Introduction to Ansys SpaceClaim

Workshop 4.1: Preparing for FEA Analysis

Release 2022 R1

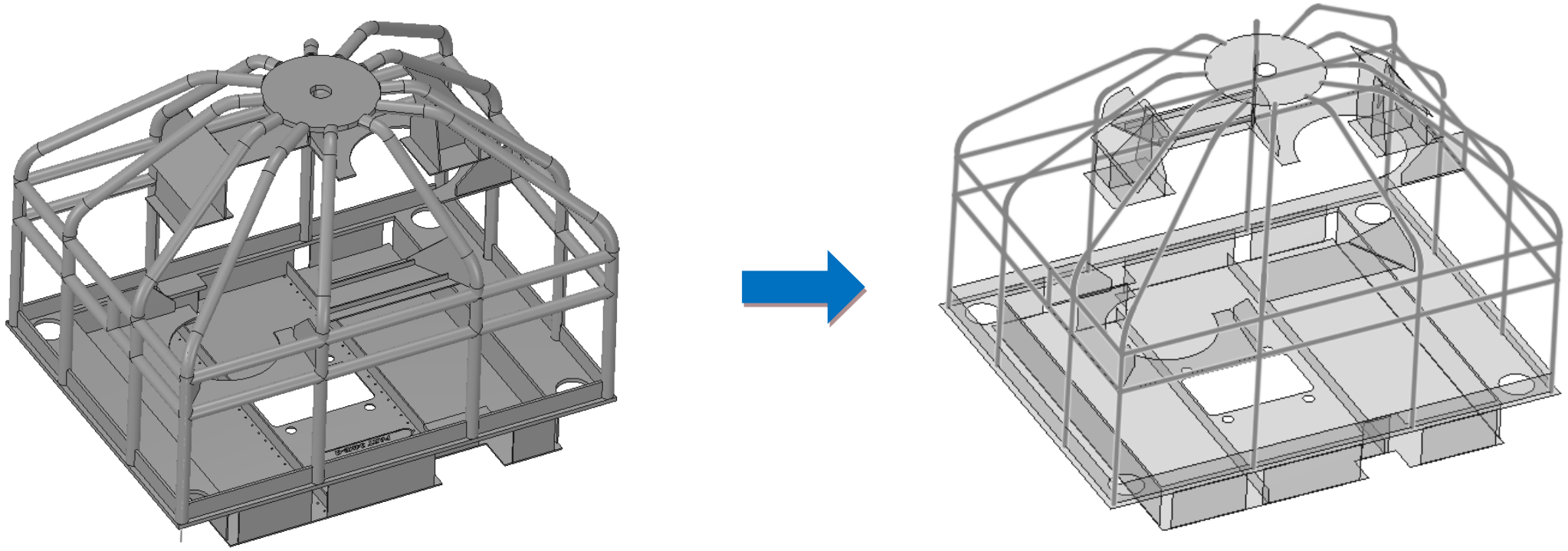
Please note:
- These training materials were developed and tested in Ansys Release 2022 R1. Although they are expected to behave similarly in later releases, this has not been tested and is not guaranteed.
- The screen images included with these training materials may vary from the visual appearance of a local software session.
- Although some workshop files may open successfully in previous releases, backward compatibility is somewhat unlikely and is not guaranteed.

Overview

- Completion of this workshop involves:
  - Clean up of impressions and small holes
  - Beam extraction
  - Midsurface extraction
  - Extend beams and midsurfaces to establish connection

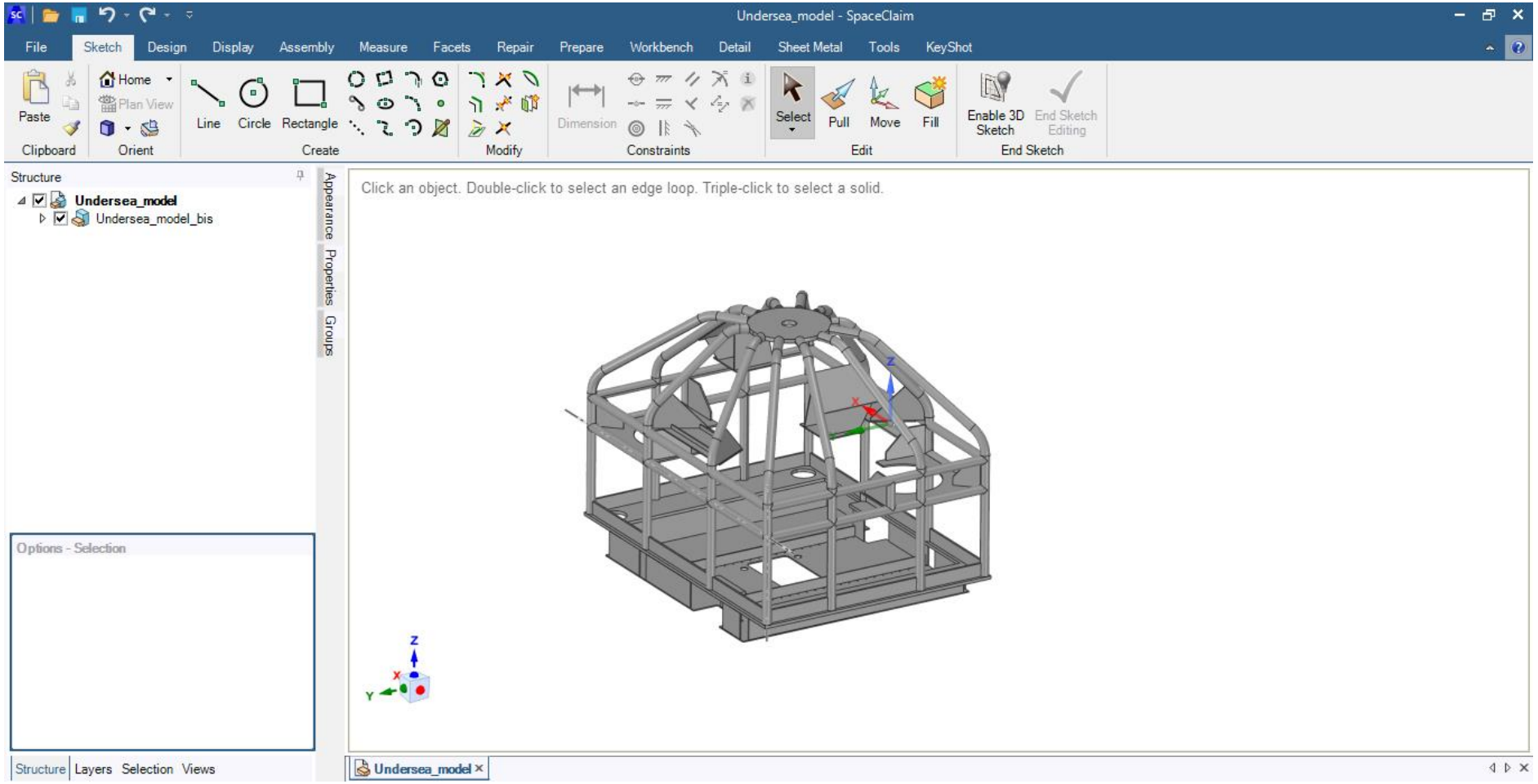
Objectives

- Clean up model by removing small holes and impressions
- Simplify model by extracting beams and shell
- Connect extracted beams and shells

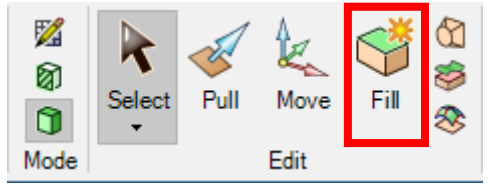


Open SpaceClaim File

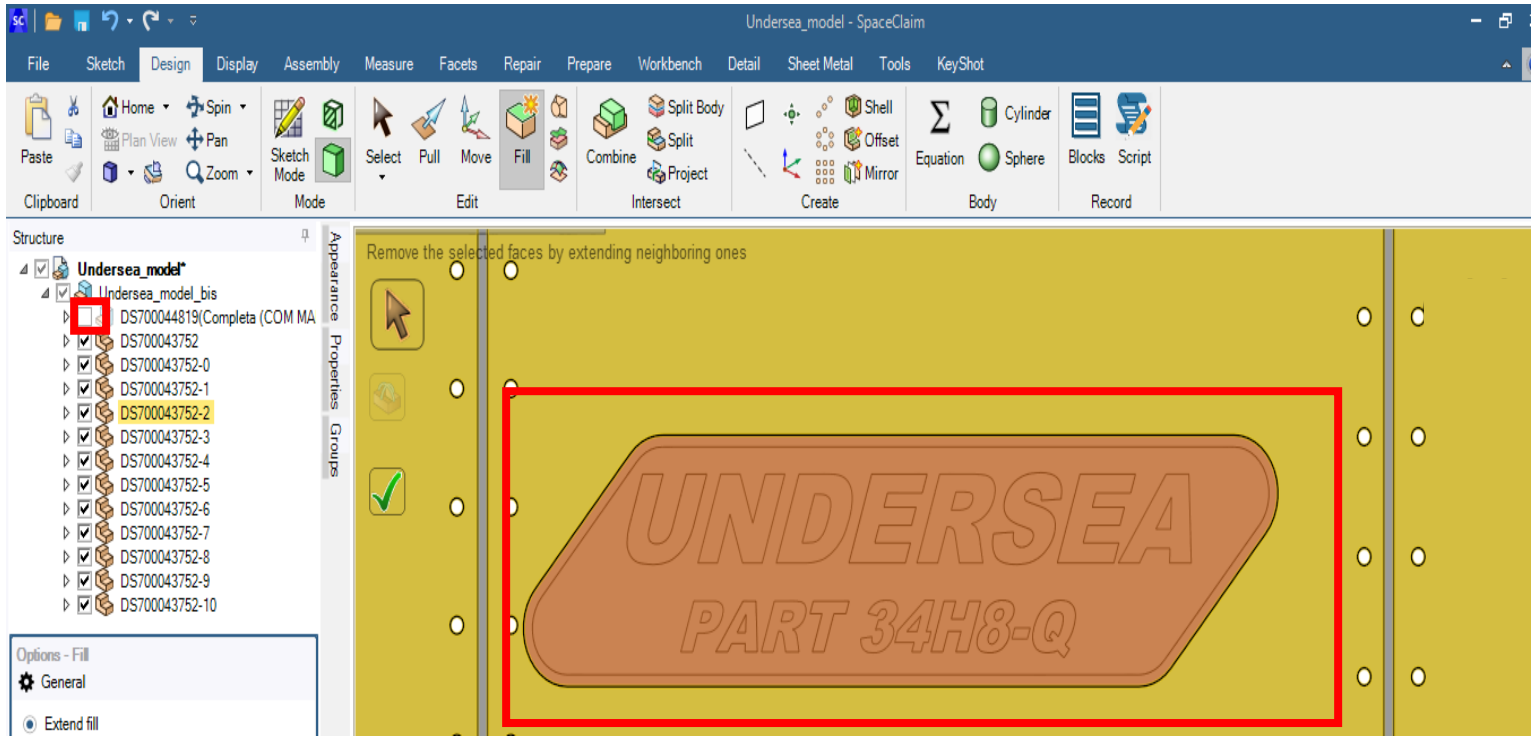
- “File → Open” the file “Undersea_model.scdoc”

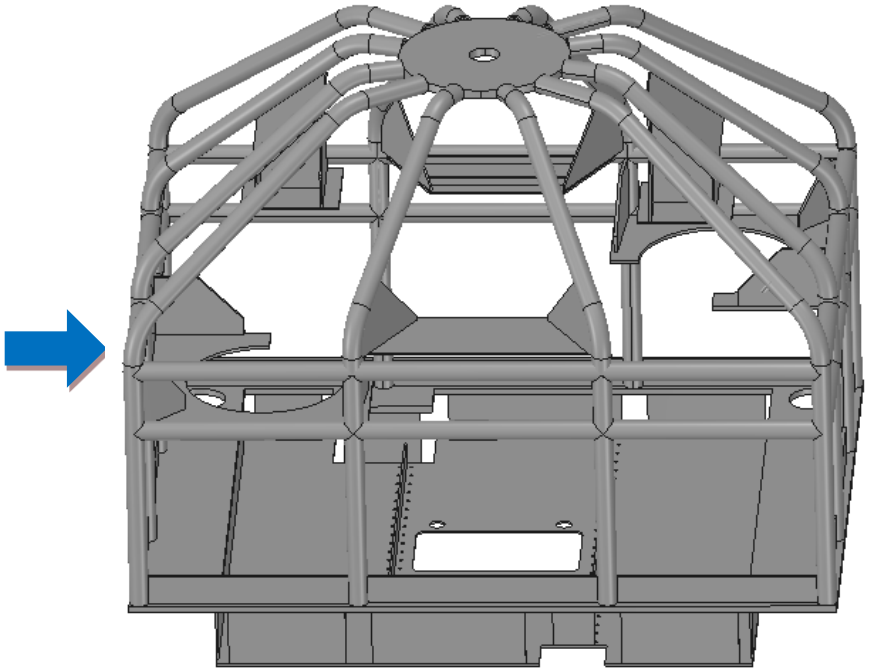


Clean-Up Impressions on Model

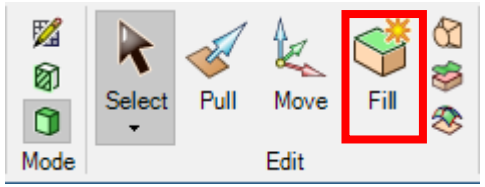


- Use “Design → Fill” to remove impressions
  - Select faces representing impressions on the model using box selection. You may need to hide the DS700044819 component

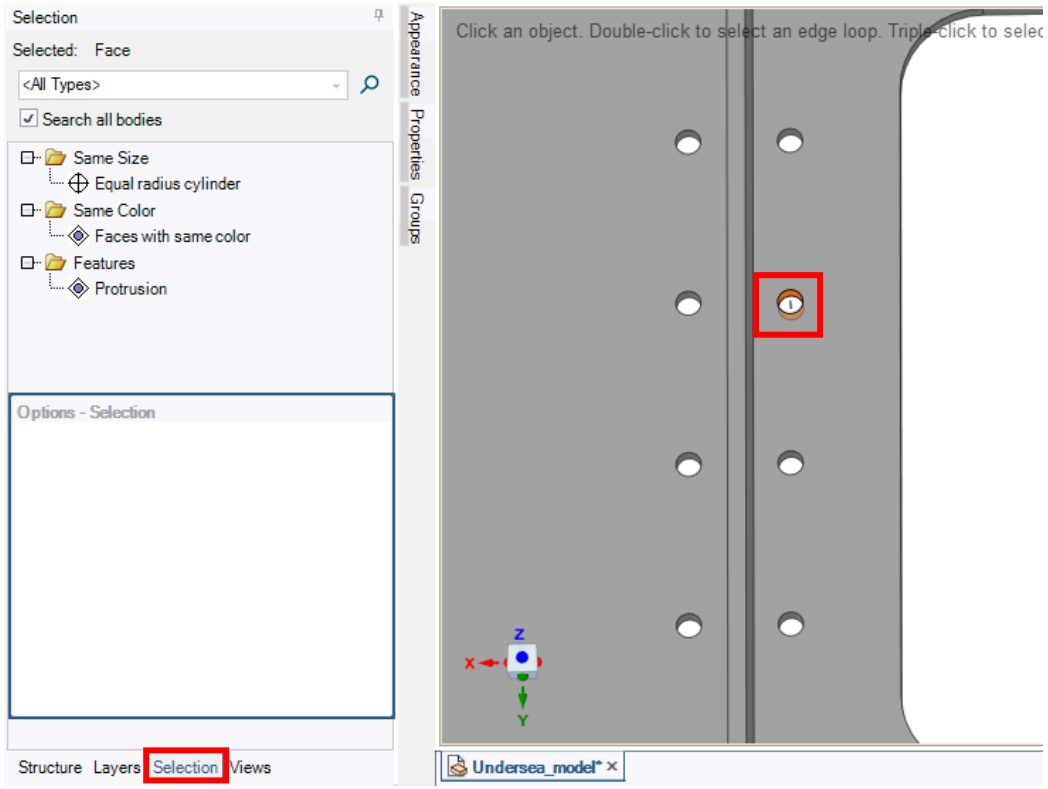


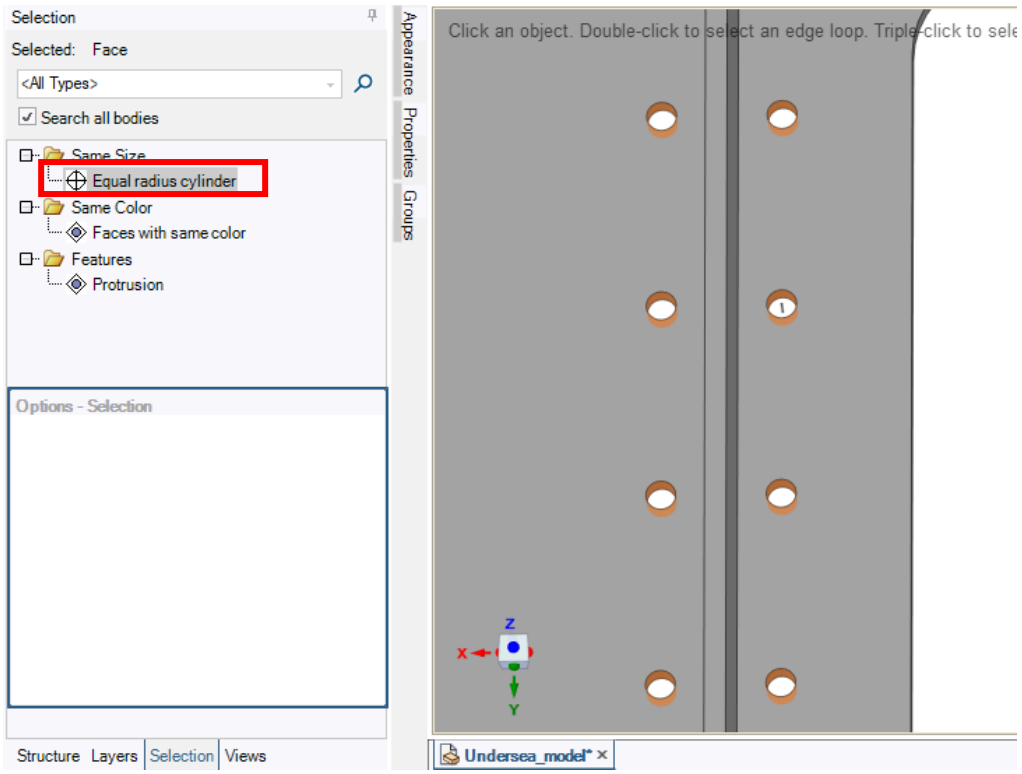


Clean-Up Small Holes in Model (1)



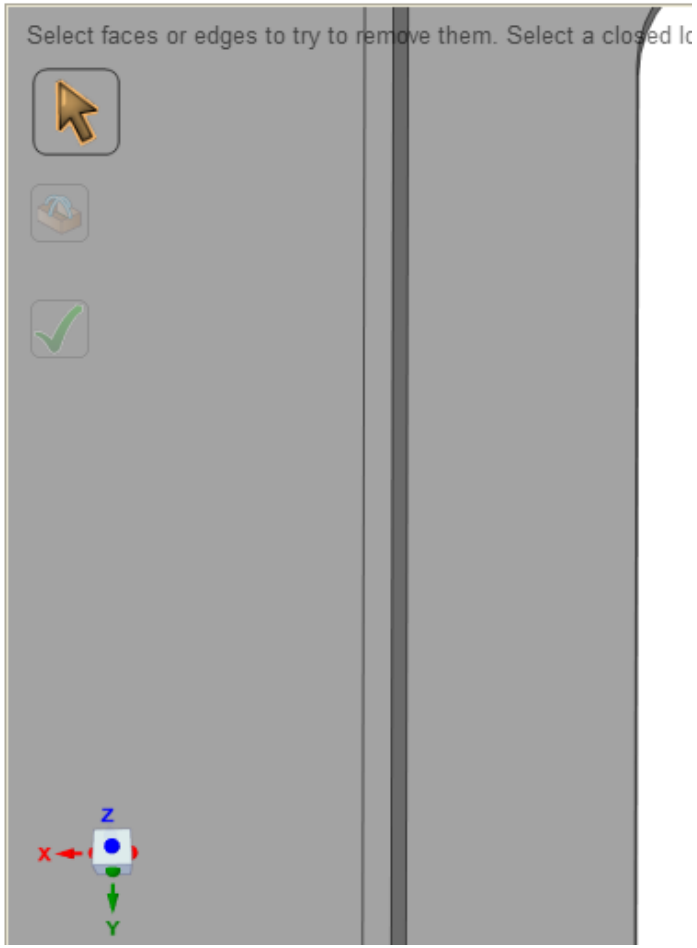
- Use “Design → Fill” to remove small holes
  - Select face of any one hole and click “Selection” tab
  - Select “All equal radius cylinders” option to select all holes of same radius





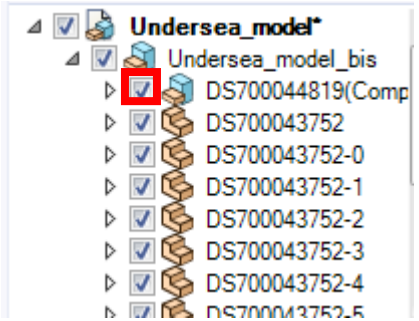
Clean-Up Small Holes in Model (2)

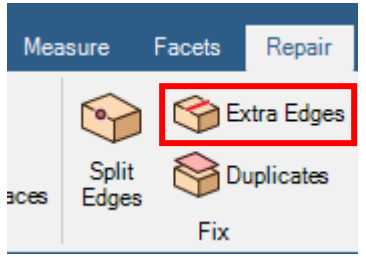
- Click “Complete” to remove holes by filling material

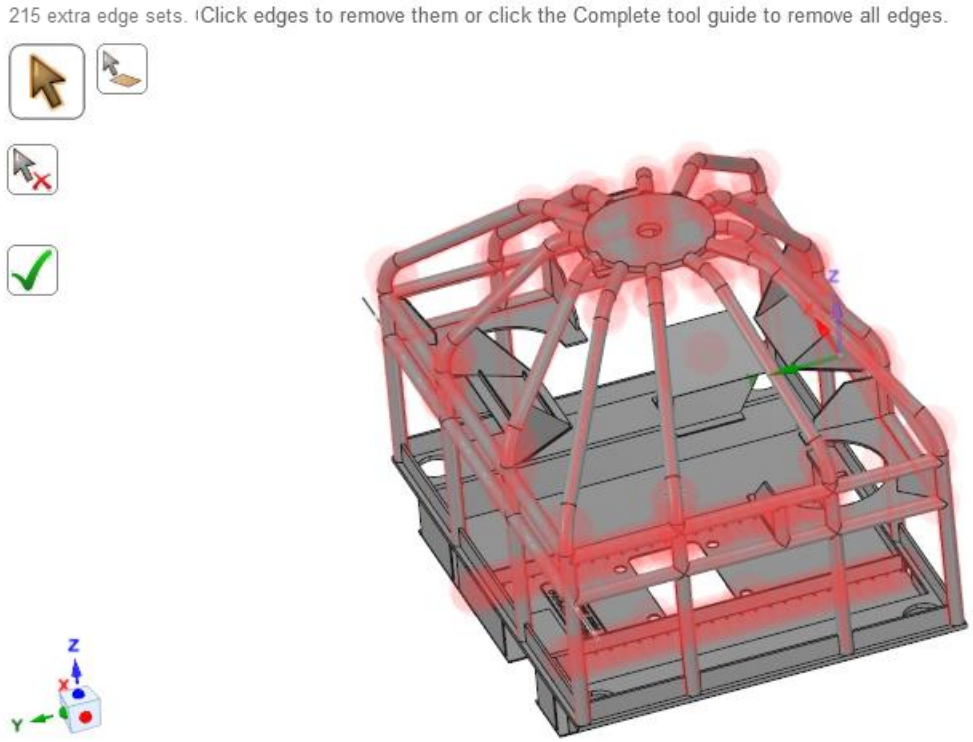


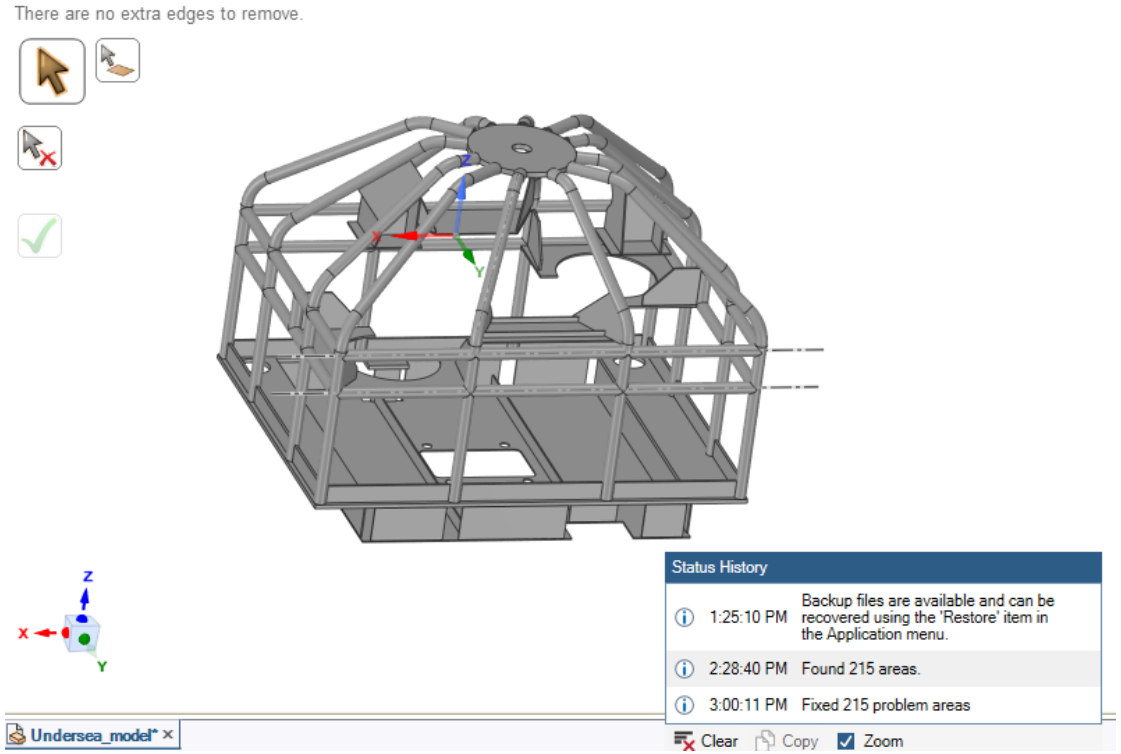
Repair Extra Edges

- In the Repair tab, click on Extra Edges
- Click “Complete” twice to remove all Extra Edges



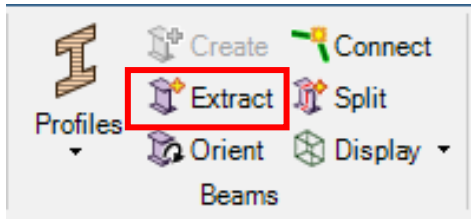


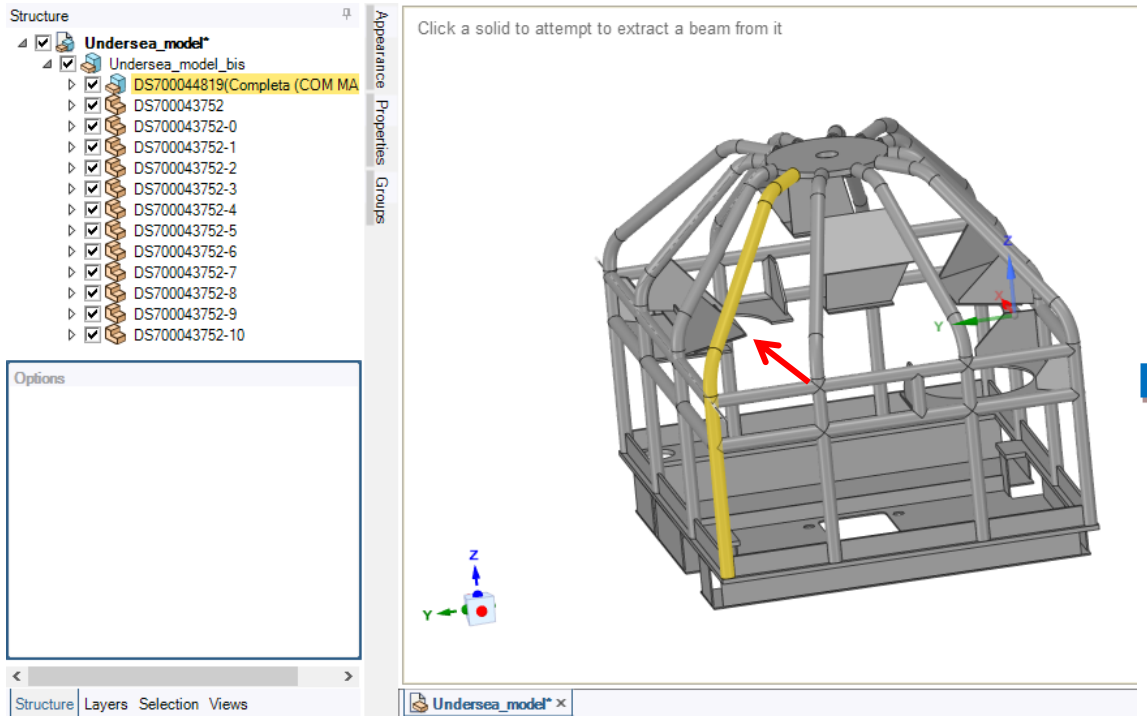


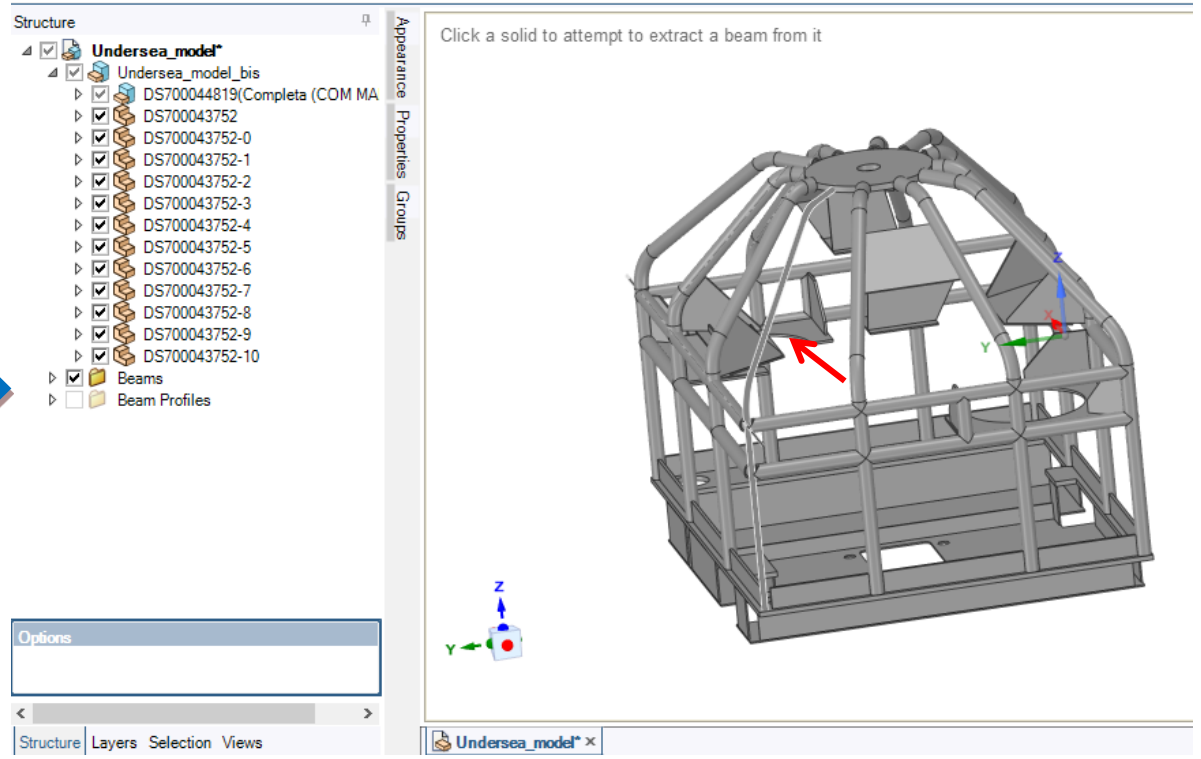


Extract Beam from Cylinders (1)

- Use “Prepare → Extract” to extract beam from cylinder
  - Select anyone cylinder body to extract beam out of it

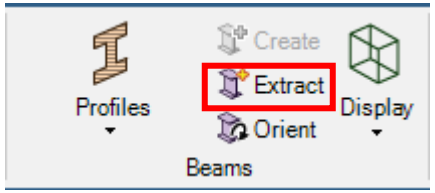


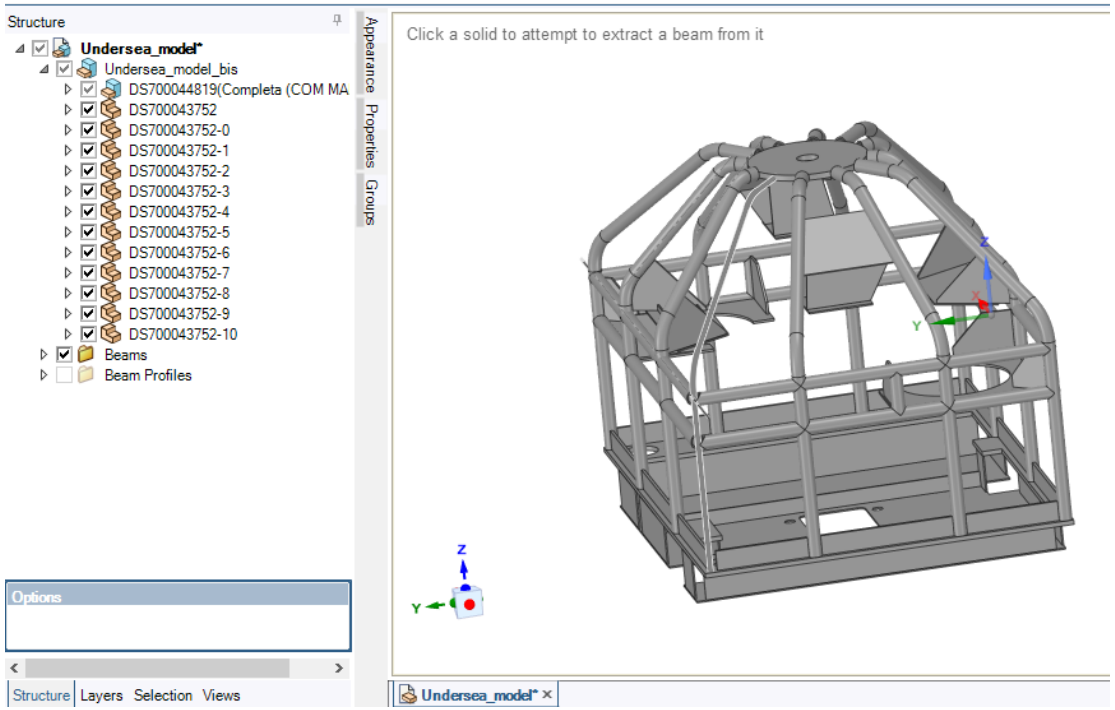


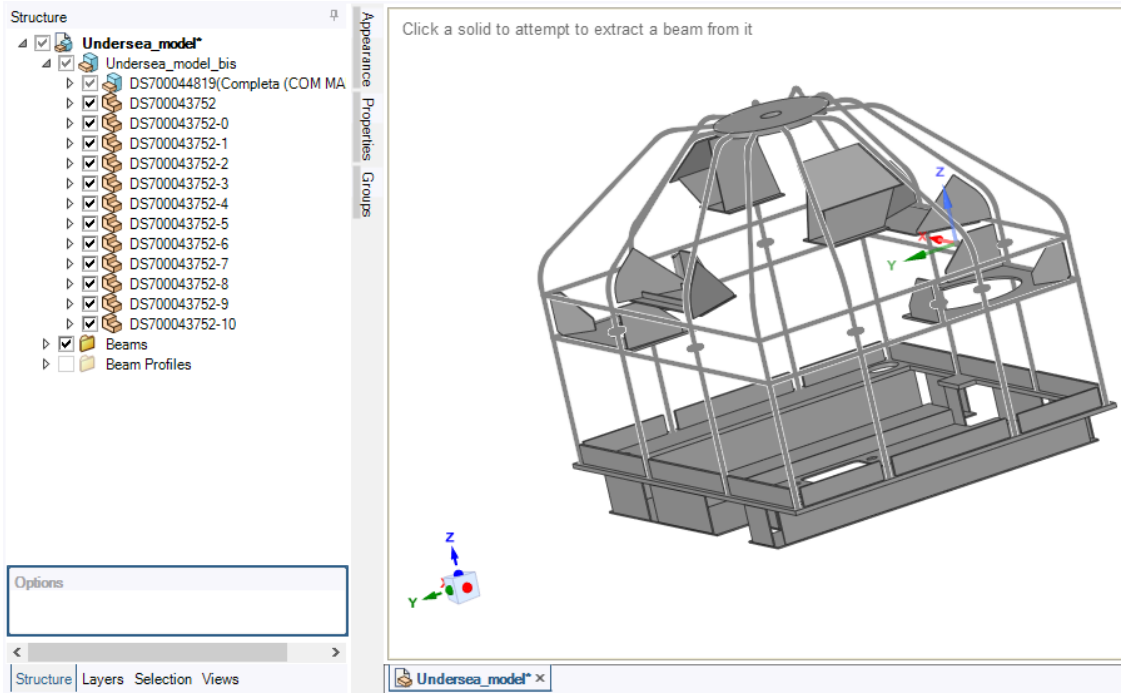


Extract Beam from Cylinders (2)

- Similarly, Extract beam for all cylindrical bodies

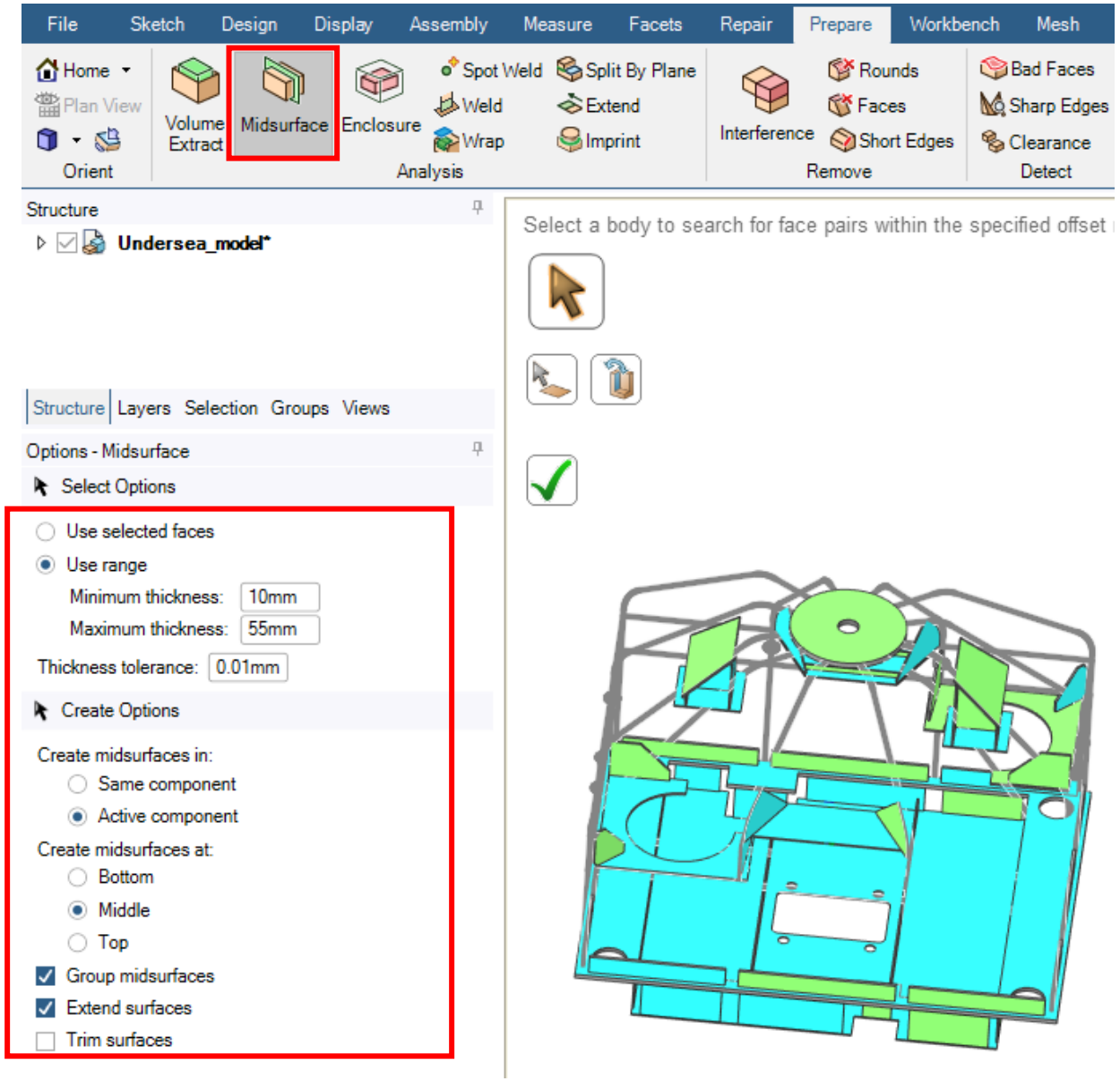






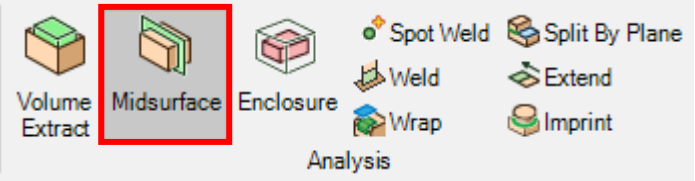
Extract Shell from Thin Bodies (1)

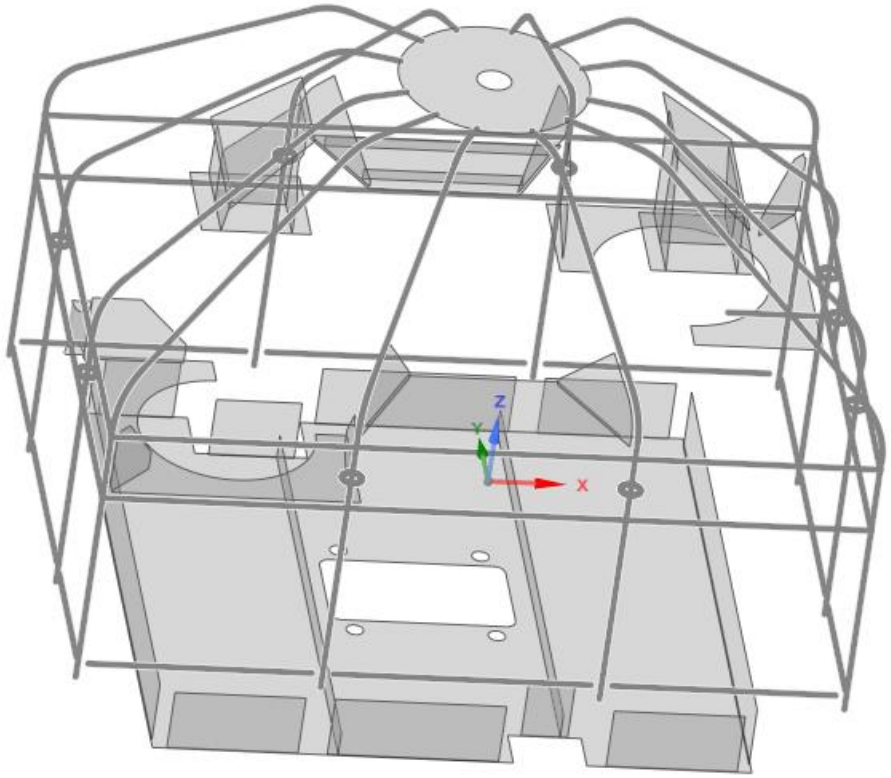
- Use “Prepare → Midsurface” to extract shell (midsurface) from thin bodies
  - Select “Use range” option and set Min and Max thickness as 10 and 50 mm respectively
    - For any selected body, all face pairs within the specified thickness range gets selected automatically



Extract Shell from Thin Bodies (2)

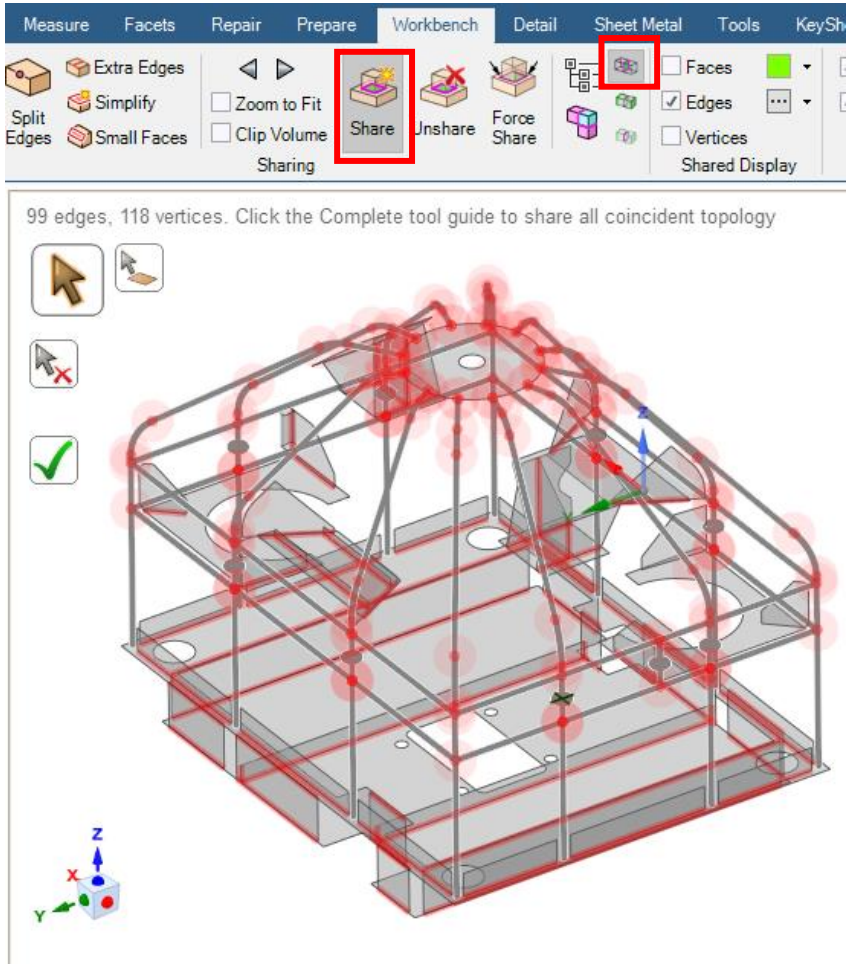
- Click “Complete” to extract midsurfaces for selected body

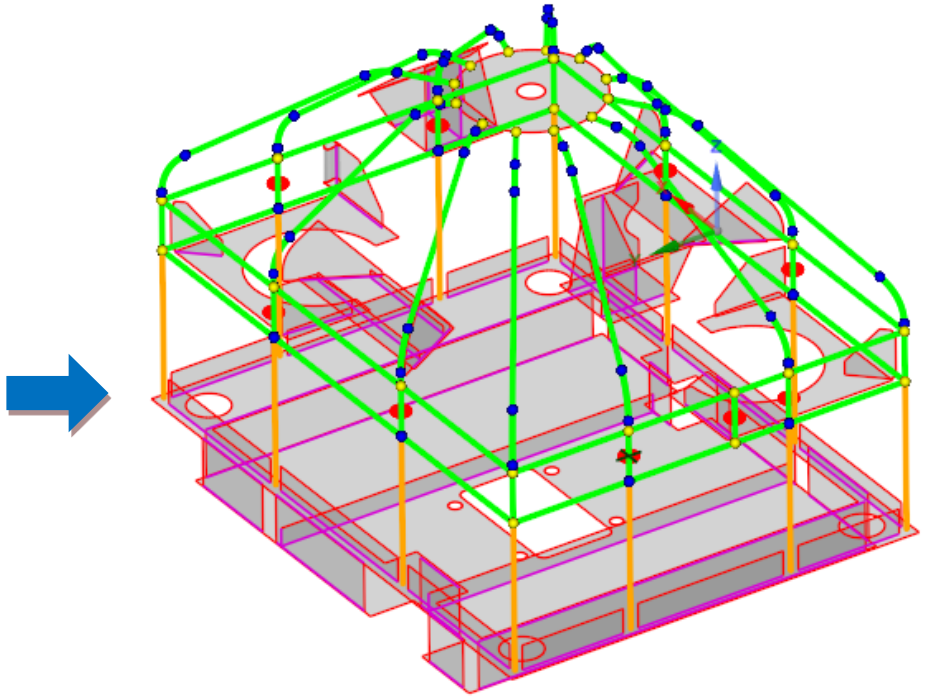


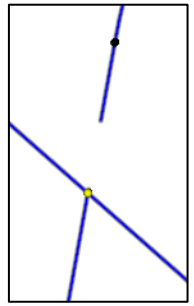


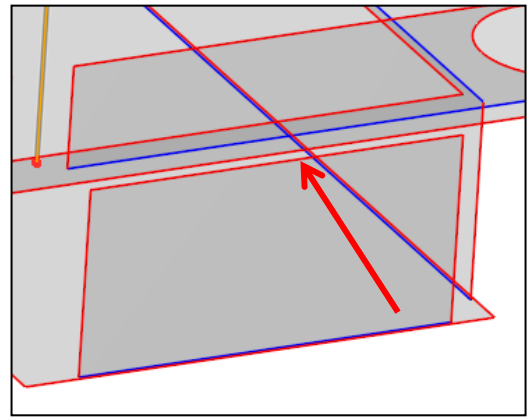
Check connectivity & Share Topology

- Use “Workbench → Share” to Share the Topology and turn the Show Connectivity on
  - Surface bodies and beams have gap which need to be removed to establish proper connections



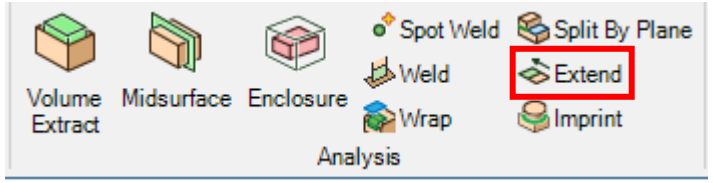


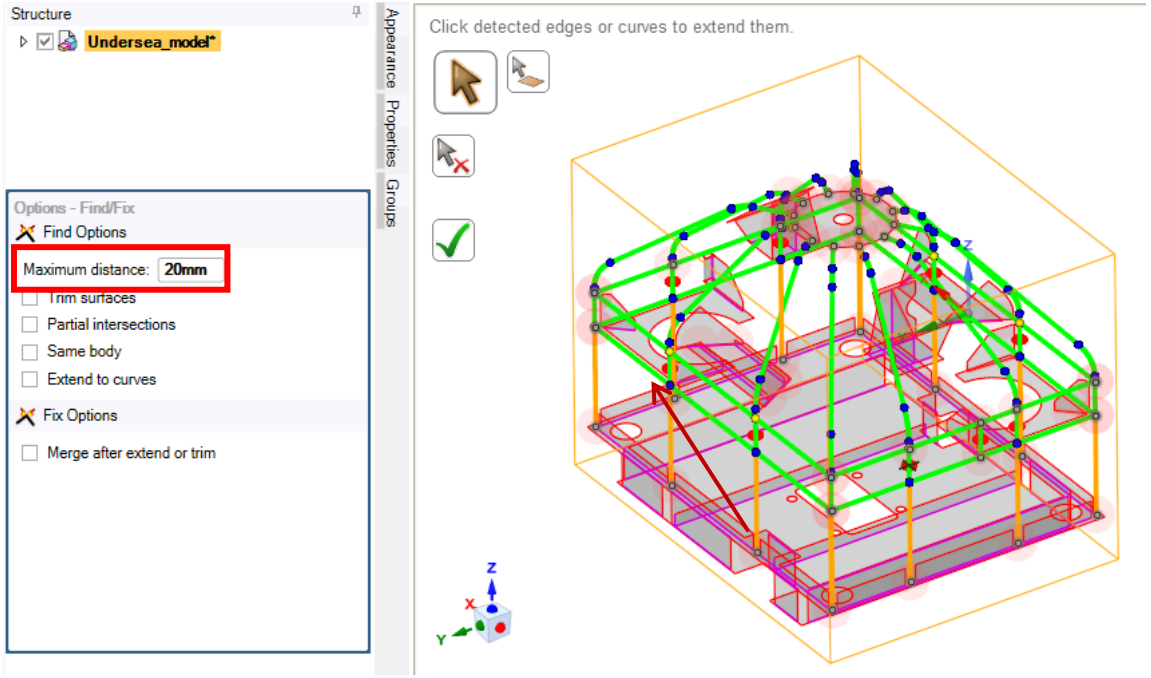


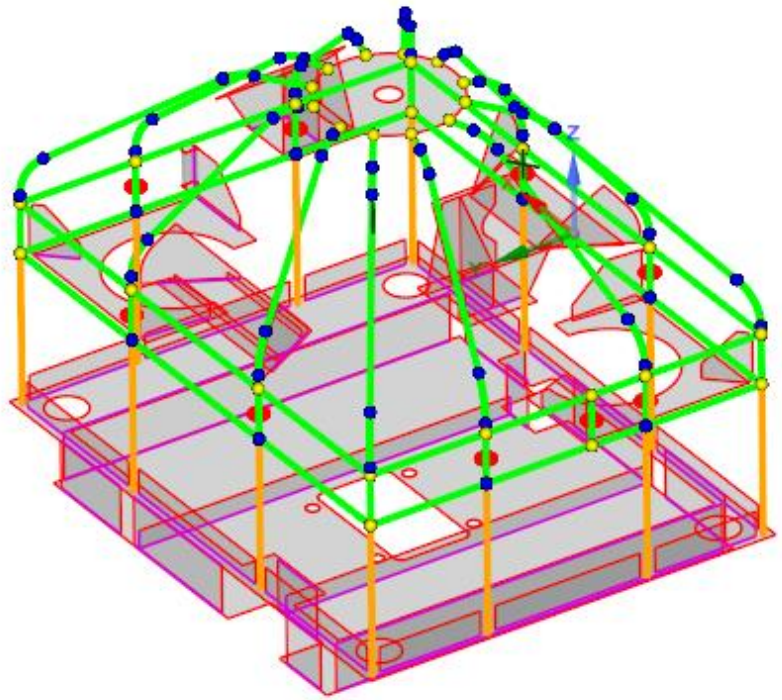


Extend Midsurfaces and Beams (1)

- Use “Prepare → Extend” to extend edges and points
  - Specify “Maximum Distance” as 20 mm
  - Click “Complete” a couple of times to fix all the highlighted regions

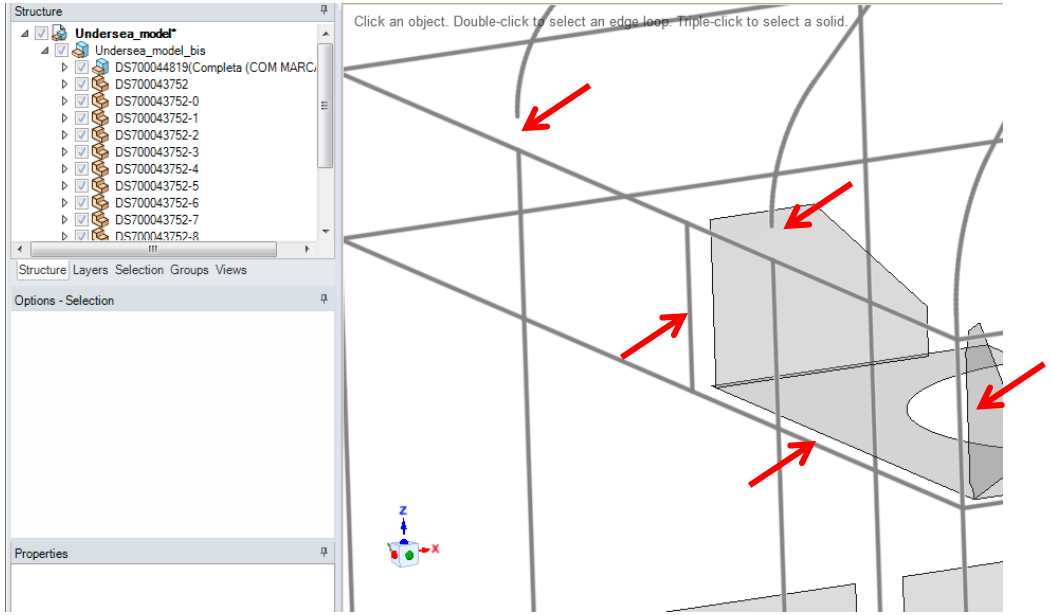


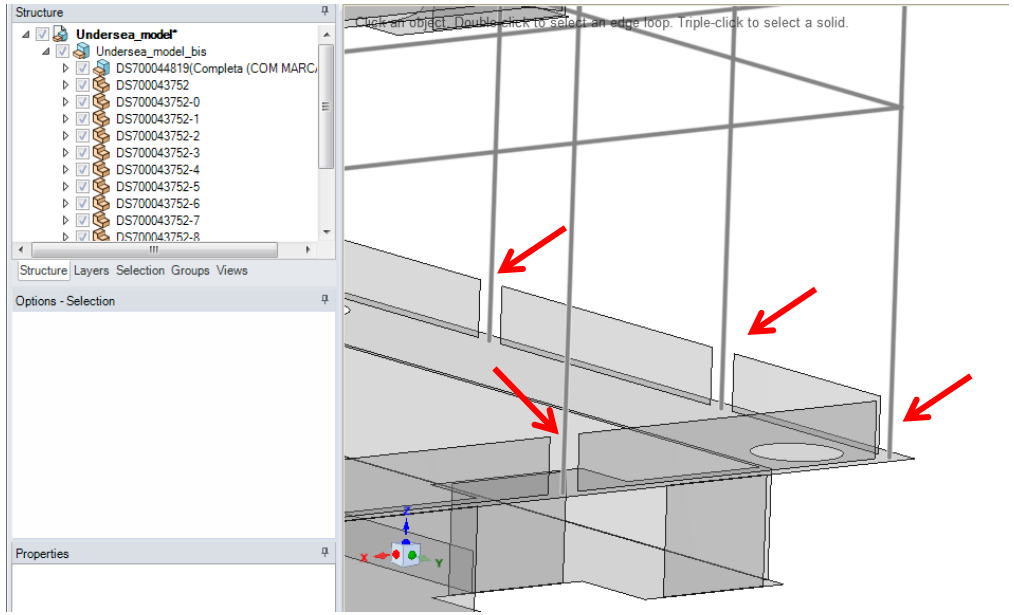




Extend Midsurfaces and Beams (2)

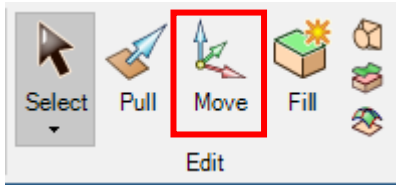
- There are several additional regions where gaps need to be removed. “Extend” tool might change the topology in these regions so it's recommended to manually work on these areas

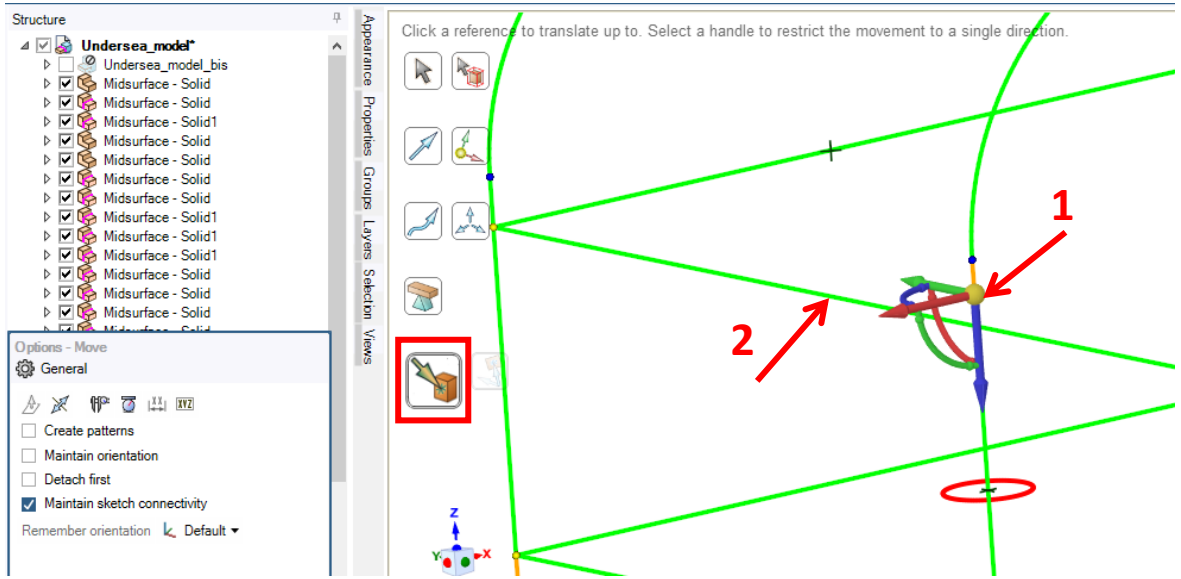


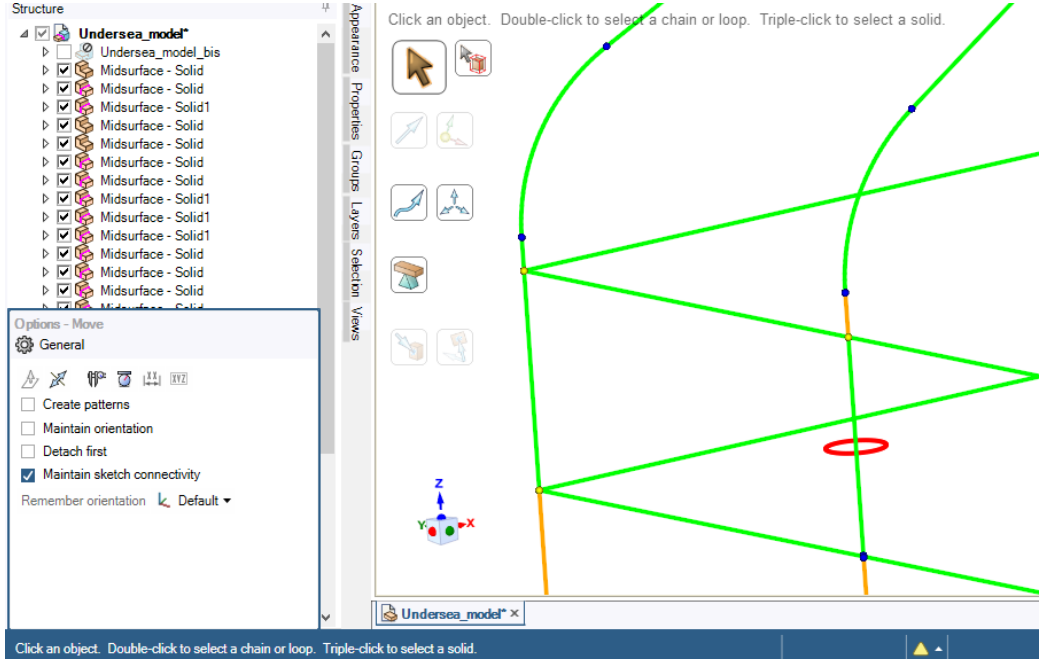


Extend Midsurfaces and Beams (3)

- Use “Design → Move” to extend point
  - Select end point of beam to move
  - Select lower beam as “Up To” destination

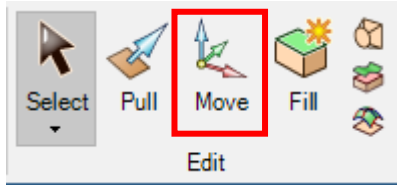


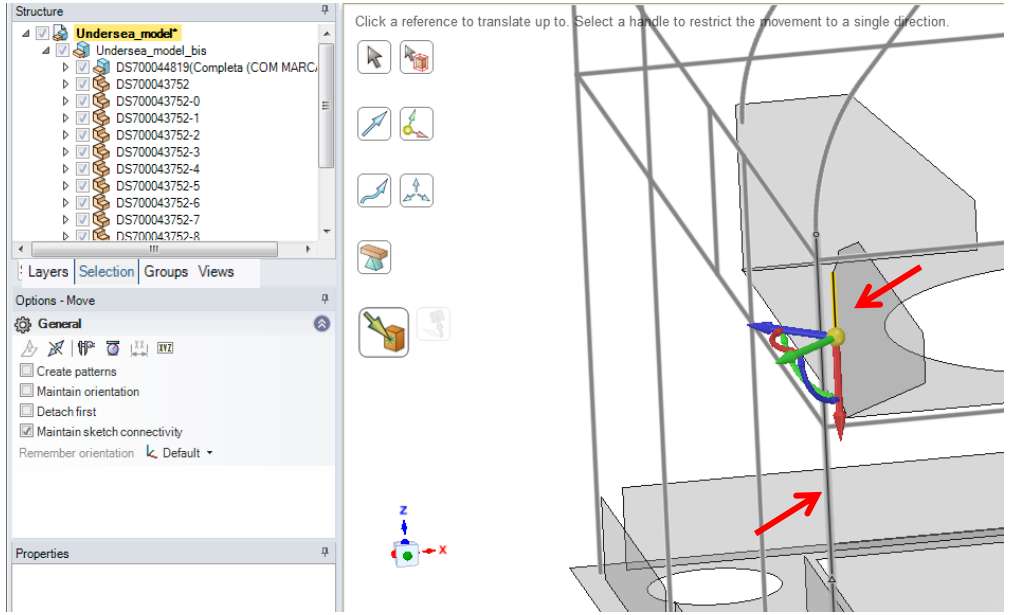


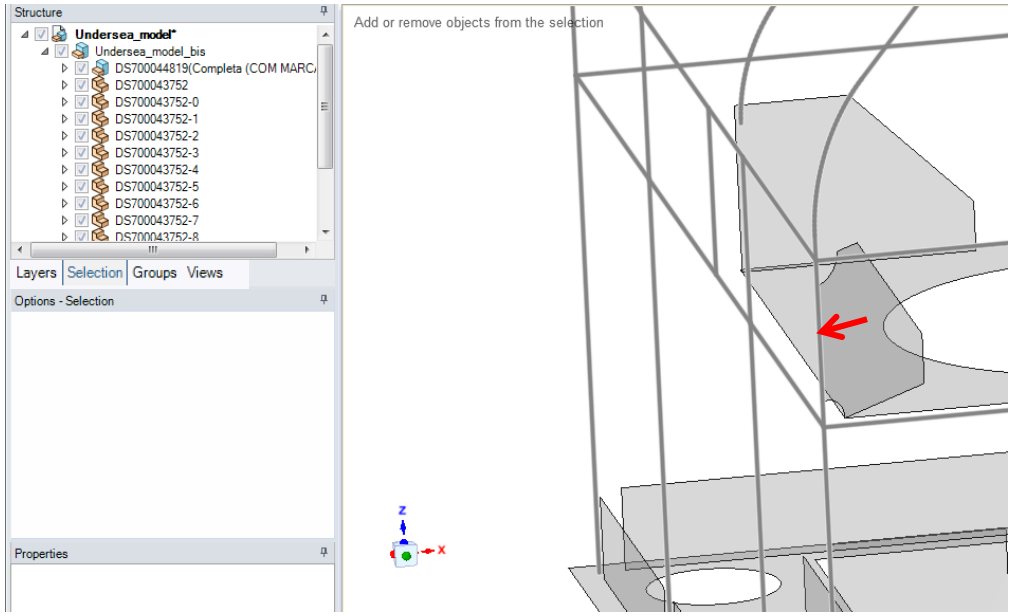


Extend Midsurfaces and Beams (4)

- Use “Design → Move” to extend edge
  - Select edge of midsurface to move
  - Select adjacent beam as “Up To” destination

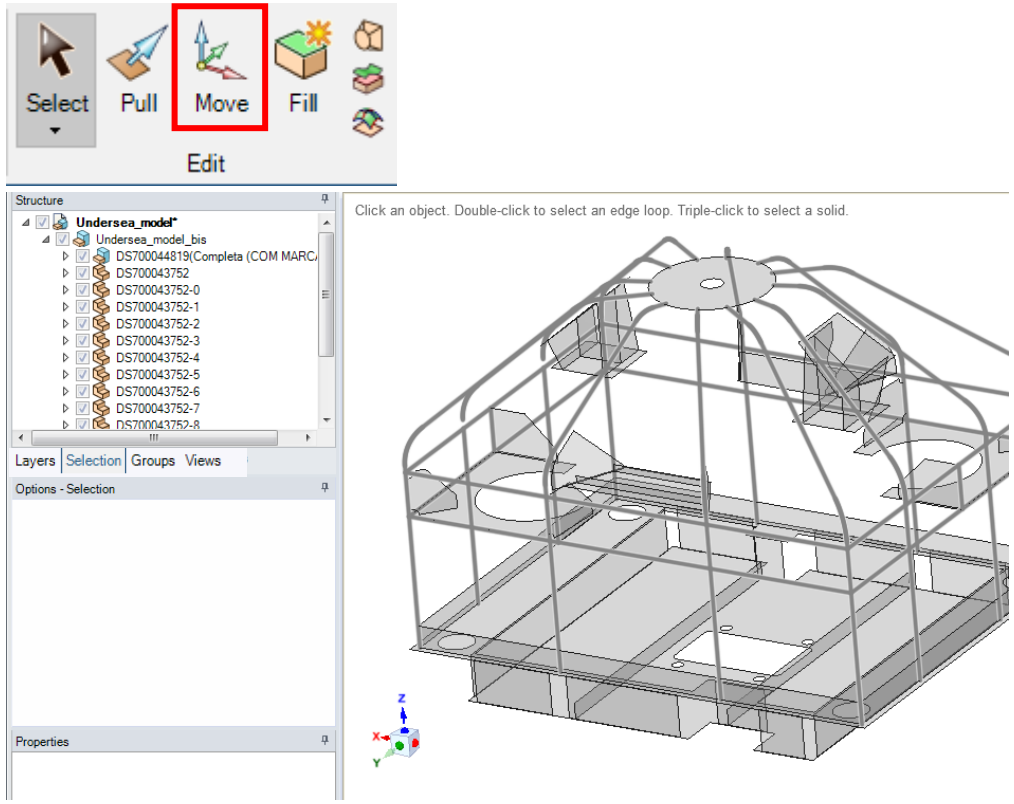






Extend Midsurfaces and Beams (5)

- Similarly remove all gaps in model using “Move” tool
- When the “Move” tool does not work, you can use the “Pull” then the “Split” tools



End of presentation