruded section		Partition needs further body splitting, or it's template face needs to be split into quad regions.
Hexahedron		Ready for meshing

13SP1: New Hex-Split App (beta)

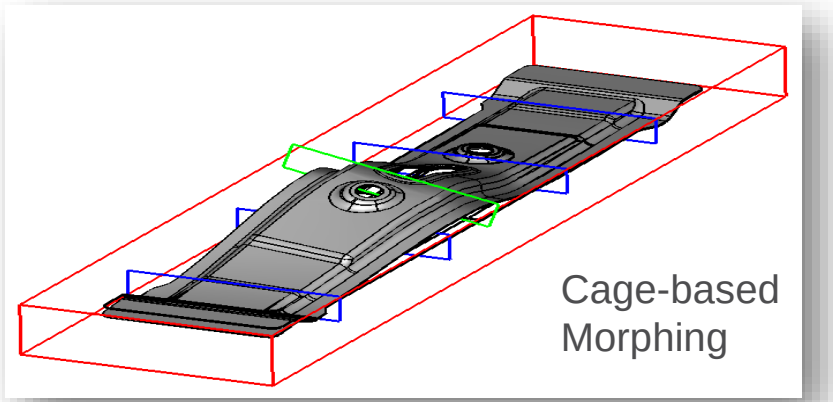
Powerful Hex Meshing

- Smart geometry driven auto-sizing
- Automatic optimised alignment and balancing of hex-mesh sizes
- Ability to add custom localised sizes
- Fully customise sizing and mesh styles via the mesh recipe tool
- Recipes can be saved for batch meshing

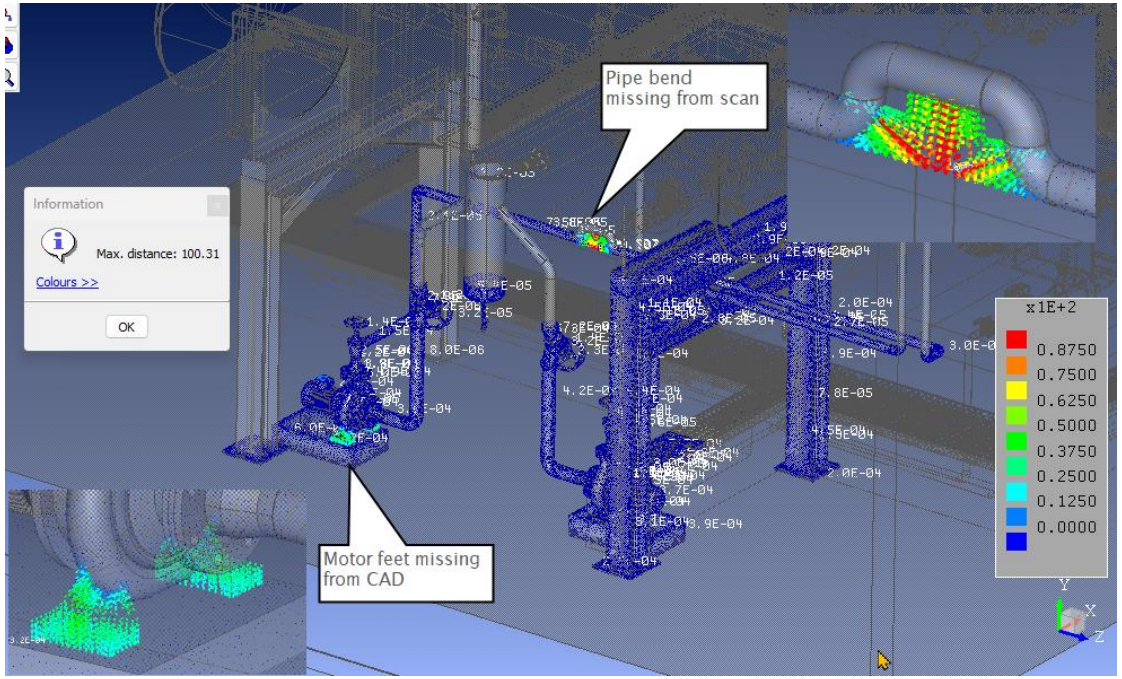


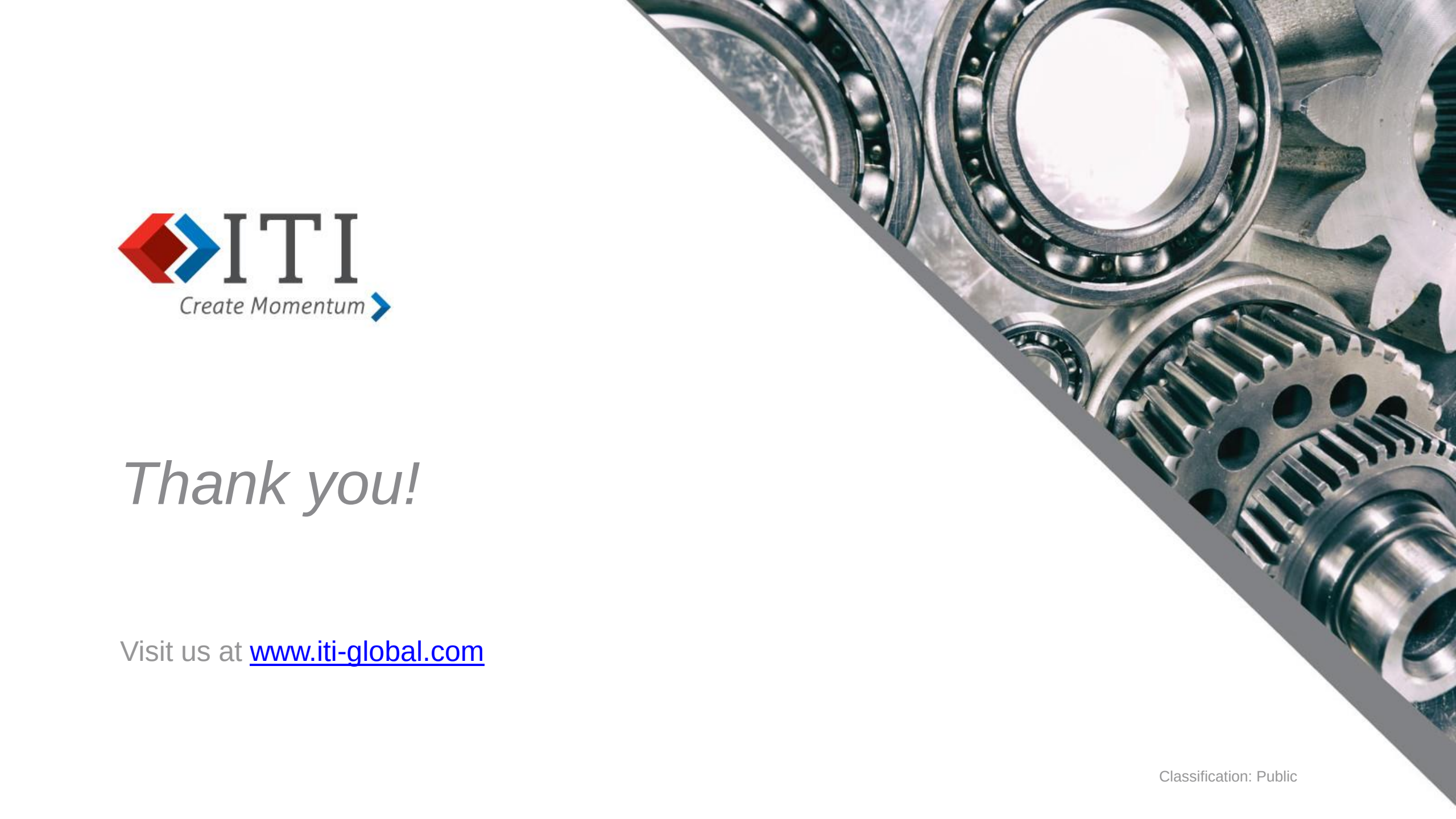
DX13: Coming in 13 Service Pack 2 (Q2 2025)

- **Hex-split App v1.0**
  - **Official release of hex meshing tools**
- **Morph**
  - **New cage-based morphing (beta)**



- **Scan-to-CAD**
  - **Compare scans to CAD to highlight differences**





Thank you!

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