TUTORIAL VIDEO 04

04 From CAD to shell mesh: midsurface, thickness parts, mesh check

Take a CAD part to a shell mesh: import a STEP file, check how its faces connect, extract the mid-surface -- each wall thickness becomes its own part at once -- clean it up, mesh it, and read the mesh check.

Tutorial files	folder `04_CAD_to_shell_mesh` — open `part2_carrier_tray.step` first
Video	Watch video 04 on YouTube
Download files	Download the tutorial files (97 MB)

1 Opening, Import CAD

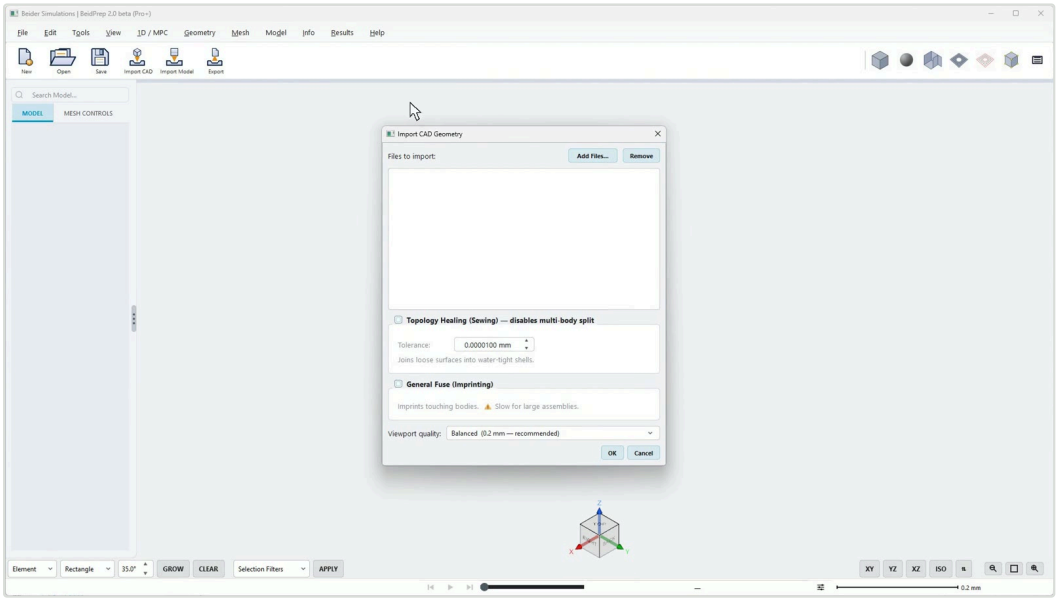
video 0:00

This video takes a CAD part all the way to a shell mesh.

You will import a STEP file, make its mid-surface, mesh it, and check the mesh.

1. Click Import CAD on the File tab.

   The Import CAD Geometry window opens.



The screen at 0:14 in the video.

2 Add files, Options

video 0:15

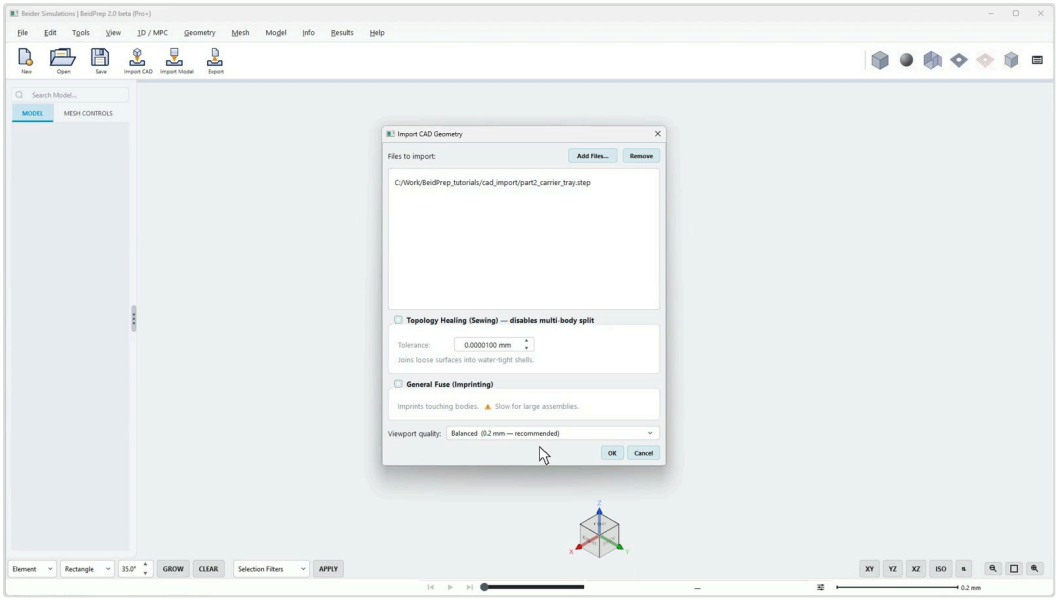
1. Click Add Files, and choose the STEP file.

   You can add several files; they are read one after the other.

Sewing and imprinting stay off for a single clean solid like this one.

Viewport quality changes only how the part is drawn, never the geometry you mesh.

Balanced is the recommended setting.



The screen at 0:34 in the video.

3 Import, Look round

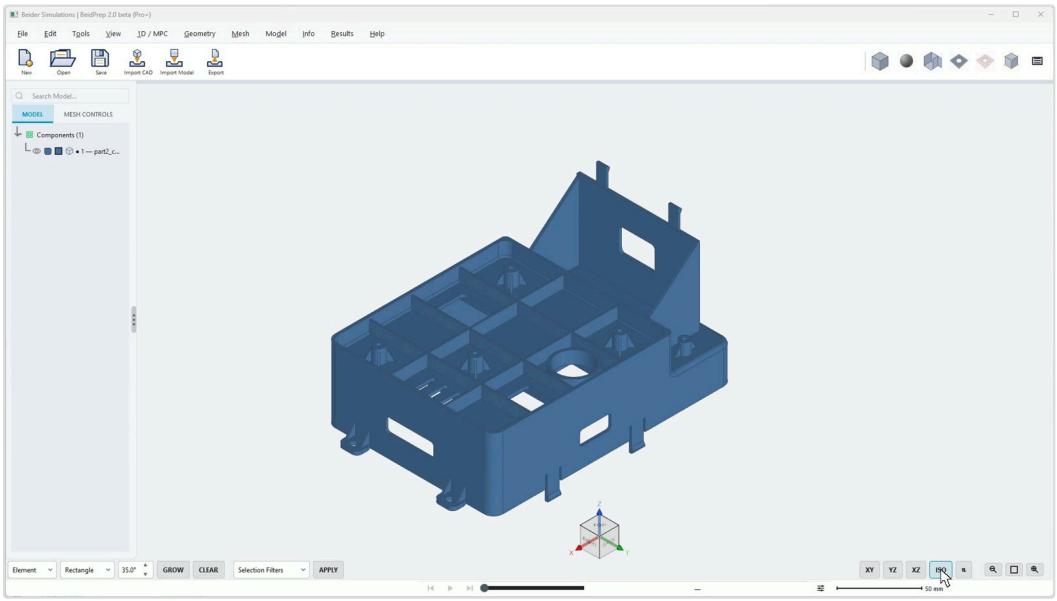
video 0:34

1. Click OK.

   The tray appears in the 3D view, and as a CAD body in the model tree.

2. Turn the part with the left mouse button, and zoom with the wheel.

   It is a thin-walled tray, with ribs, bosses, cut-outs and mounting feet.



The screen at 0:50 in the video.

4 Edges by connection

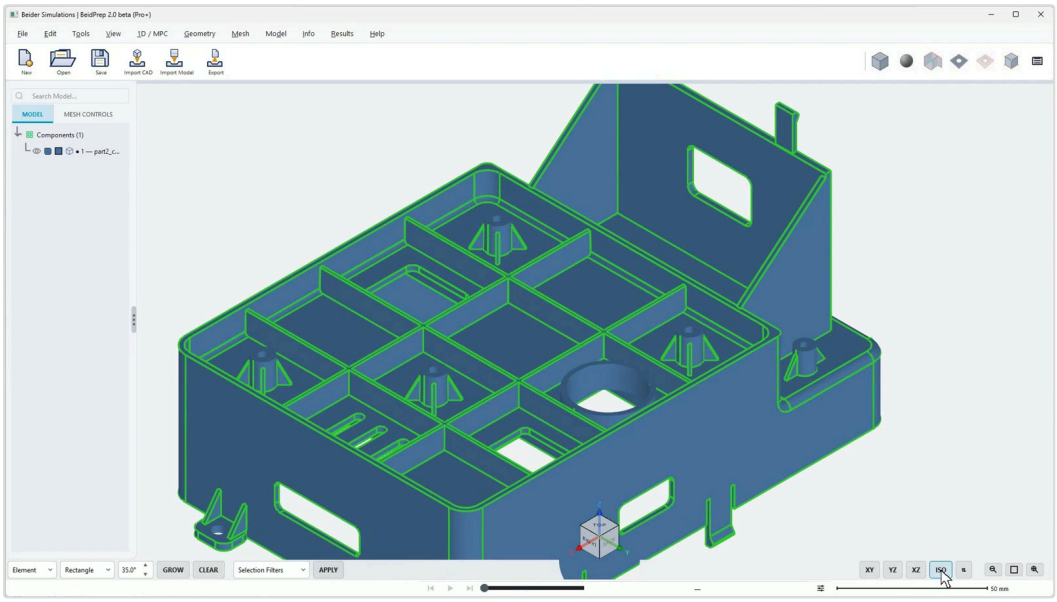
video 0:50

The display buttons change how CAD is drawn.

This one colours the edges by how the faces connect.

Green is an edge shared by two faces. Red is an open edge: a gap you would have to close before meshing.

This part is all green.



The screen at 1:06 in the video.

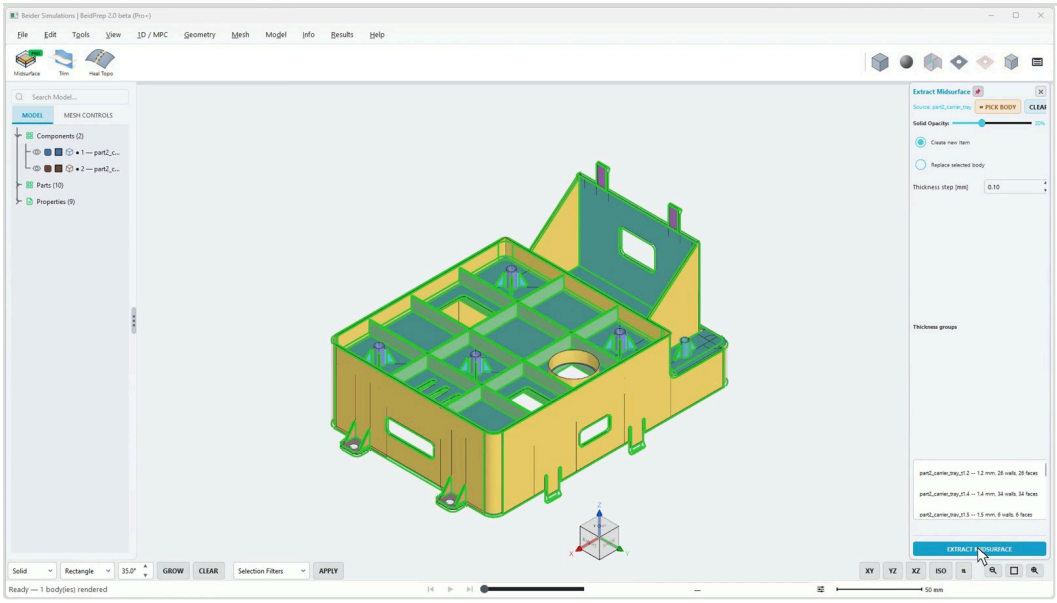
5 Midsurface

video 1:07

The tray is a solid, but its walls are thin.

A thin wall is meshed with shells on its mid-surface.

1. Click Midsurface on the Geometry tab, and click the solid.
2. Keep Create new Item, and click Extract Midsurface.



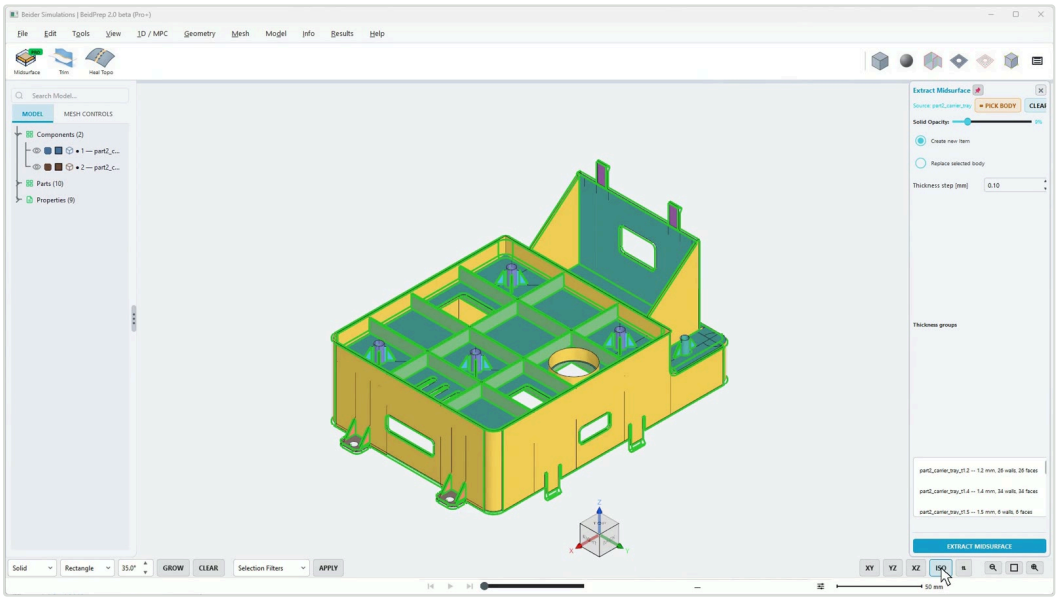
The screen at 1:20 in the video.

6 What it built

video 1:21

Each wall gets its own mid-surface, halfway between its two faces.

Where walls meet, their mid-surfaces share an edge, so the mesh on them will be connected.



The screen at 1:32 in the video.

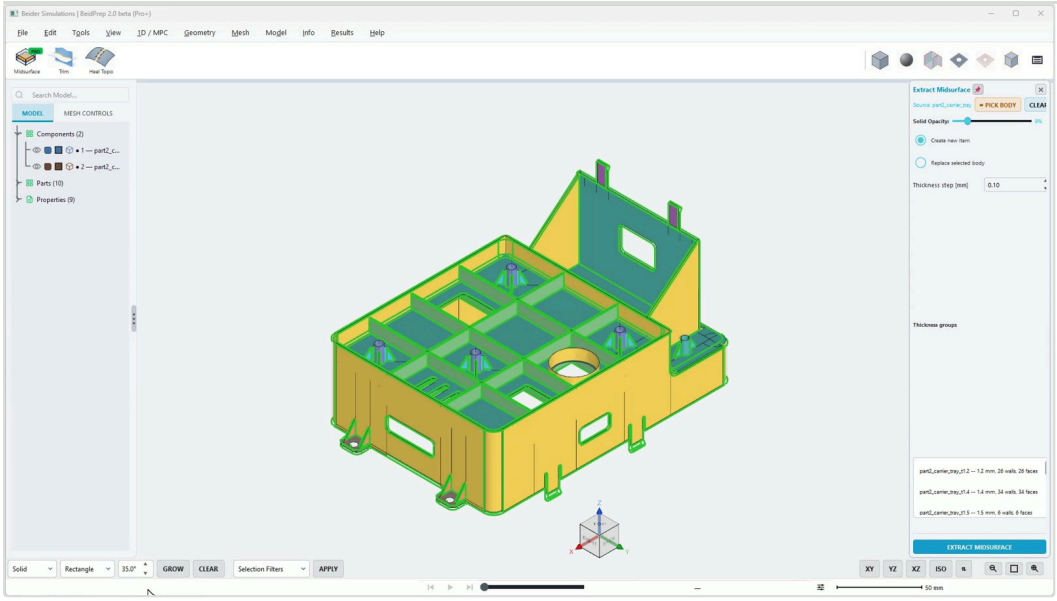
7 Nothing left out

video 1:32

The tool does not guess.

A region it cannot read as a wall is left out, drawn orange, and listed here with its reason.

On this part, nothing is left out.



The screen at 1:43 in the video.

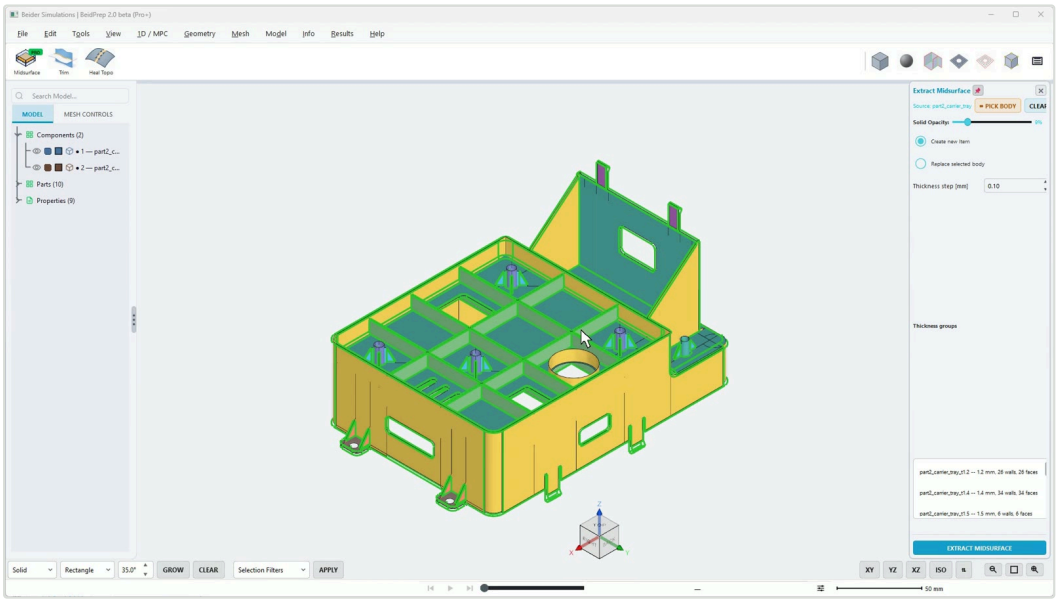
8 Thickness groups

video 1:43

Thickness groups lists the walls by thickness.

Each wall's thickness is measured, and rounded to the Thickness step.

Each group is already its own part, drawn in its own colour.



The screen at 1:54 in the video.

9 Parts in the tree, Heal Topo

video 1:54

1. Widen the model tree, and open Parts.

   Each part is named after the tray and its thickness, and its colour matches the 3D view.

Before meshing, Heal Topo on the Geometry tab has clean-up tools.

Consolidate Fragments removes small loose faces left round holes, and keeps every hole at its exact size.

2. Choose the mid-surface body.

   A note says what was removed, and that every hole was kept.



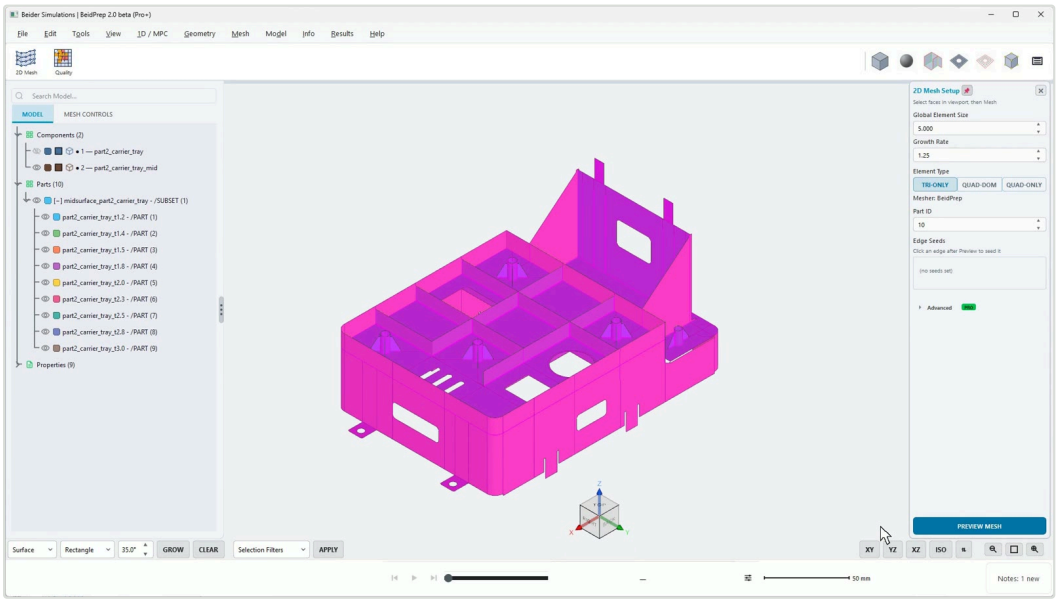
The screen at 2:22 in the video.

10 Hide the solid, 2D Mesh

video 2:22

1. Hide the solid in the model tree, so only the mid-surface is shown.
2. Now click 2D Mesh on the Mesh tab, and drag a rectangle around the whole mid-surface.

   Every face turns magenta.



The screen at 2:33 in the video.

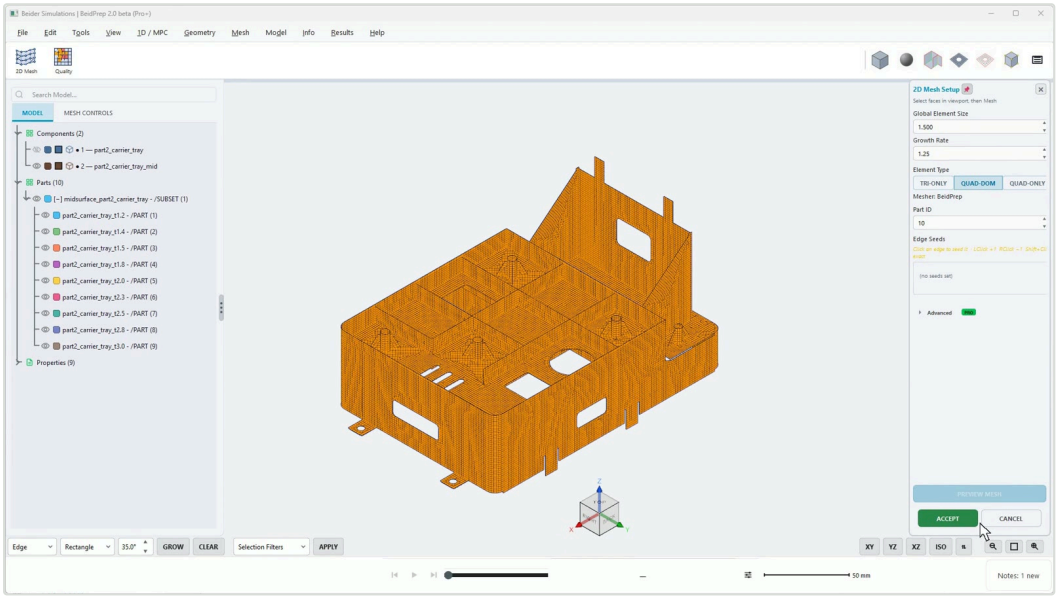
11 Size and type, Preview

video 2:33

1. Set the element size for this part.
2. Choose Quad Dom.
3. Click Preview Mesh.

   The mesh is drawn in orange; it is not in the model yet.

   In the video: **1.5** in Global Element Size.



The screen at 2:46 in the video.

12 Accept, Mesh check

video 2:47

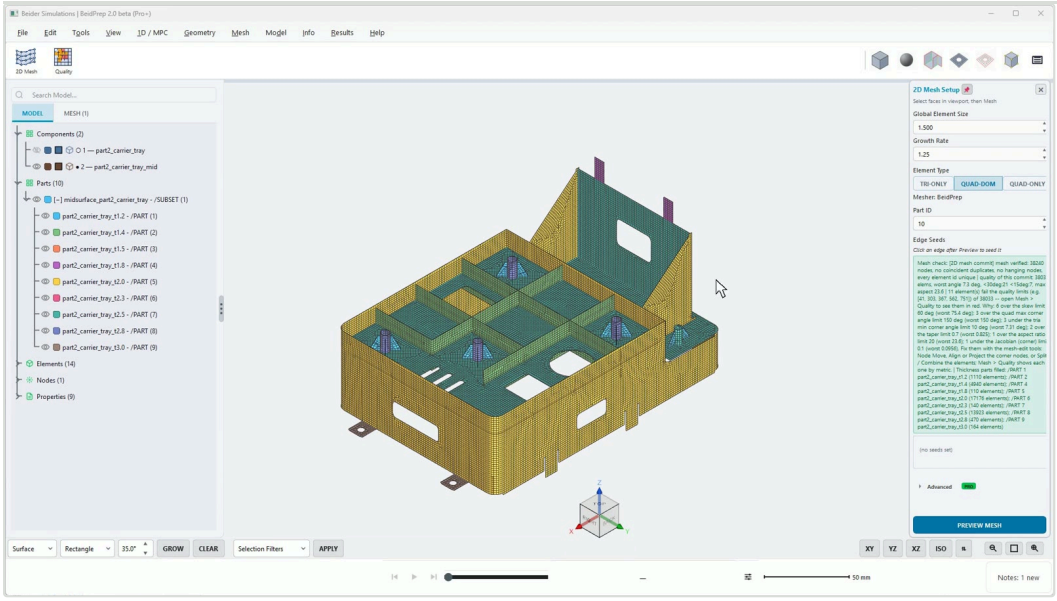
1. Click Accept.

   The mesh goes into the model, and each wall's elements go into its thickness part.

   Every accepted mesh is checked at once.

   It confirms that the mesh is connected: no duplicate nodes, and no hanging nodes.

   It also names the few elements that fail the quality limits; video six shows how to fix elements like these.



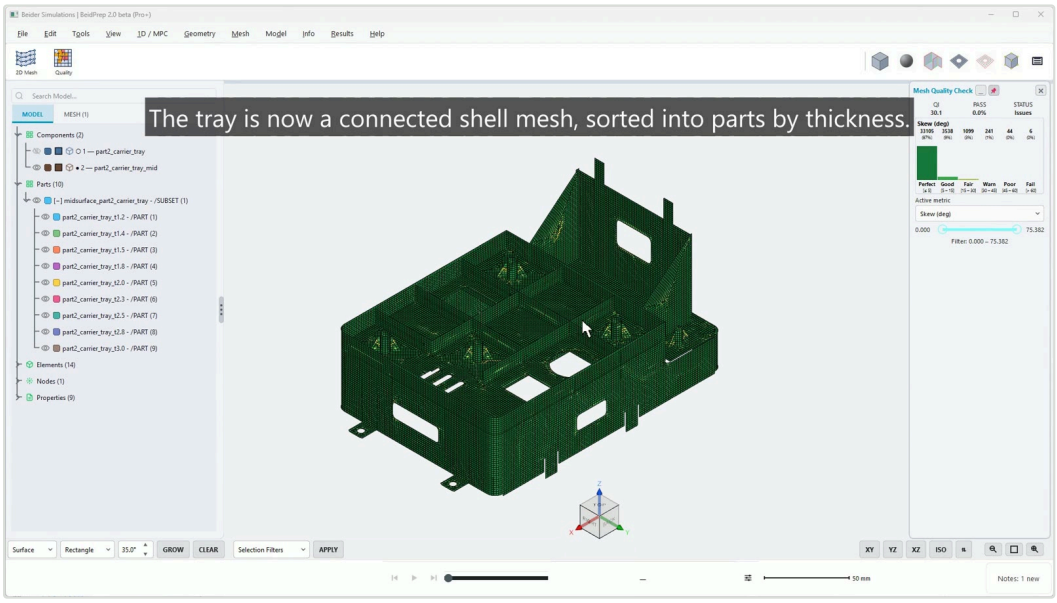
The screen at 3:08 in the video.

13 Quality, Close

video 3:08

1. Click Quality on the Mesh tab for the details.
2. Choose a criterion, and the elements are coloured by it.

   The tray is now a connected shell mesh, sorted into parts by thickness.



The screen at 3:15 in the video.

Steps and pictures are taken from tutorial video 04. Every picture is a frame of the video.