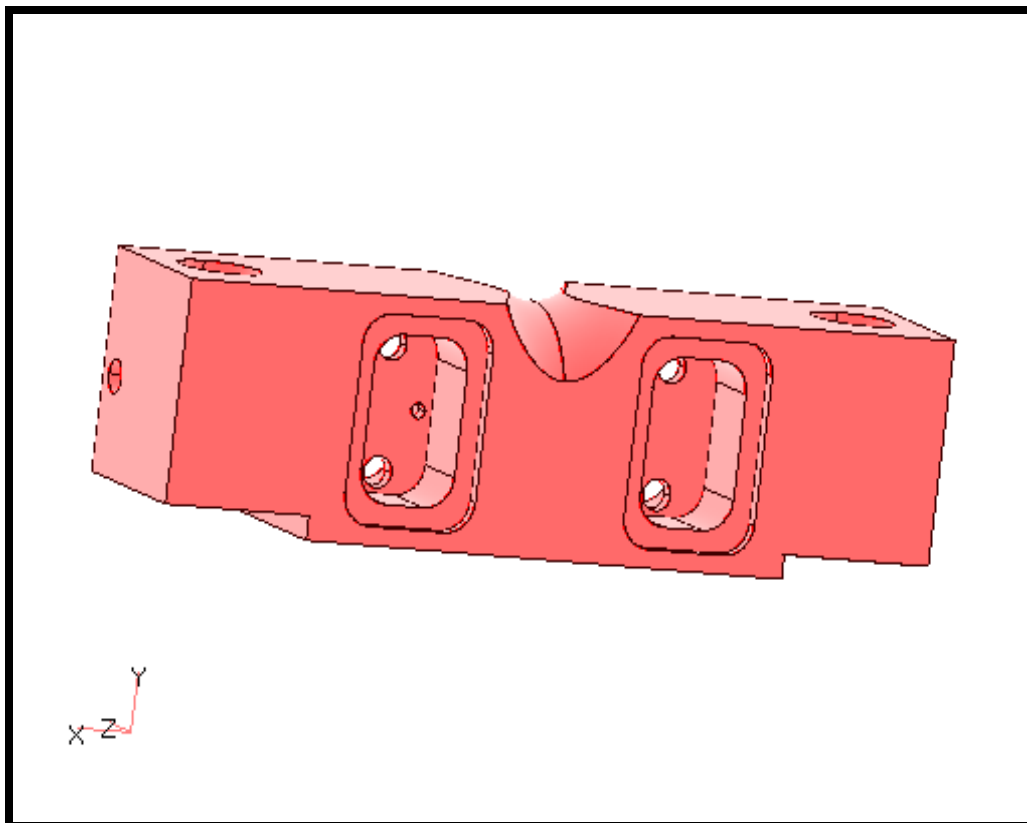

WORKSHOP 7a

Feature Suppression



Objectives:

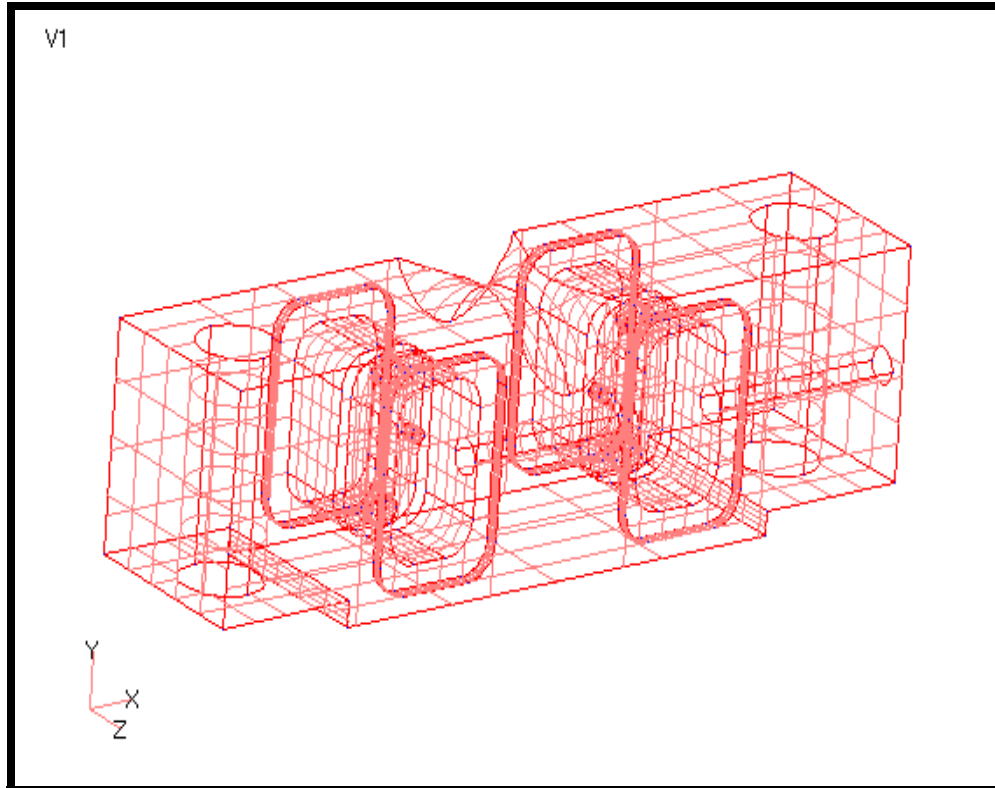
- Import ACIS model.
- Obtain solid mesh without feature suppression.
- Obtain mesh with suppression of holes and surfaces.



Model Description:

This exercise will show that one can import an existing ACIS surface model and generate an N4W solid. The solid can be meshed with or without suppressing the features. Using the feature suppression command depends on whether or not the feature is pertinent in the analysis.

Figure 7a.1 - Model Geometry



Suggested Exercise Steps:

- Import the file “inlet_block.sat”
- Create the material and property.
- Solid mesh the model (without suppressing any features).
- Delete the solid mesh.
- Suppress some features (holes and surfaces) on the model.
- Form boundary surfaces (top, front, and back) for the center curvature of the block in the model to represent the new geometry.
- Mesh the surfaces that enclose the new volume.
- Obtain the solid mesh from the surface elements.

Exercise Procedure:

1. Start up MSC.Nastran for Windows V4.0 and begin to create a new model.

Double click on the icon labeled **MSC.Nastran for Windows V4.0**.

On the *Open Model File* form, select **New Model**.

Open Model File:

New Model

2. Import an ACIS file.

File/Import/Geometry...

Change directory to **c:\Mscn4w40\examples**. Select **inlet_block.sat**.

File name:

inlet_block.sat

Open

In the *Solid Model Read Options* window, click **OK**.

OK

3. Get a better view of the model.

Right Click on screen to invoke the pop up menu.

Workplane...

Uncheck **Draw Workplane**. This will turn off the workplane.

Draw Workplane

Done

View/Regenerate <Ctrl+A>

Switch to Rendered solid mode by clicking the *View Style* icon.



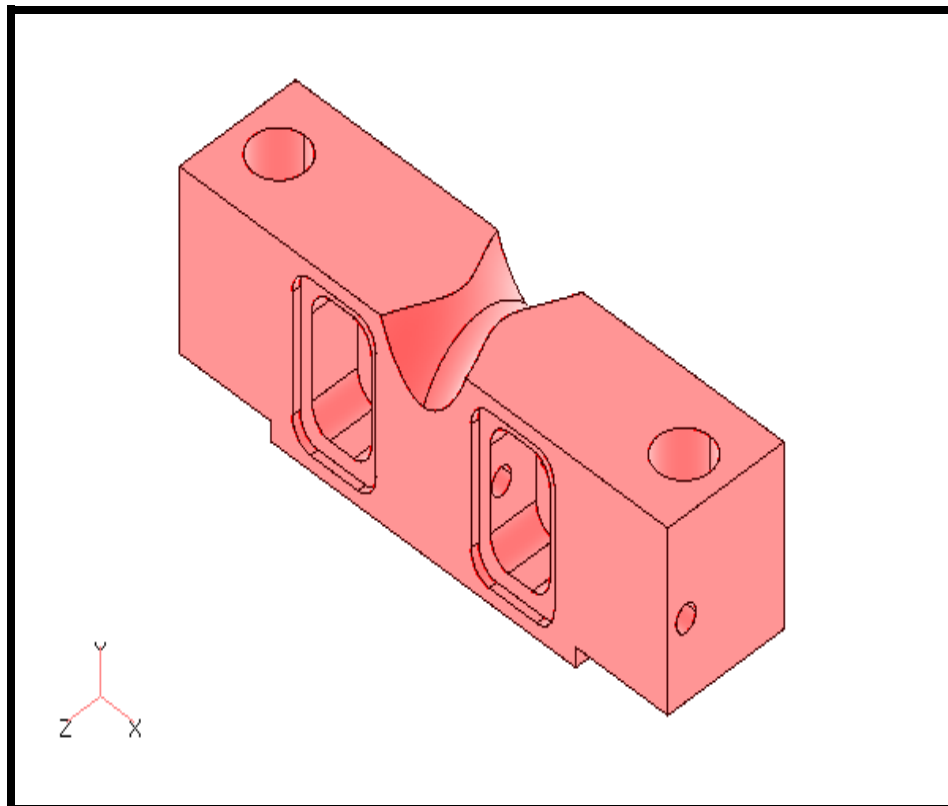
Then select **Rendered Solid**.

View/Rotate... <F8>

Isometric

OK

Figure 7a.2 - Solid Model



4. Create a new material.

Model/Material...

ID:

1

Title:

mat_1

Youngs Modulus:

10e6

Poisson's Ratio:

0.3

OK

Cancel

5. Create a new property.

Model/Property...

Elem/Property Type...

Volume Elements:

Solid

OK

Title:

prop_1

Material: (pull-down)

1..mat_1

OK

Cancel

6. Mesh the solid without suppressing any features.

Mesh/Geometry/Solids...

Tet Meshing

OK

Under the *Automesh Solids* window select the following:

Property:

1..prop_1

OK

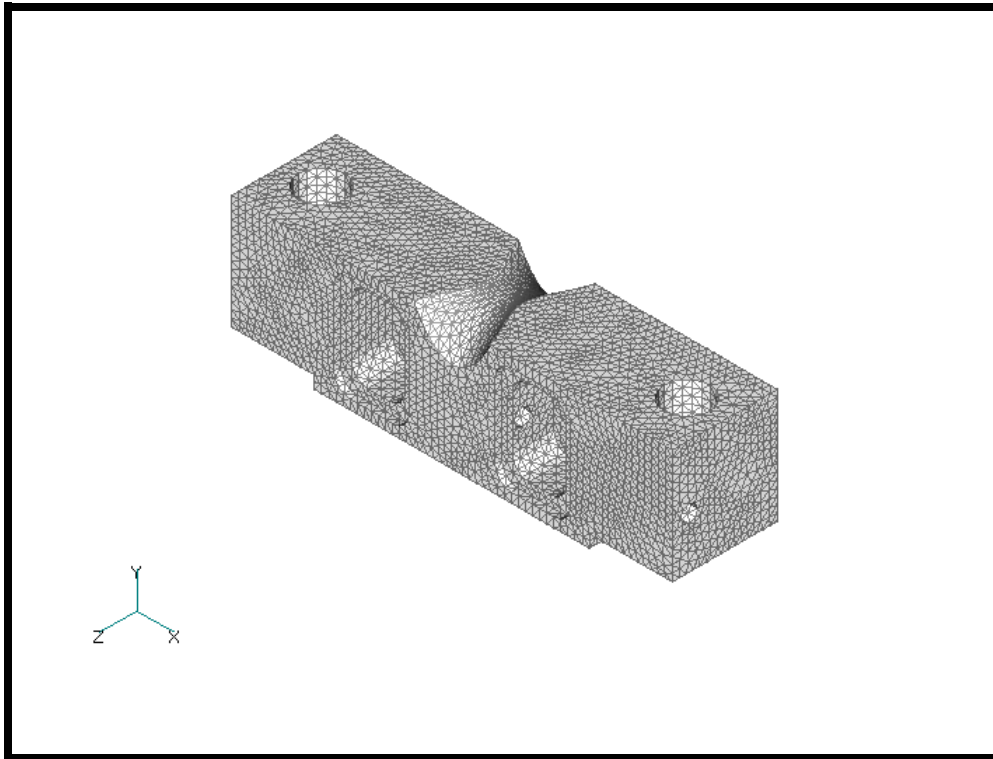
Click the *Quick Options* icon and turn off the geometry.



Geometry Off

Node
 Element

Figure 7a.3 - Meshed part without hole suppression



7. Delete the existing mesh.

Delete/Model/Element...

Select All
OK
Yes

Delete/Model/Node...

Select All
OK
Yes

Click the *Quick Options* icon and turn on the geometry.



Geometry On

Done

View/Regenerate <Ctrl+G>

Switch to Wireframe mode by clicking the *View Style* icon and then **Wireframe**.



8. Suppress a hole.

Zoom in on a hole using the *Zoom* icon. (Use Dyn Rotate if necessary to get a better perspective on the hole to suppress).



Mesh/Mesh Control/Feature Suppression...

Entity ID:

1..inlet_block

OK

Under the *Feature Suppression* window select the following:

Feature Selection:

● **Manual**

● **Remove**

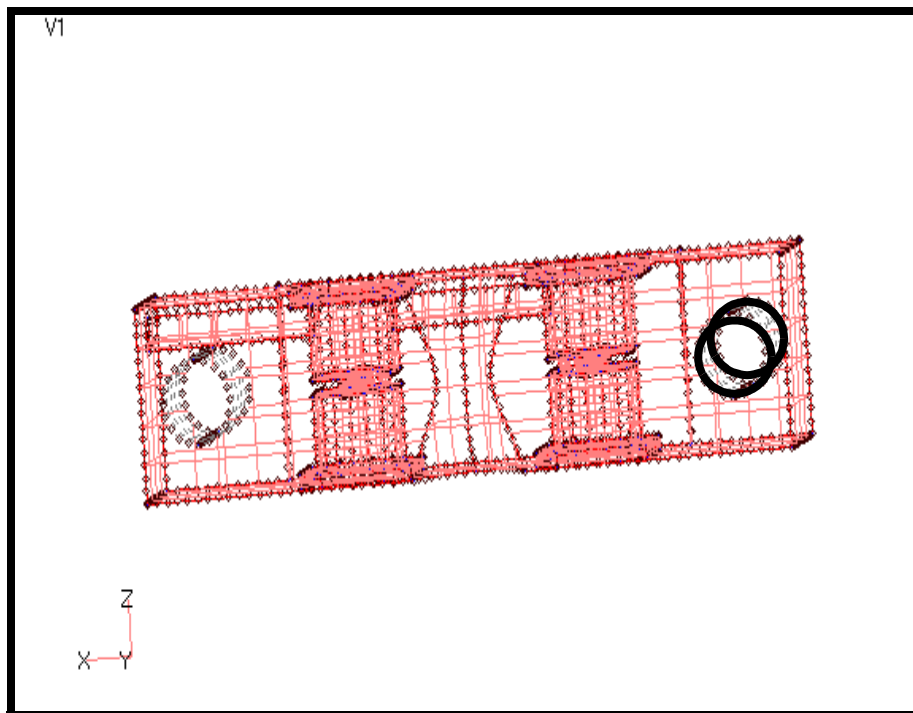
Loops...

In the *Select Loops for Feature Suppression* window, select the 2 curves that define the outer edge of the hole as shown in Figure 7a.4. You need only to input two curves that define one circular edge of the hole to suppress the entire hole.

OK

The feature should then be outlined in gray. The entire hole will be ignored during the meshing process.

Figure 7a.4 - Hole in zoom view



Refit the model on the screen.

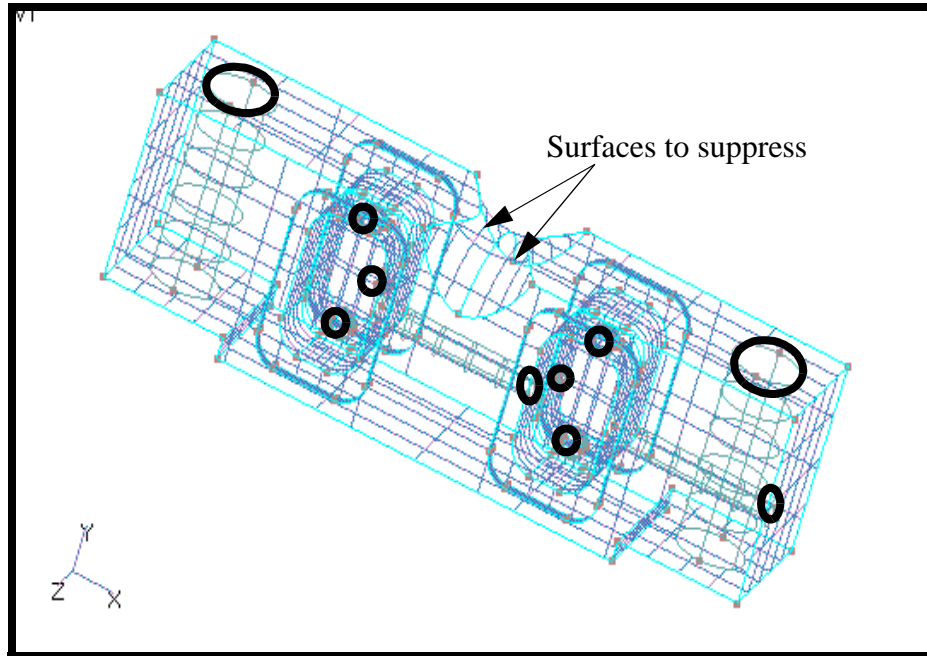
View/AutoScale <Ctrl+A>

Now suppress all the other holes in the part (See Figure 7a.5).

Repeat the process described (in Step 8) above to suppress the other holes in the model.

Use Dyn. Rotate and zooming to gain a better perspective of the features.

Figure 7a.5 Features to suppress in the model.



(Note: With all the holes suppressed, the solid can be meshed using Mesh/Geometry/Solids)

9. Otherwise, the curved surfaces, as indicated in Figure 7a.5, can also be suppressed.

Mesh/Mesh Control/Feature Suppression...

Feature Selection: ● **Manual**
 ● **Remove**

Surfaces...

<Select the surfaces> (*Surface 1 and 101*)

OK

10. Since the suppressed surfaces will be ignored by the mesher, new surfaces need to be created that will define the new geometry. First, create curves across the curved surface, as shown in Figure 7a.6 below. We will use these curves to create new surfaces, which will be used to define the new mesh.

Geometry/Curve-Line/Points...

From Point: 189 (Select Point A in Fig. 7a.6)

To Point: 3 (Select Point B in Fig. 7a.6)

OK

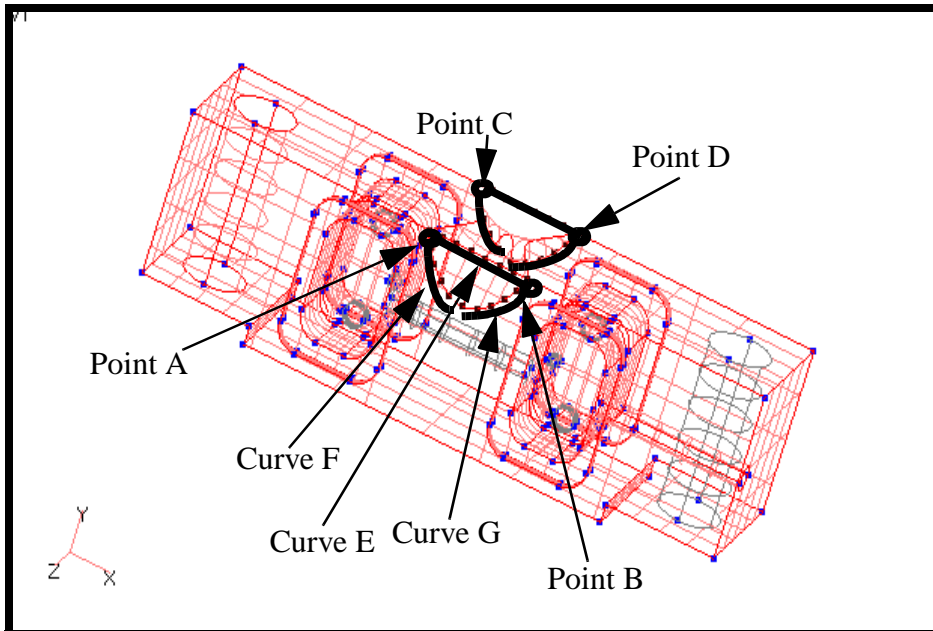
From Point: 185 (Select Point C in Fig. 7a.6)

To Point: 4 (Select Point D in Fig. 7a.6)

OK

Cancel

Figure 7a.6 Curves to form boundary surfaces.



11. Create boundary surfaces from the curves just created.

Geometry/Boundary Surface...

Select the three curves that form the front surface.

(e.g., *Curves E, F, and G form the front face in Figure 7a.6*)

Select the three curves that form back surface.

Select the four curves that form top surface.

Refit the model on the screen.

View/Autoscale**<Ctrl + A>**

12. Mesh the surfaces in the solid model. The suppressed surfaces and holes will be ignored.

Mesh/Geometry/Solid from Surfaces...

Under the *Automatic Mesh Sizing* window,

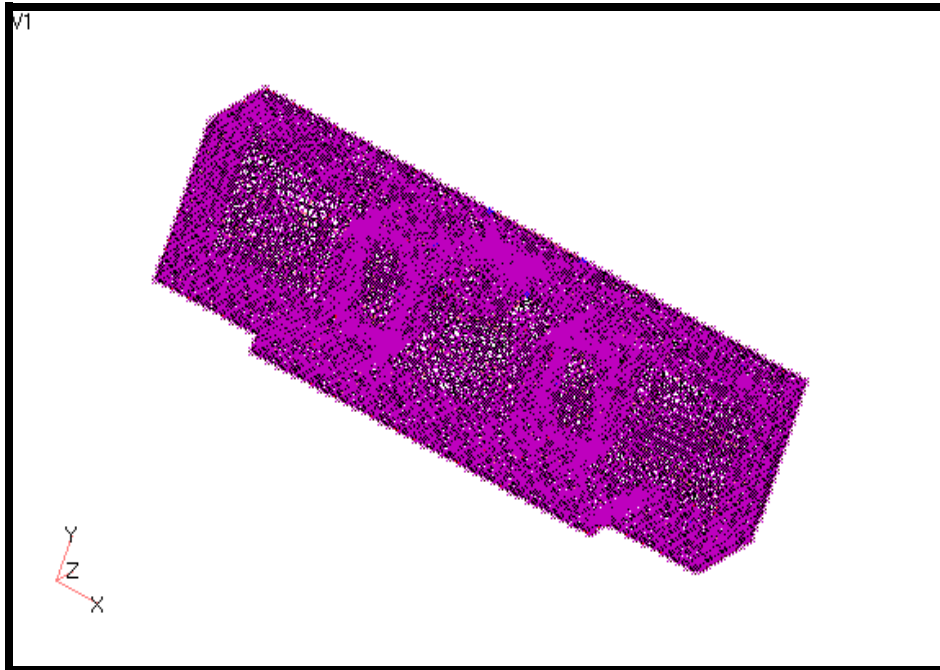
Under the *Automesh Solids* window select the following:

Property:

 Surface Mesh Only

Answer **Yes** when asked, “Do you really want to mesh Boundary Surfaces?”

Figure 7a.7 Surface meshed after feature suppression.



13. Verify that there are no free edges.

View/Select...

(F5)

Model Style

● Free Edge

OK

There should be no free edges displayed

Return to the normal view of the model.

View/Select...

(F5)

Model Style:

● Draw Model

OK

14. Obtain the solid mesh from the surface elements.

Mesh/Geometry/Solid from Elements...

Select All

OK

Under the *Automatic Mesh Sizing* window,

OK

Under the *Automesh Solids* window select the following:

Property:

1..prop_1

Midside Nodes

OK

15. Inspect the meshed part.

Click the *Quick Options* icon and turn off the geometry.



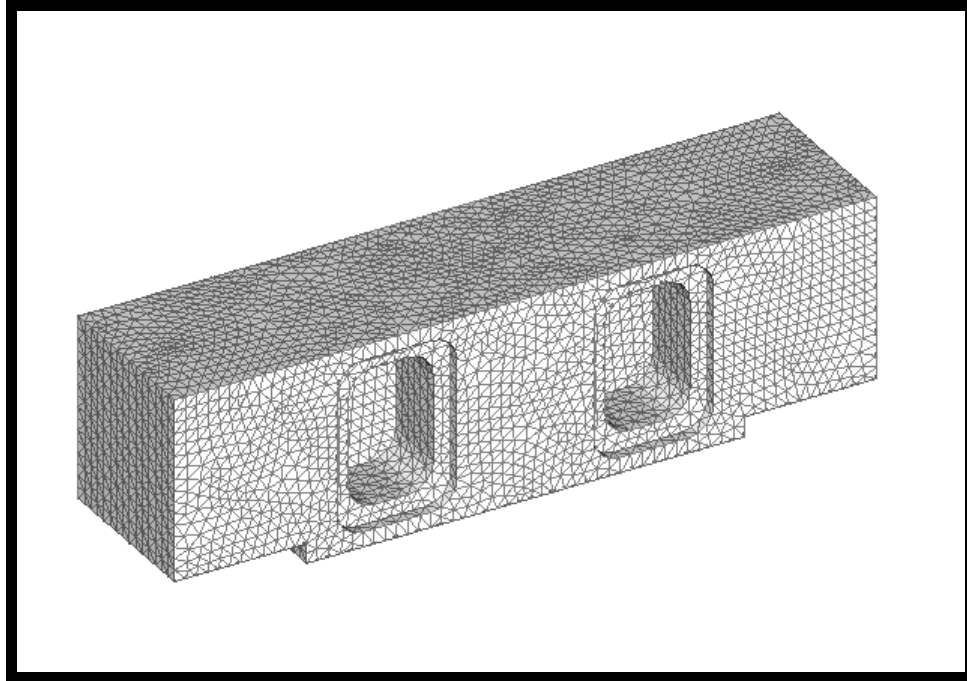
Geometry Off

Node

Done

View/Regenerate <Ctrl+G>

Figure 7a.8 - Meshed part with feature suppression



When done, save the model in C:\Temp and exit MSC.Nastran for Windows.

File/Save As...

File name:

prob7a

OK

File/Exit

This concludes the exercise.