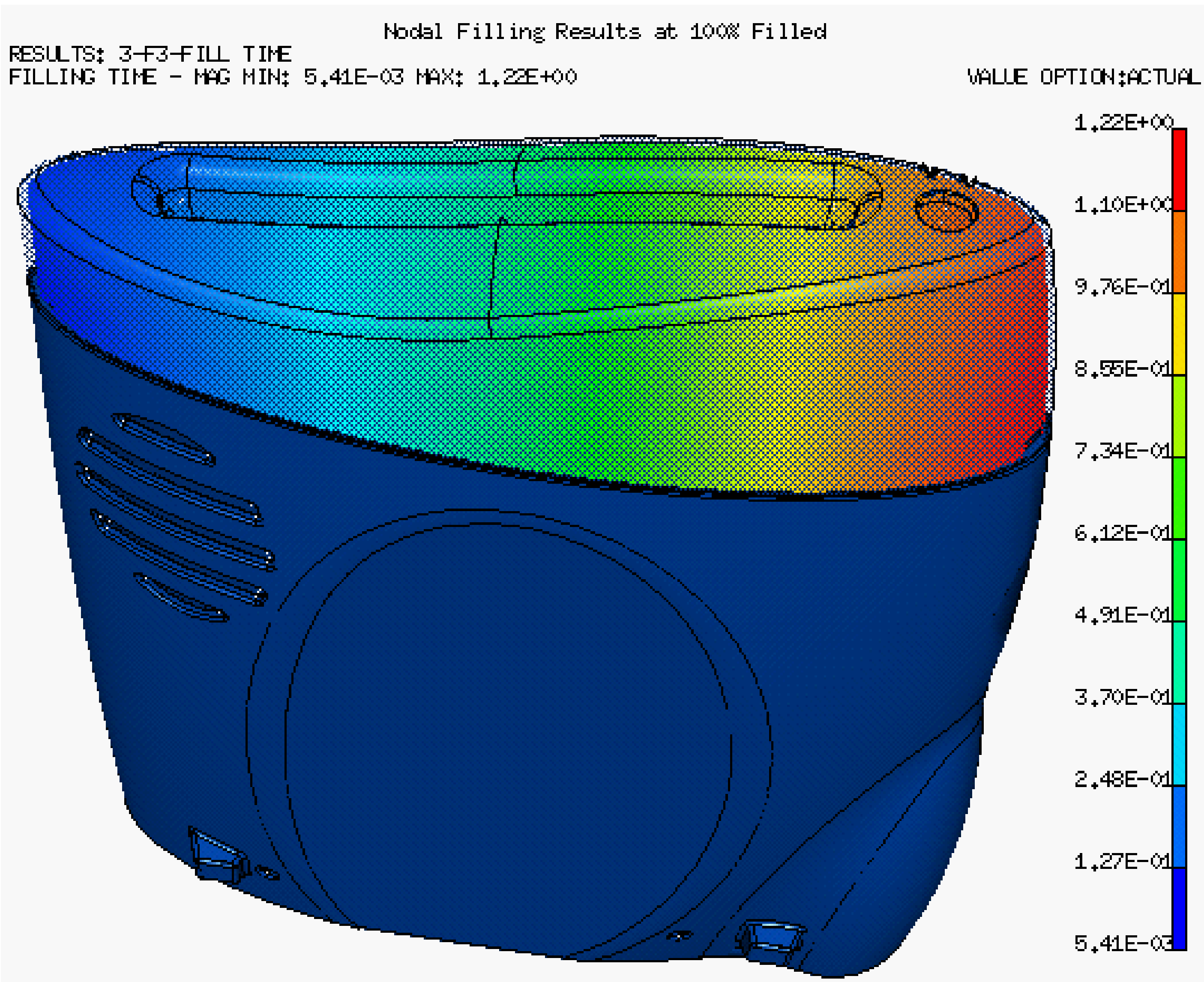
Zip Demo
Plastics Vignette



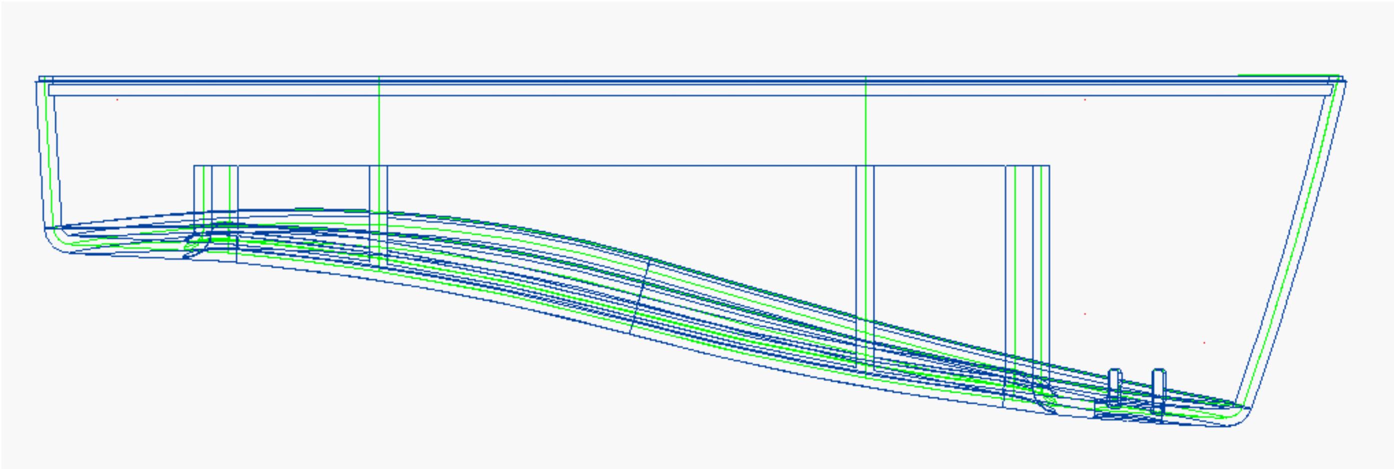
CHECKLIST

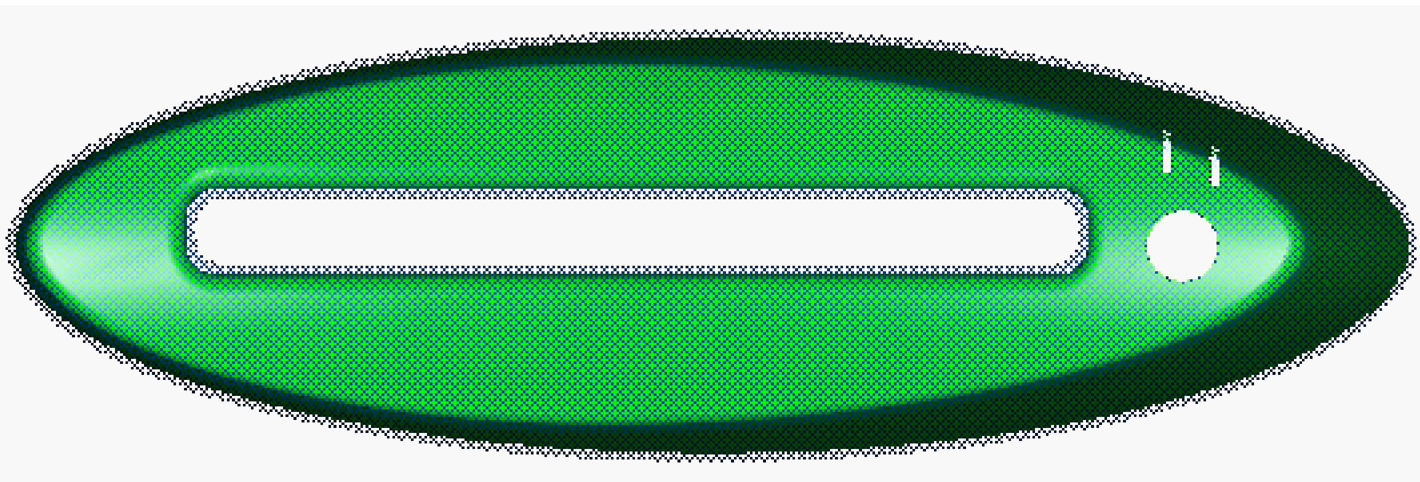
Preparation

1.0 Make sure Plastics is loaded on your machine.
2.0
3.0
4.0

Demonstration Installation and Setup

- Copy or unload the demo files to a local directory
- cd to the directory containing the demo files
-
- Start I−DEAS
  Project = **Any**
  Model File = **No model file**
  Application = **Simulation**
  Task = **Master Modeler**
- File, Import, IDEAS Simulation Universal File
  'Zip_Plastics_Vignette.unv'
- Do the following manually or run
  'Zip_Plastics_Vignette.prg'
- Options, units, **MM**
- Display Filter: Workplane **OFF**,
  Parts−Centerlines/Coordinate systems, Local
  Origin − **OFF,** okay, okay
- Line Options, Line attributes:
  iso/tangent/seams − **OFF,** okay, okay
- Line Options, Line attributes:
  Silhouette − **OFF,** okay, okay
- Shading Options, Hardware Support, Backlight−**ON,** okay, okay
- Define a global symbol 'hide'
  "/gl hi fil pm 2;; at e pf on p 1 done okay po *"
- Define a global symbol 'dots'
  "mpos;;/ta mesh;/do n d;return;redi"
- Define a global symbol 'stars'
  "mpos;;/ta mesh;/do n a;return;redi"
- Save − use any name you like, i.e., 'Zip_Plastics_Vignette'



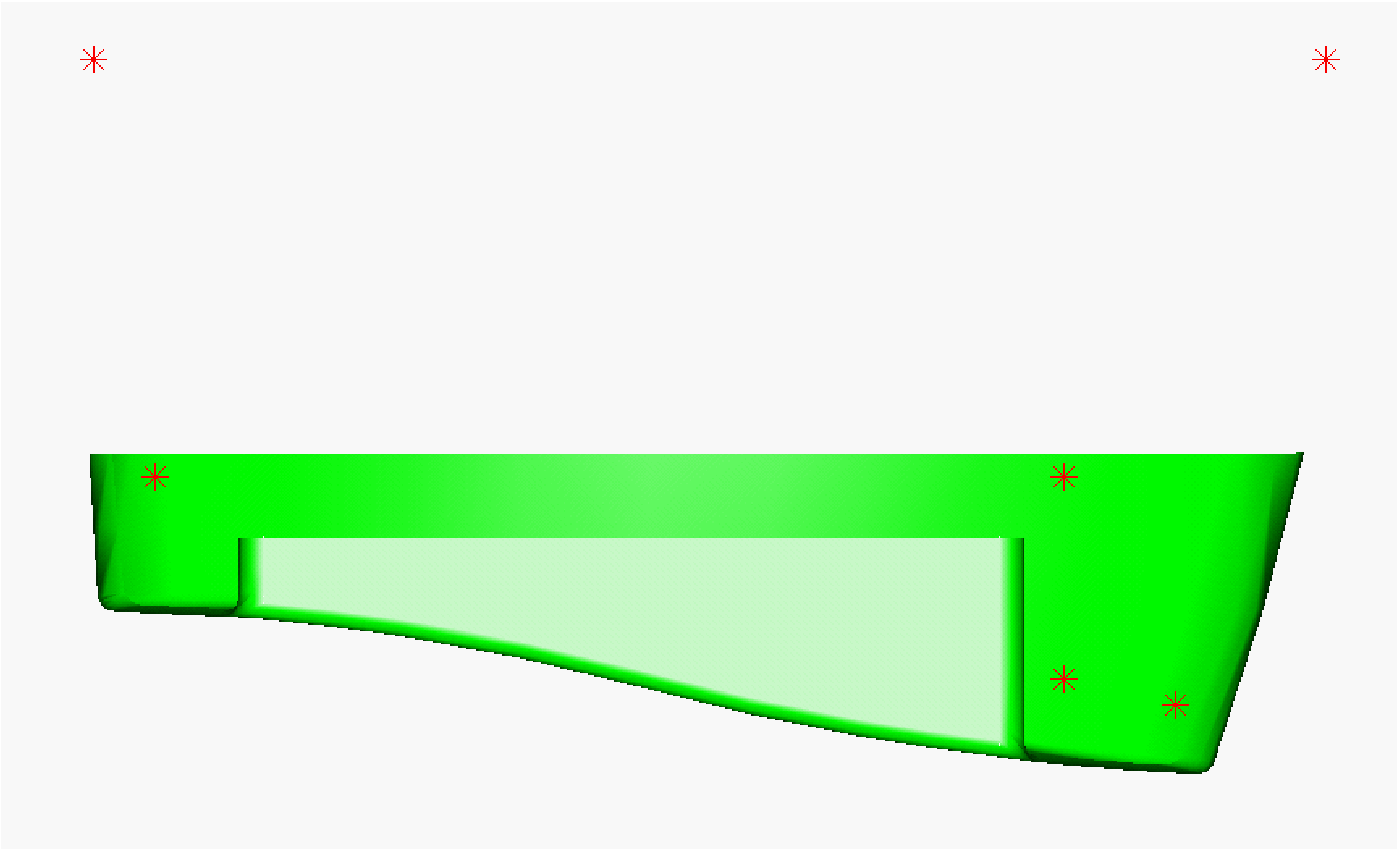


• **Get...'Front Cover'**
Get the 'Front Cover' from the '1997 Zip Covers' bin.

>> The demonstration starts here <<

Show the green mid−surfaces of the 'Front Cover' (you might show the blue 'Front Cover' in a translucent display to show the midsurfaces).

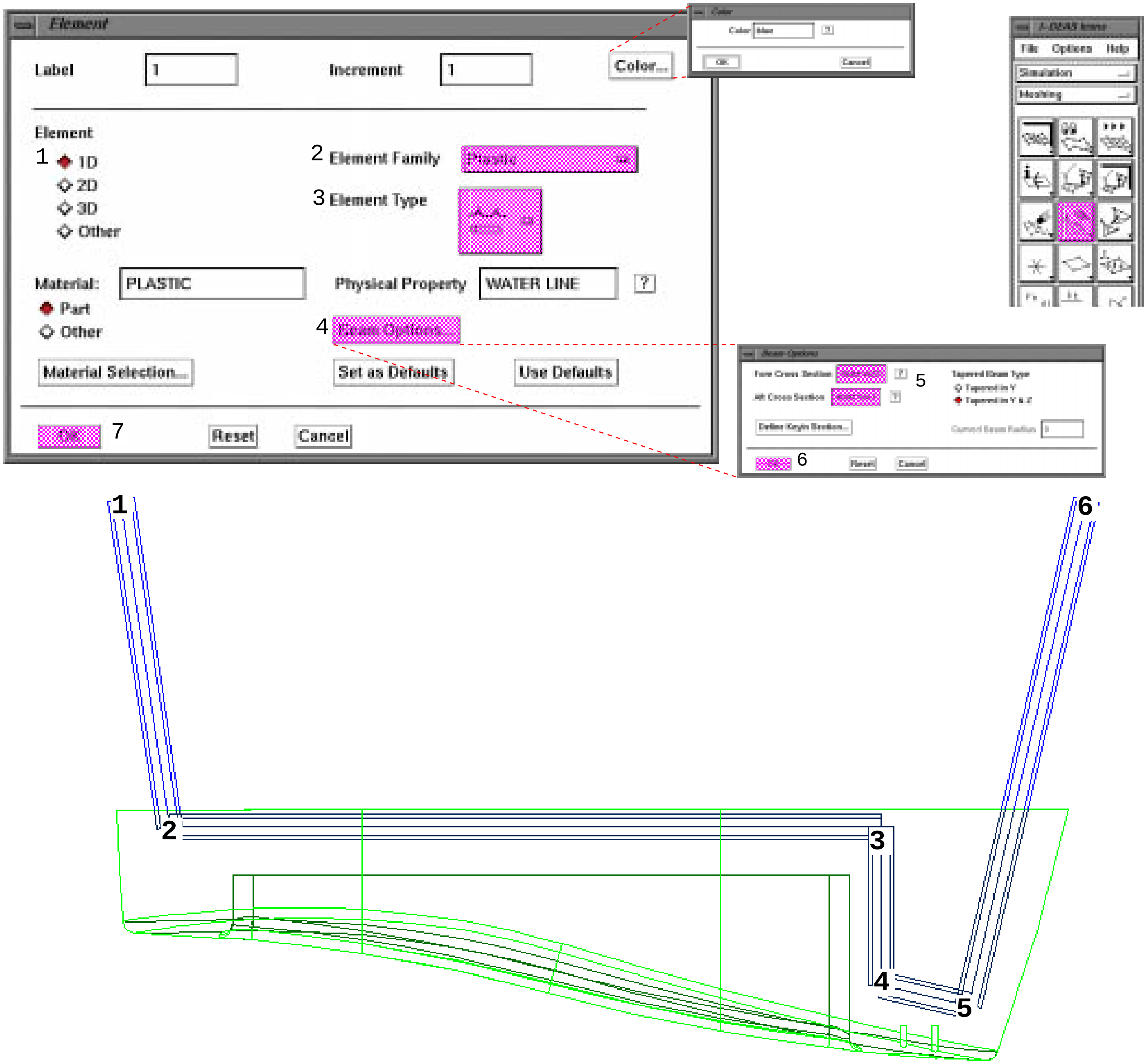
The demonstration starts with the midsurfaced front cover on the screen. Since midsurfacing was discussed in the main Zip demonstration, it is not recovered here.



- **Put Away** the ‘Front Cover’
- **Top View, Autoscale**
- **Line Display**

**** The above graphic (will not match your screen) is shown clipped ****
Pre-created nodes are shown as asterisks rather than as dots. Learn the location of these nodes such that you will be able to pick them without having to show them as asterisks.

- **Master Modeler ... Meshing**

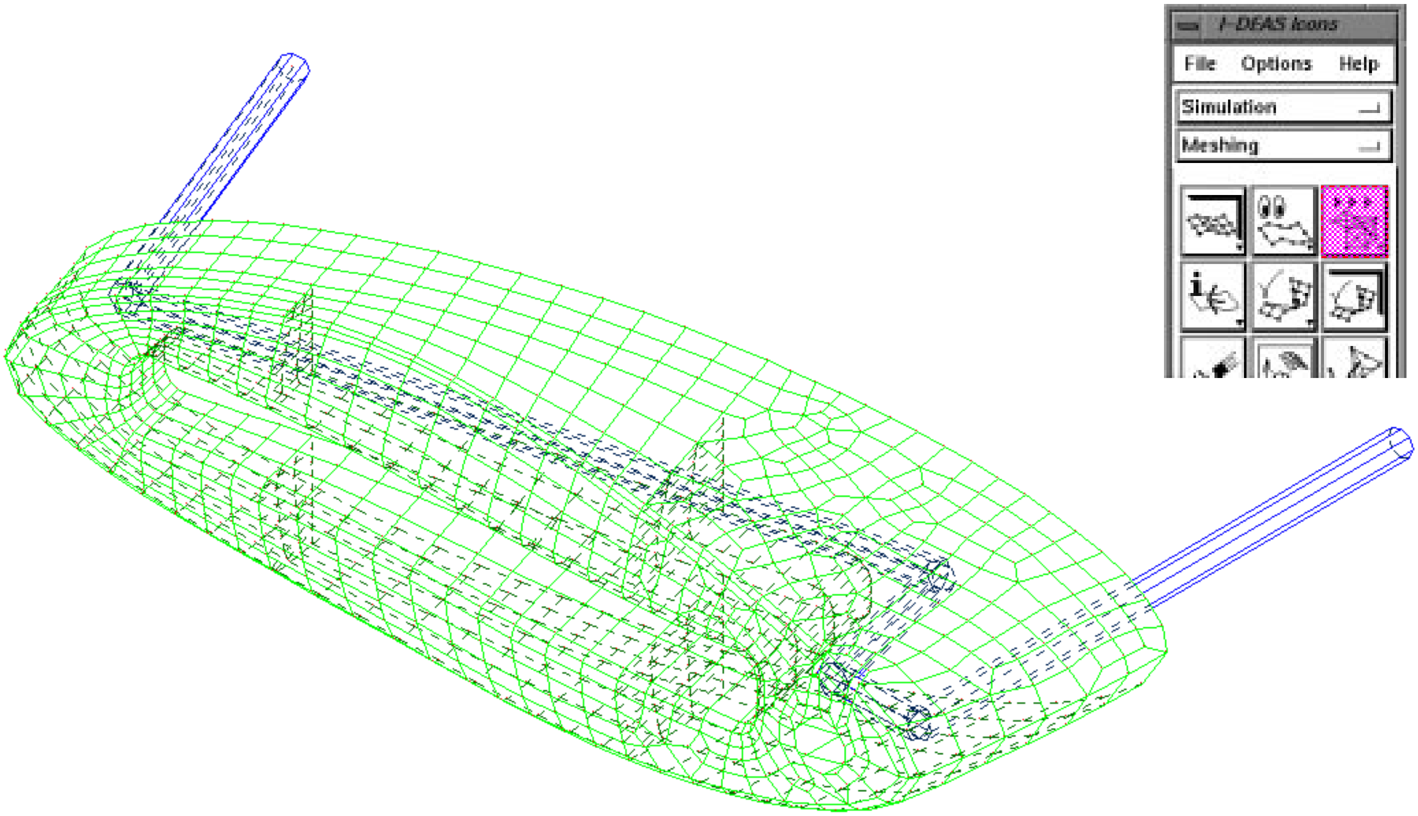


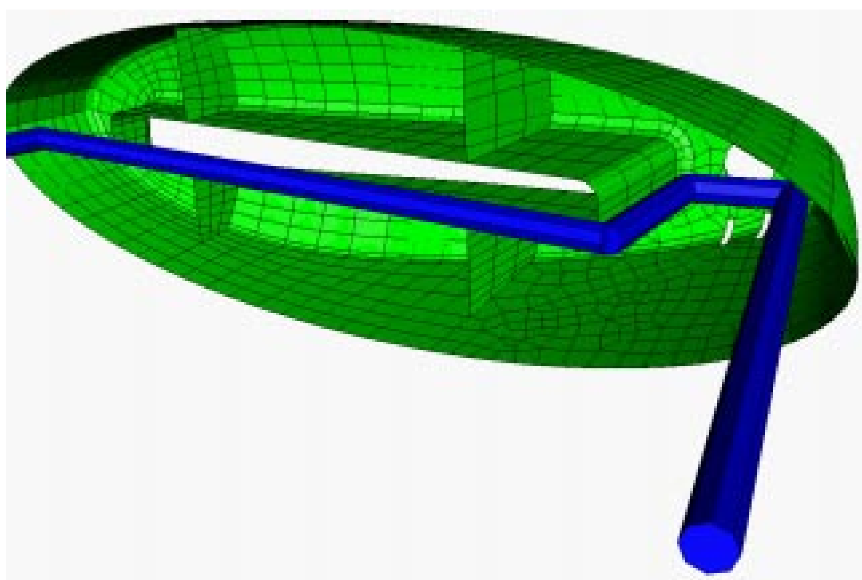
Create a cooling system for the front cover mold....

• **Element...**

```
1. Set ’Element’         to ’1-D’
2. Set ’Element Family’  to ’Plastic’
3. Set ’Element Type’    to ’Water Line’
4. Hit ’Beam Options’
5. Set ’Fore/Aft Cross Section’ to ’4MM WATER"
6. Okay
7. Okay...create the elements 1-2,2-3,3-4, etc.
```

Point out that the 4mm cooling line diameter is displayed scaled to the model rather than just shown as lines (like most other plastic packages). The ability to show the lines scaled helps the user catch modeling errors before they manifest themselves as bogus answers (and wasted time).

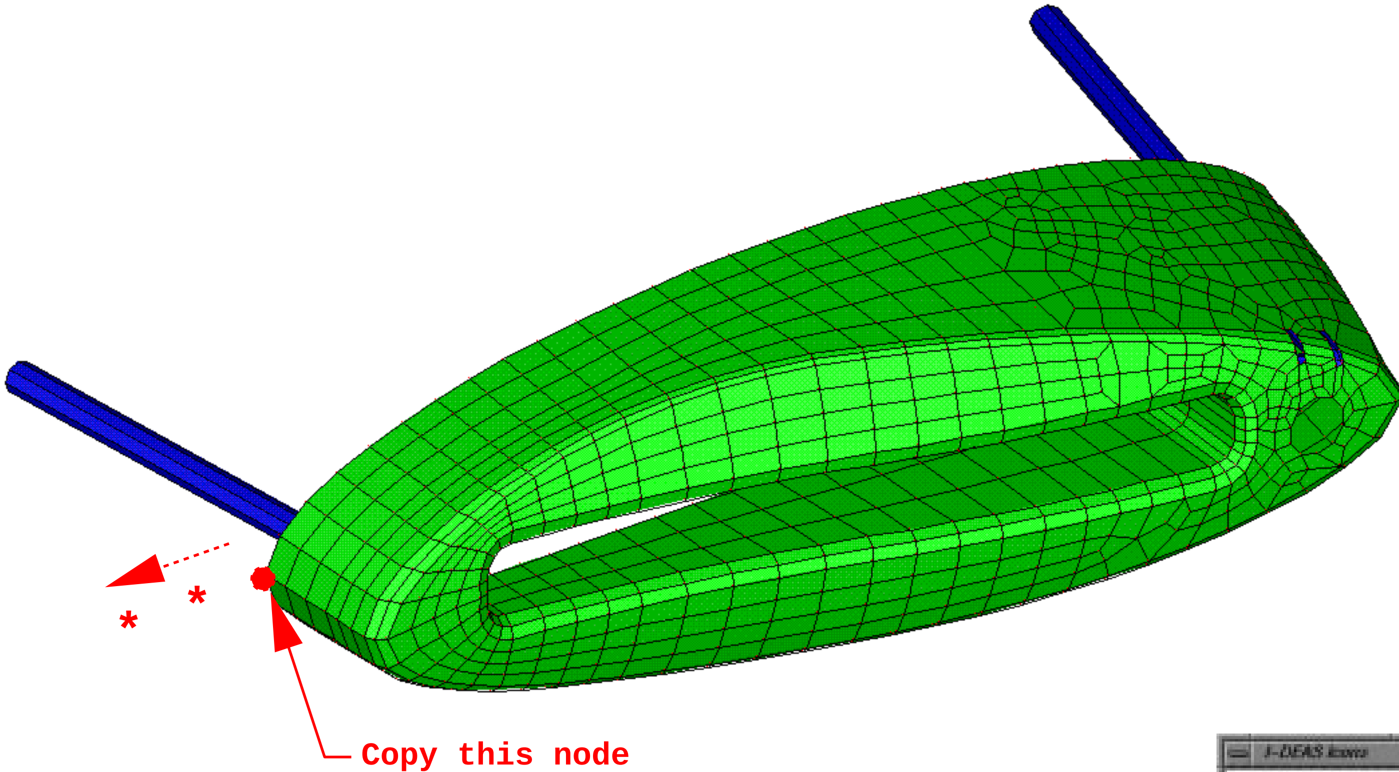


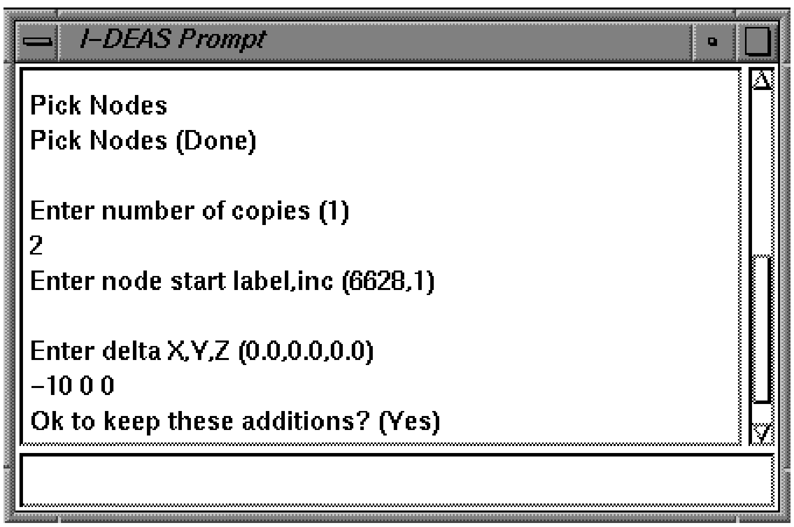


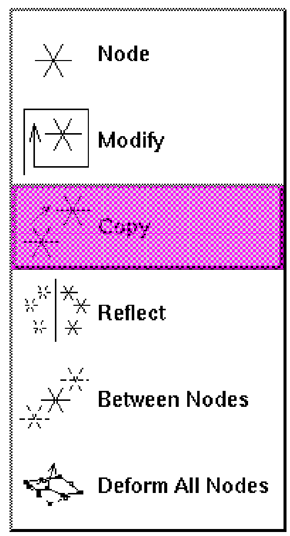
Automatic Mesh Generation

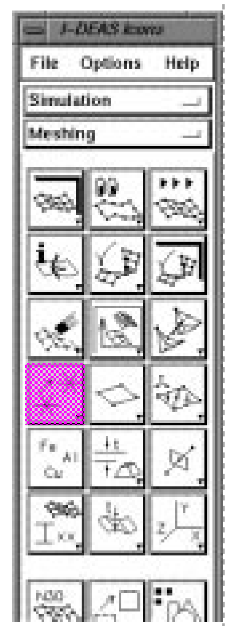
- **Iso View**
- **Autoscale**
- **Line Display**
- **Mesh on Part, Yes** (total elements/nodes generated=211/194)

The automatic mesh generator is used to place the plastics flow mesh on the midsurfaces. Point out that the mesh generator does a nice job of transitioning from regular shaped areas to more difficult areas. The finite elements pick-up the appropriate surface thicknesses that are determined by the midsurface generator. The benefit is that the user does not have to manually assign element thicknesses, thus saving time and reducing errors.



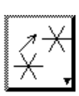






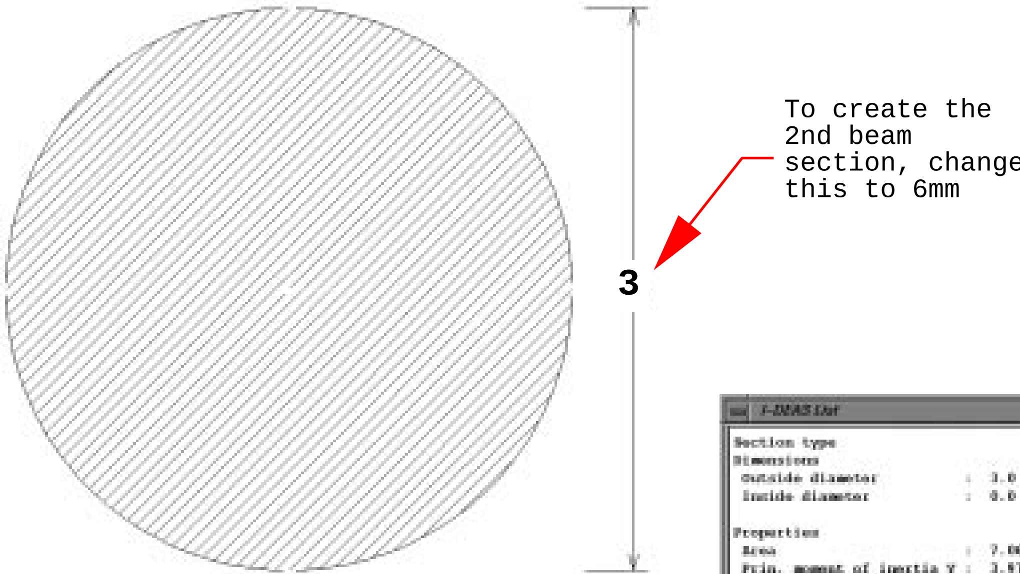
Create a runner for the mold

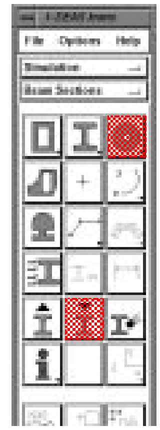
- Dynamically rotate the model to get the view shown

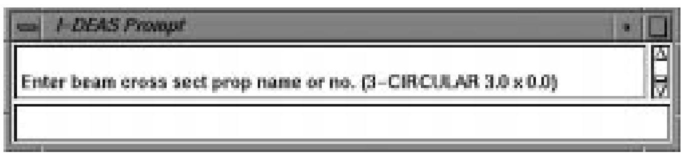
- **Node, Copy** 

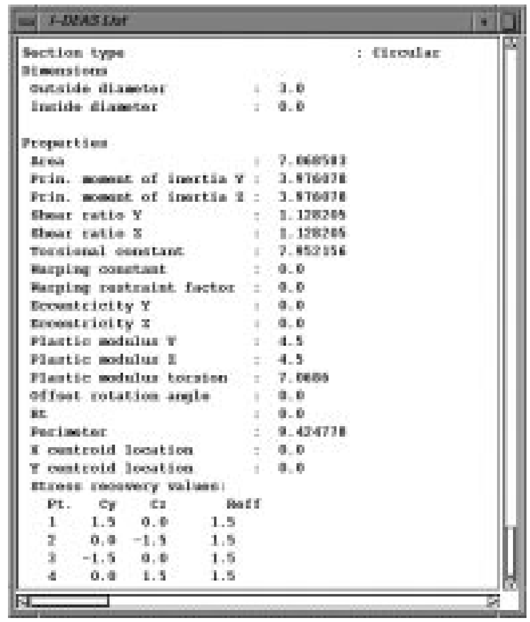
Make 2 copies of the node shown. Each copy is -10mm in X from its parent. Take the defaults for node labeling.

In addition to best-in-class automatic mesh generation, I-DEAS offers besh in class bottoms-up mesh construction tools as well. The ability to copy/move/reflect/extrude/surface coat nodes and elements are but a smidgen of the software's power.









Create 2 runner element cross sections

• Meshing ... Beam Sections

• Circular Beam
Create a circular cross section with outside diameter of 3mm, inside diameter of 0mm.

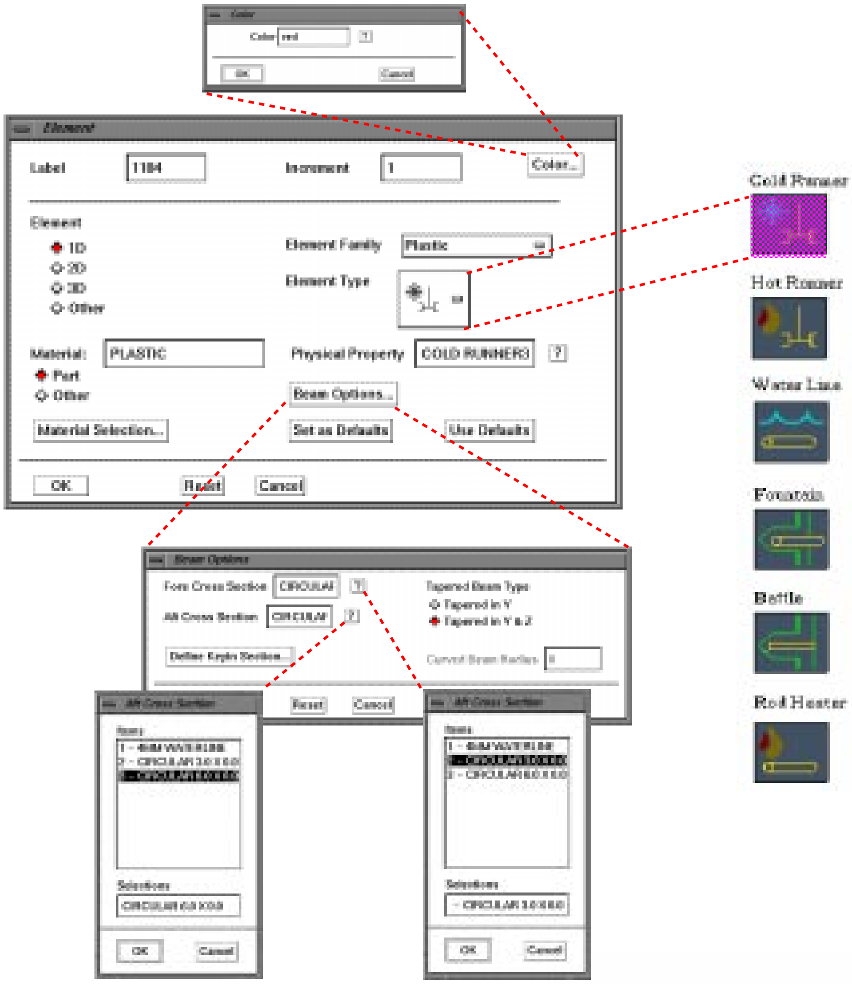
• Store Section
Take the default name presented 'CIRCULAR 3.0 x 0.0'

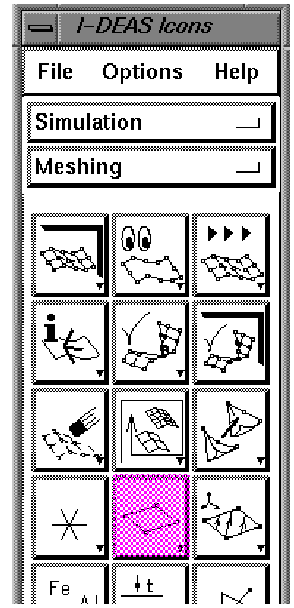
• **'/MO D'** (Type this command, pick the 3mm vertical diamater dim and change to 6mm)

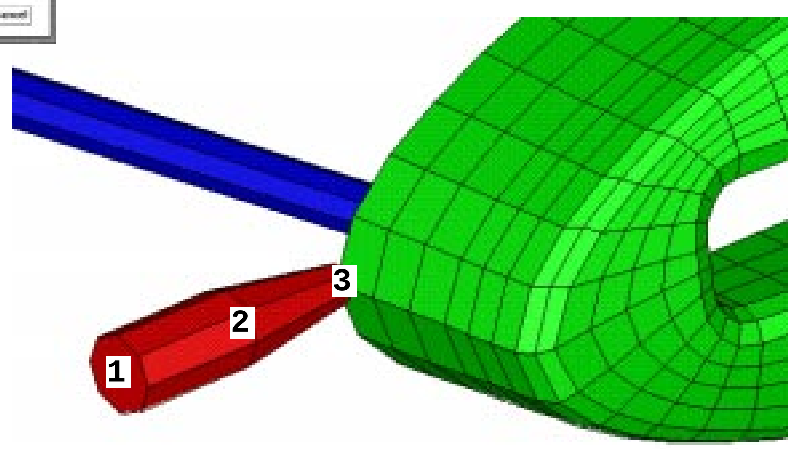
• Store Section
Take the default name presented 'CIRCULAR 6.0 x 0.0'

• Making dimension changes to beam cross sections is easy.

•Point out that in addition to standard cross sections, I-DEAS can generate 2-D properties (see list) for ANY shape. Additionally, cross sectional properties can be created from imported wireframe or from cross sectional slices of parts & assemblies.







• **Beam Sections...Meshing**

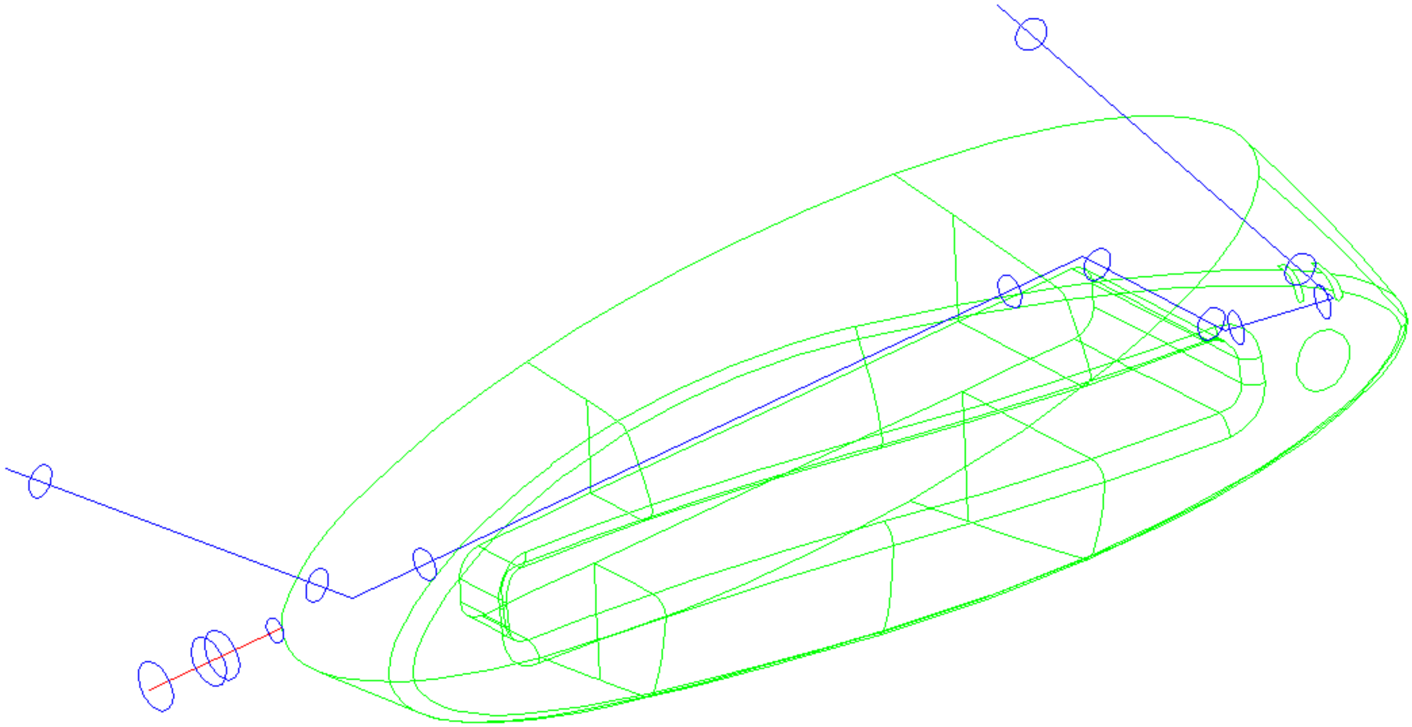
Create 2 Cold Runner Elements, one constant, one tapered

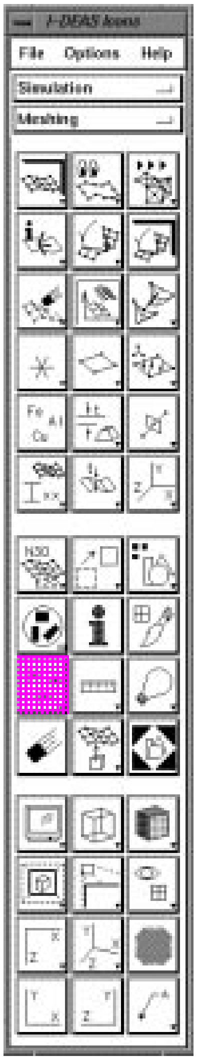
• **'Dots'**...(type this global symbol - if necessary to change node display from asterisks to dots)

• **Element**

Fillout the element form as shown. Make sure to pick 'Cold Runner' Pick the 2 nodes as shown. For the element created from node 1-2, use a fore and aft beam section, 6mm. For element from node 2-3, use a fore cross section table of 6mm, aft 3mm.

• Point out the suite of plastics specific elements that I-DEAS can create.

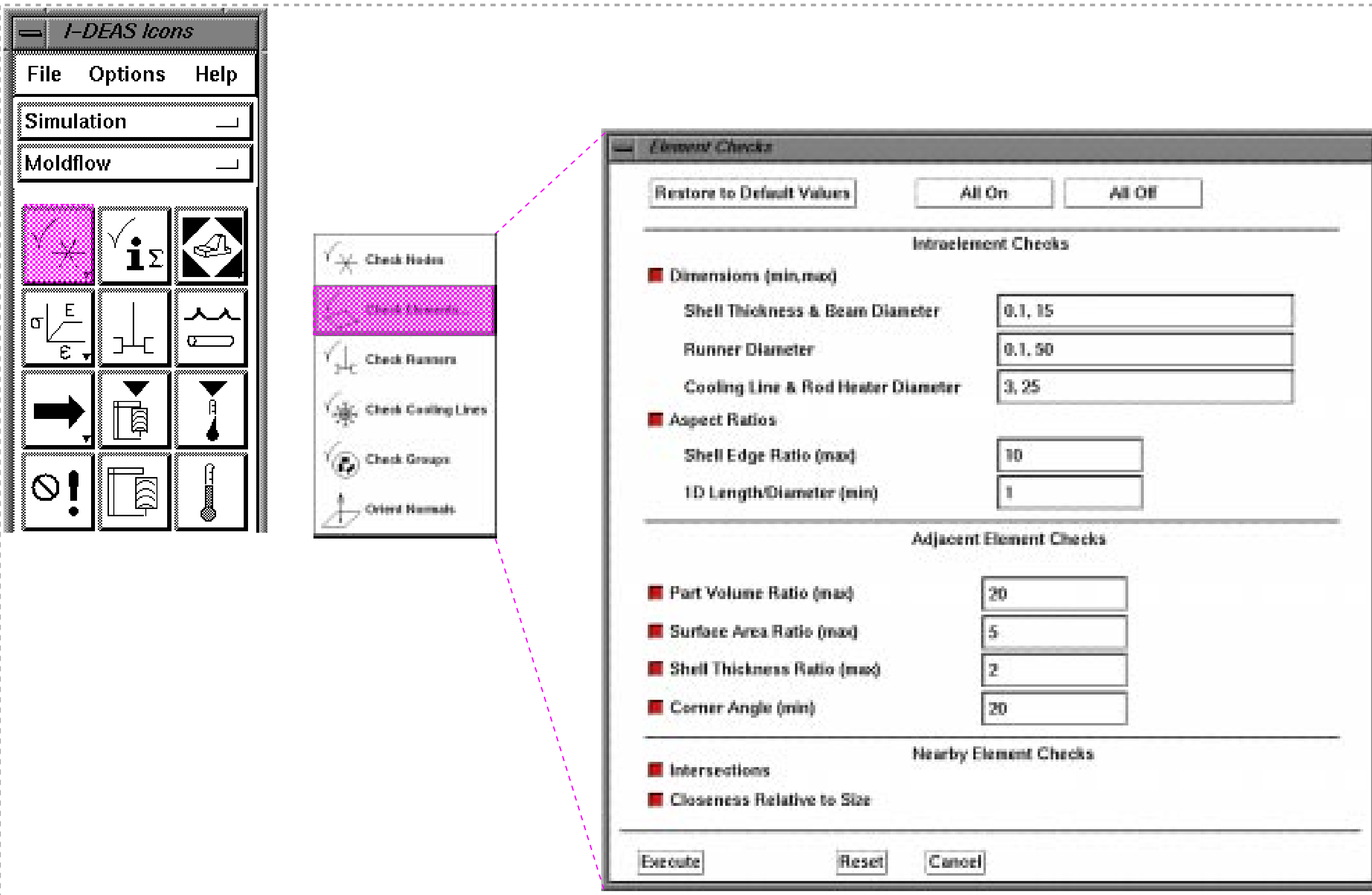




• **'Hide'** (type this global symbol)
Use the global symbol to blank all the shell elements.

• **Nodes**
Turns off the visibility of the nodes.

• **Meshing ... Moldflow**



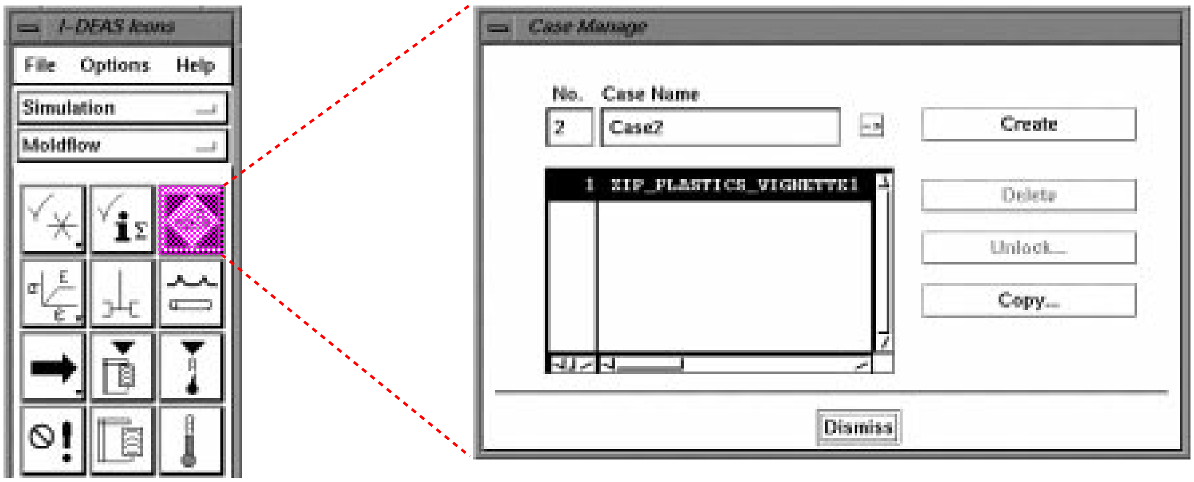
**** Showing this form is optional ****

The Moldflow Icons

• You are now just a few icons away from having filling results for the part.

• Typically, the plastics analyst will check the fidelity of the analytical model. One step in this process includes validating the mesh (verifying element connectivity), the runner, and the cooling system.

• I would suggest showing the menus but not actually running any of the checks. The element check values are customizable to conform with the requirements of an outside code.

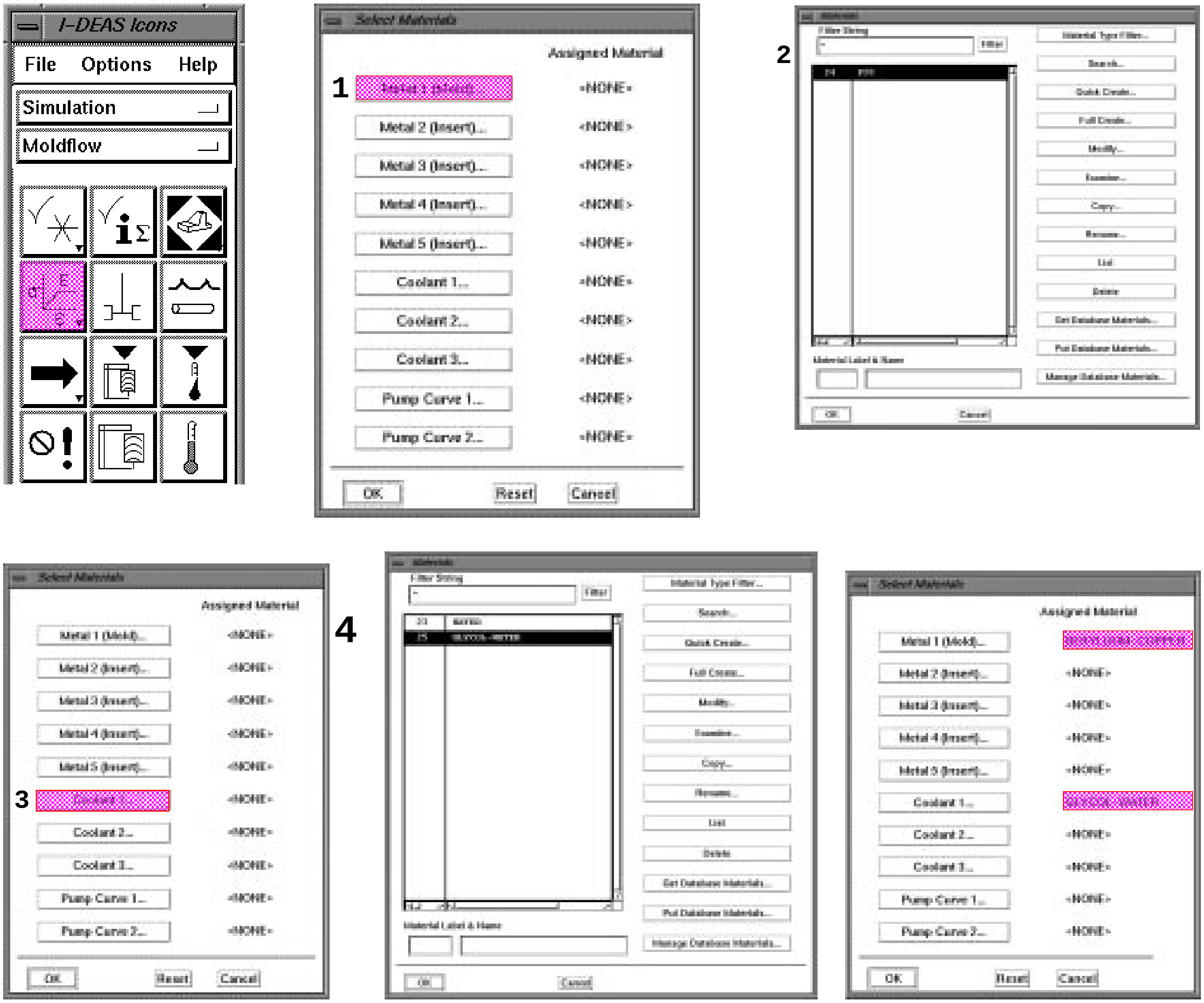


** Showing this form is optional **

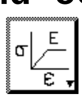
- **Case Setup**

A single model can have more than one case, with each case containing different input data, such as different types of material data, runner data, and mold data. The input data is automatically placed into the current case. Take the default name, it will match the model file name.

- **Dismiss**



The Mold Materials form is where you assign materials to the mold, inserts, and coolants.

• **Mold Materials...** 

1–Pick ‘Metal 1 (Mold)...’ to show the ‘Materials’ form

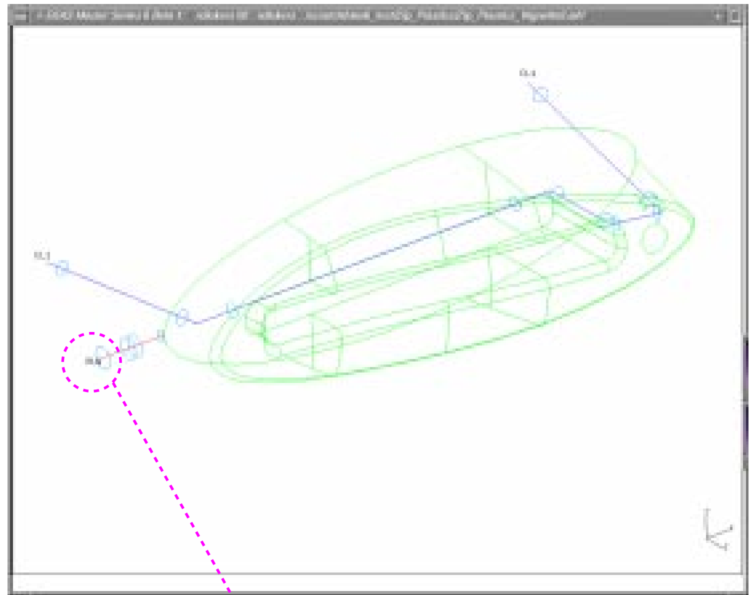
2–On the ‘Materials’ form, pick ’P20’, ’OK’

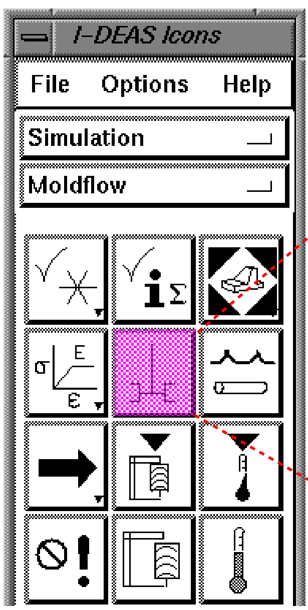
3–Pick ’Coolant 1...’ to show the ‘Materials’ form

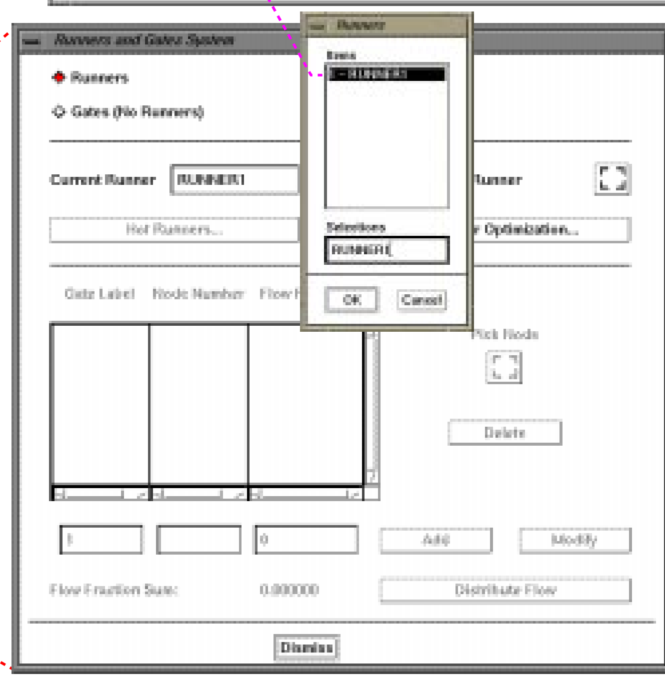
4–On the ‘Materials’ form, pick ’GLYCOL–WATER’, ’OK’

5–The form should look like this. ‘Ok’ to close the form.

• I–DEAS’ Material Data System software manages all material–specific data used by I–DEAS applications including solids, sheet metal, TMG, ESC, plastics, laminates, creep, non–linear, and more. Material properties are tracked by TDM and may be used as a query critera. The benefit is storing data in one location avoids re–creation time and minimizes data entry errors.





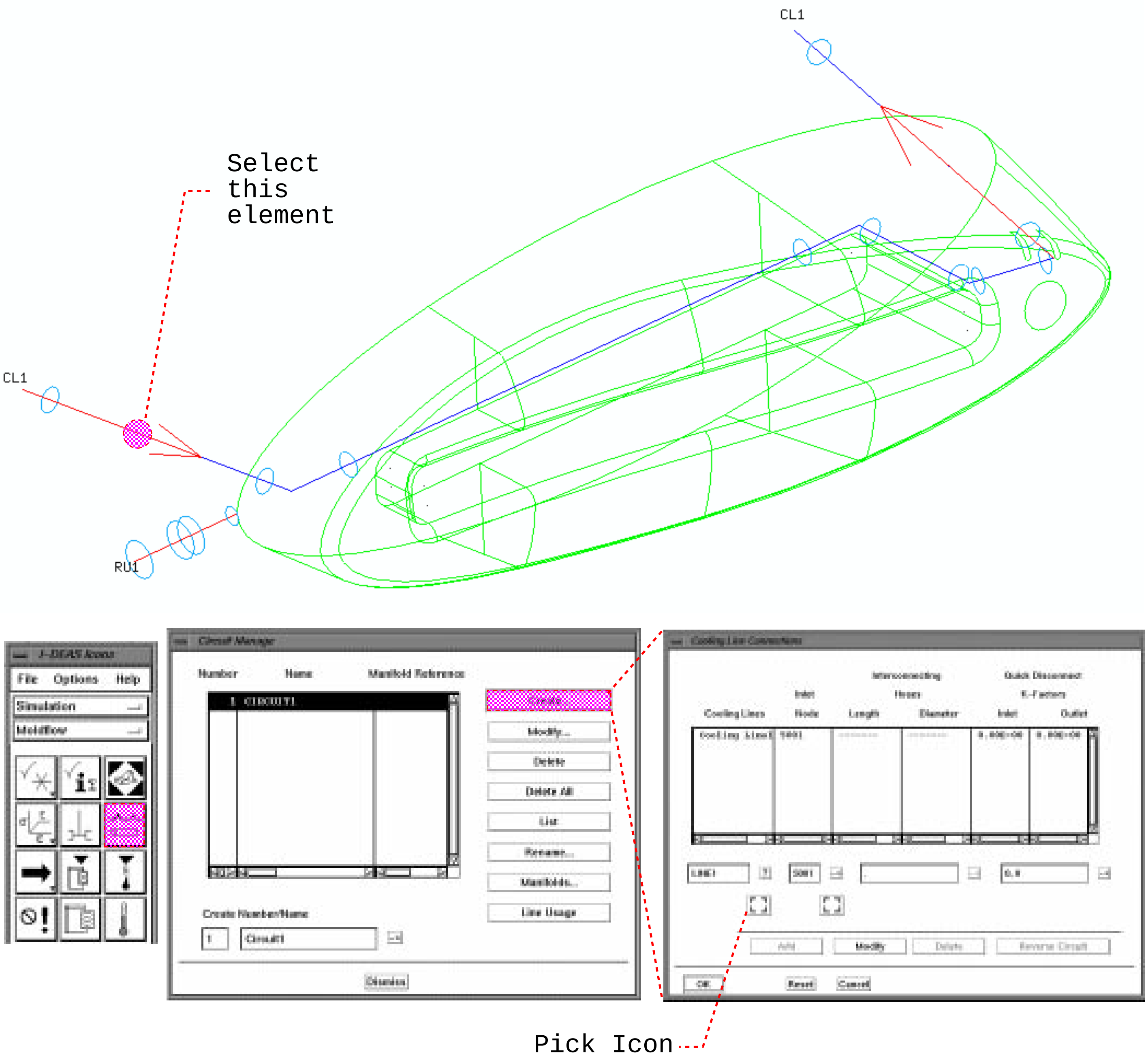


- **Runners**

I–DEAS supports filling analysis using runners or gates without runners. Runnerless analysis are simple, you pick node(s) to indicate where the part is filled and you specify how much flow is apportioned to each gate.

The benefits of modeling a runner system is that Moldflow can optimize the runner system. Optimizing a runner is an option that tells the software to adjust the sizes of the runner’s diameters to balance the flow of the resin into each gate, with the overall goal of having the mold fill uniformly. If you choose gates (not Runners), you cannot optimize your runners.

- **Dismiss**

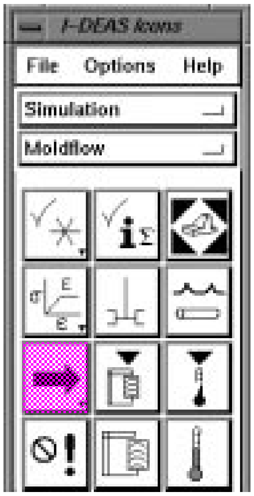


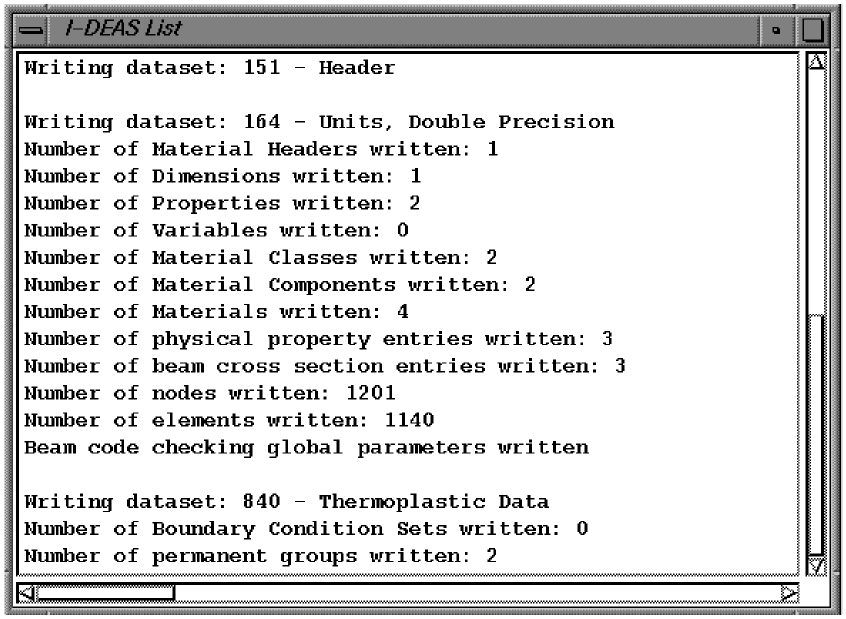
- **Circuits...**

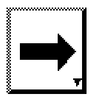
- **Create...**

On the Cooling Line Connections form, use the ‘pick’ icon and select the element shown (it should be element #1),
> Hit ’Add’.
> Hit ‘OK’ and ’Dismiss’

The direction of coolant flow is shown graphically which helps you verify that the model is setup correctly

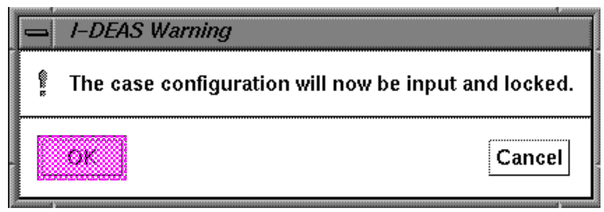


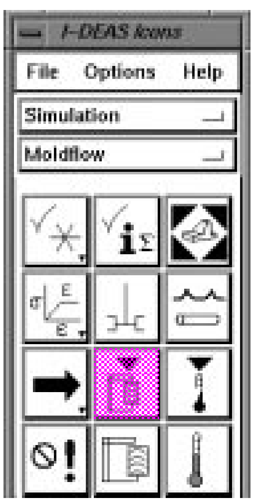


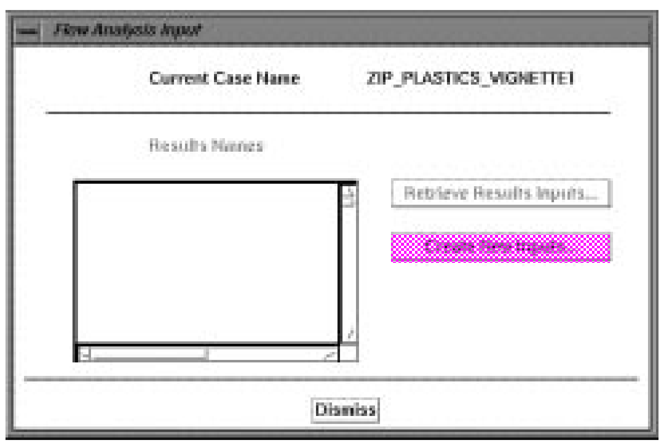
- **Input Case Configuration** 

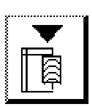
Hit 'OK' on the form

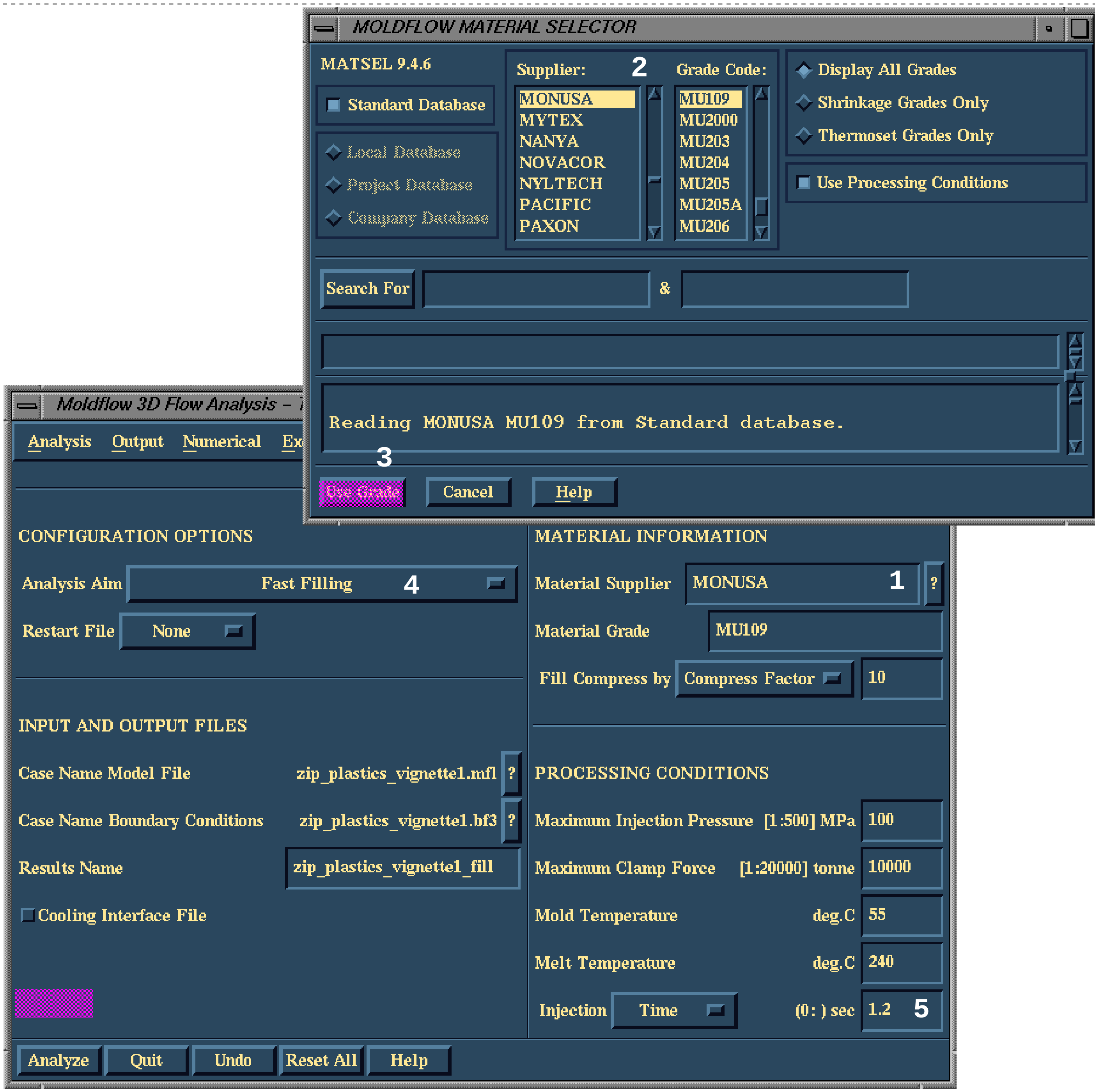
This will write a Moldflow input file.







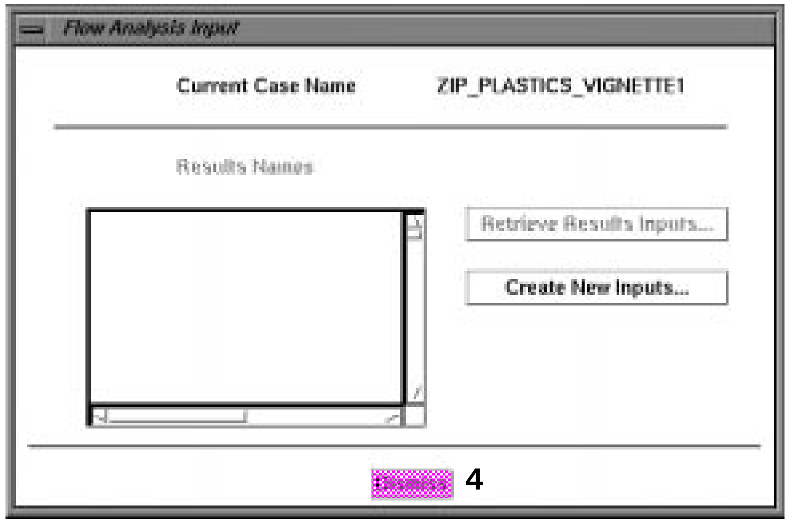
- **Flow Inputs...** 

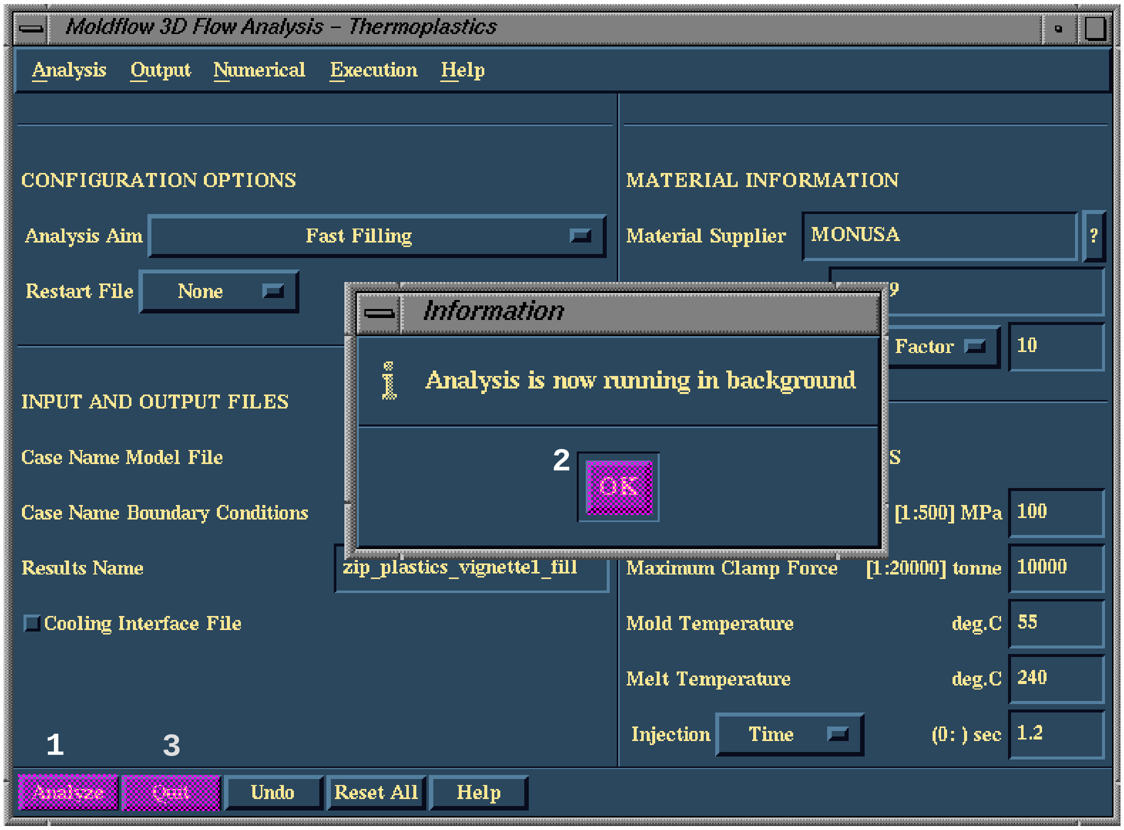


On the 'Moldflow 3D Flow Analysis' form...

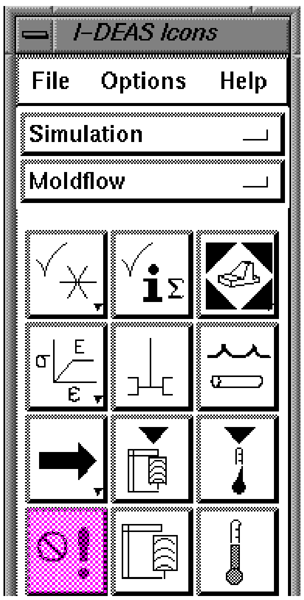
1. **Hit the ? next to the 'Material Supplier' field**
2. **Set the Supplier to 'MONUSA' and the Grade to 'MU109'**
3. **Hit 'Use Grade'**
4. **Set the Analysis Option to 'Fast Filling'**
5. **Set the Injection time to 1.2 sec**

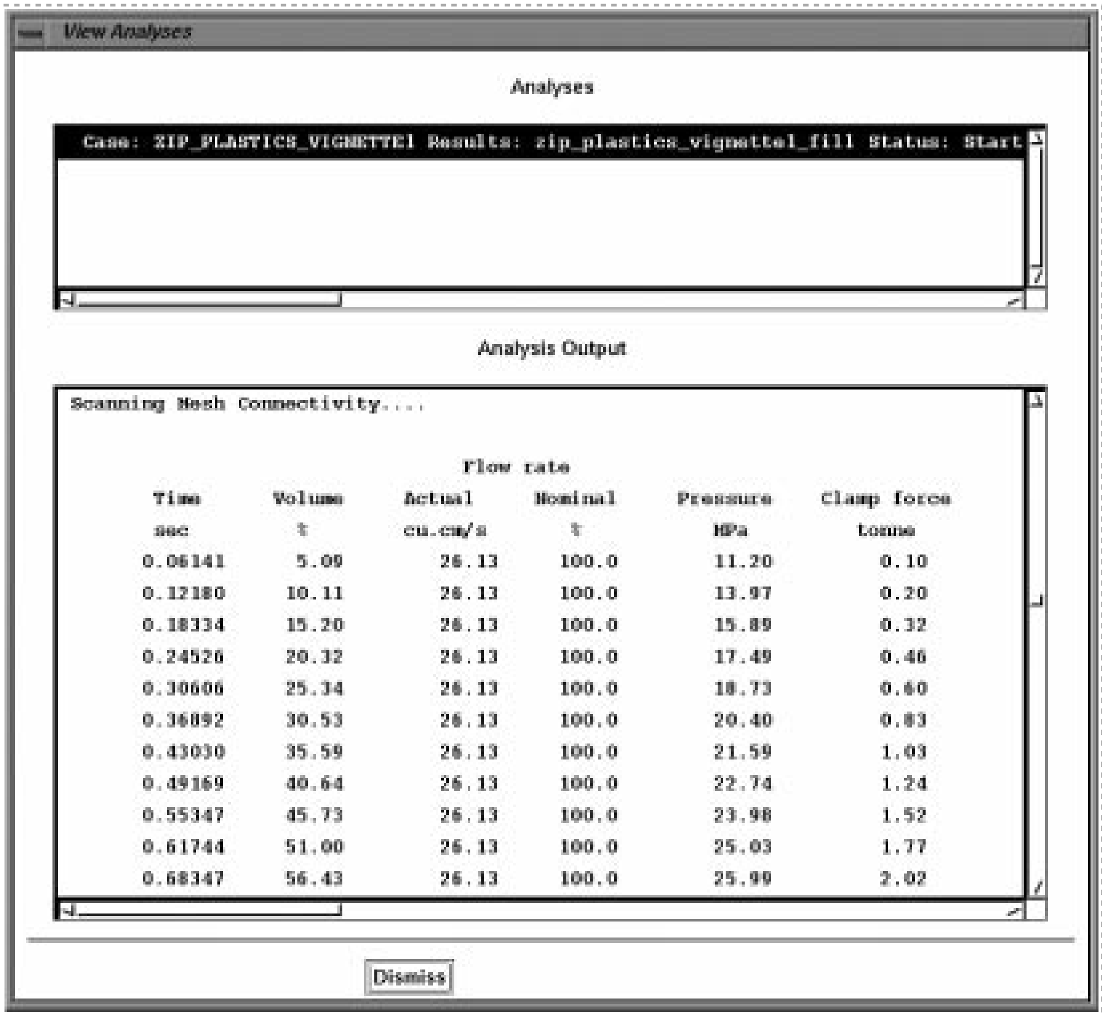
Note that the remaining Processing Conditions are derived from the material database





1. Hit analyze
2. Ok on the info form
3. Hit 'Quit'
4. Dismiss the Flow analysis Input form

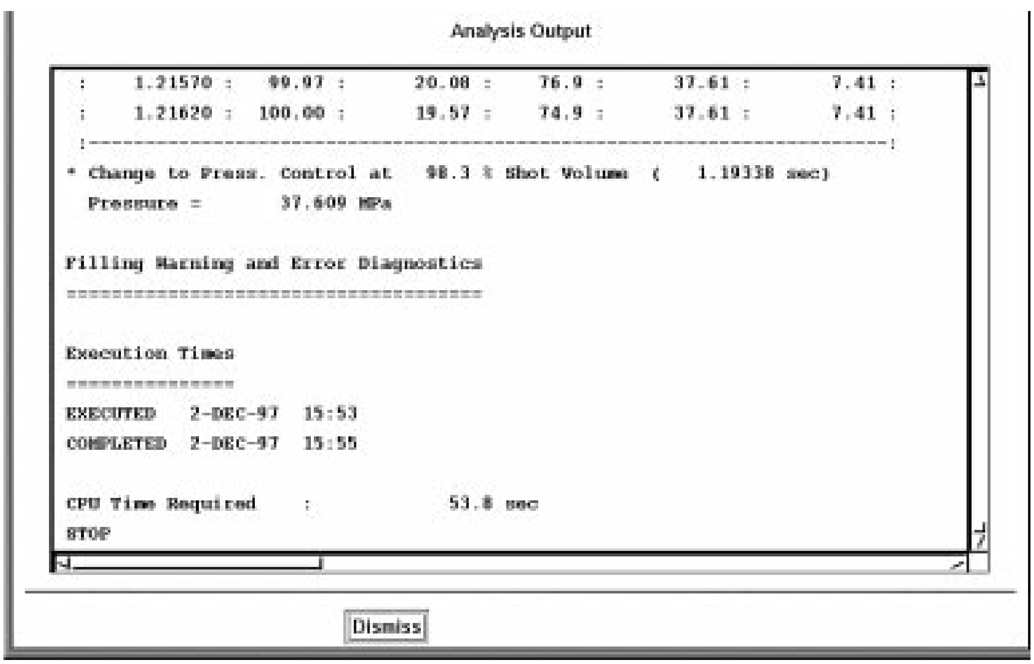


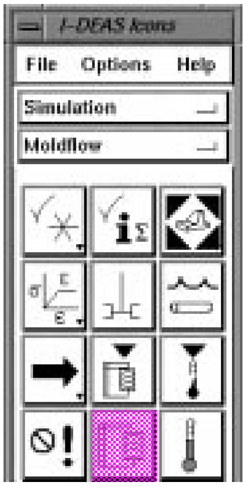


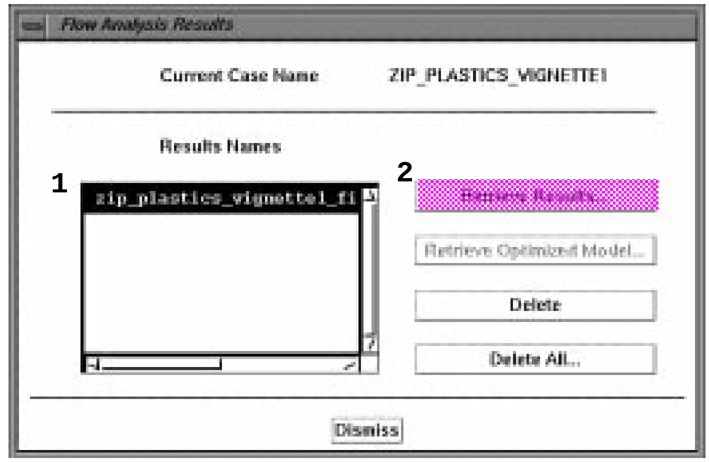
View Analyses...

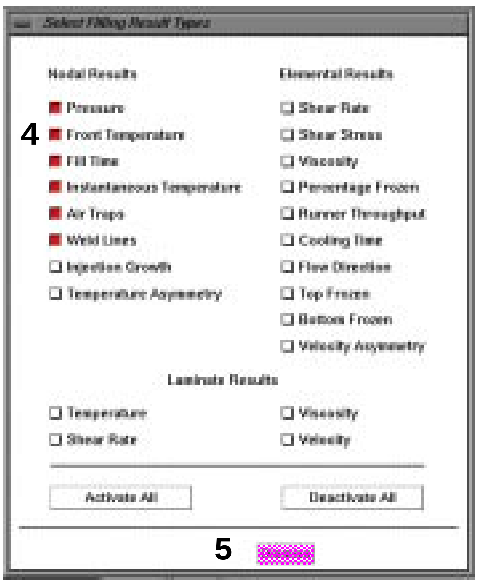
This brings-up a status window that allows you to follow the progress of the run. The runs takes about 2 minutes.

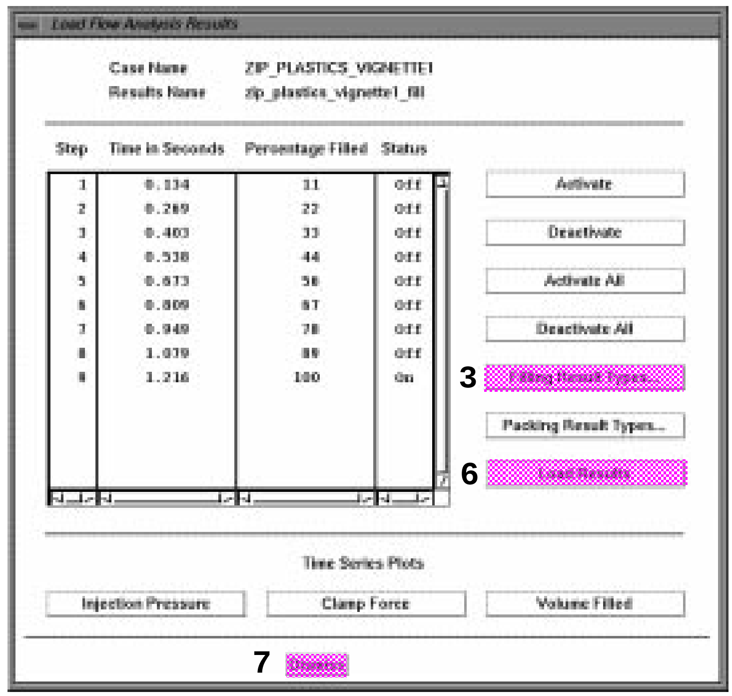
- **Dismiss**





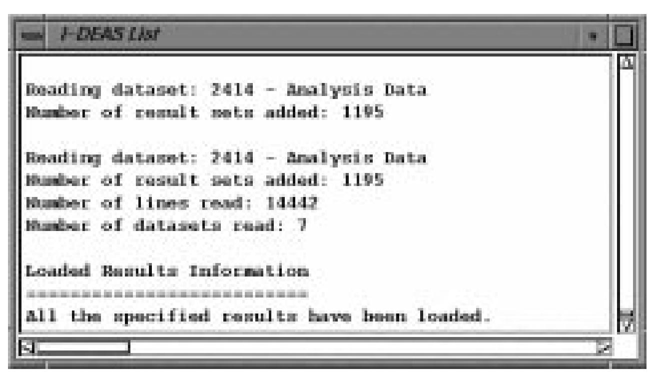






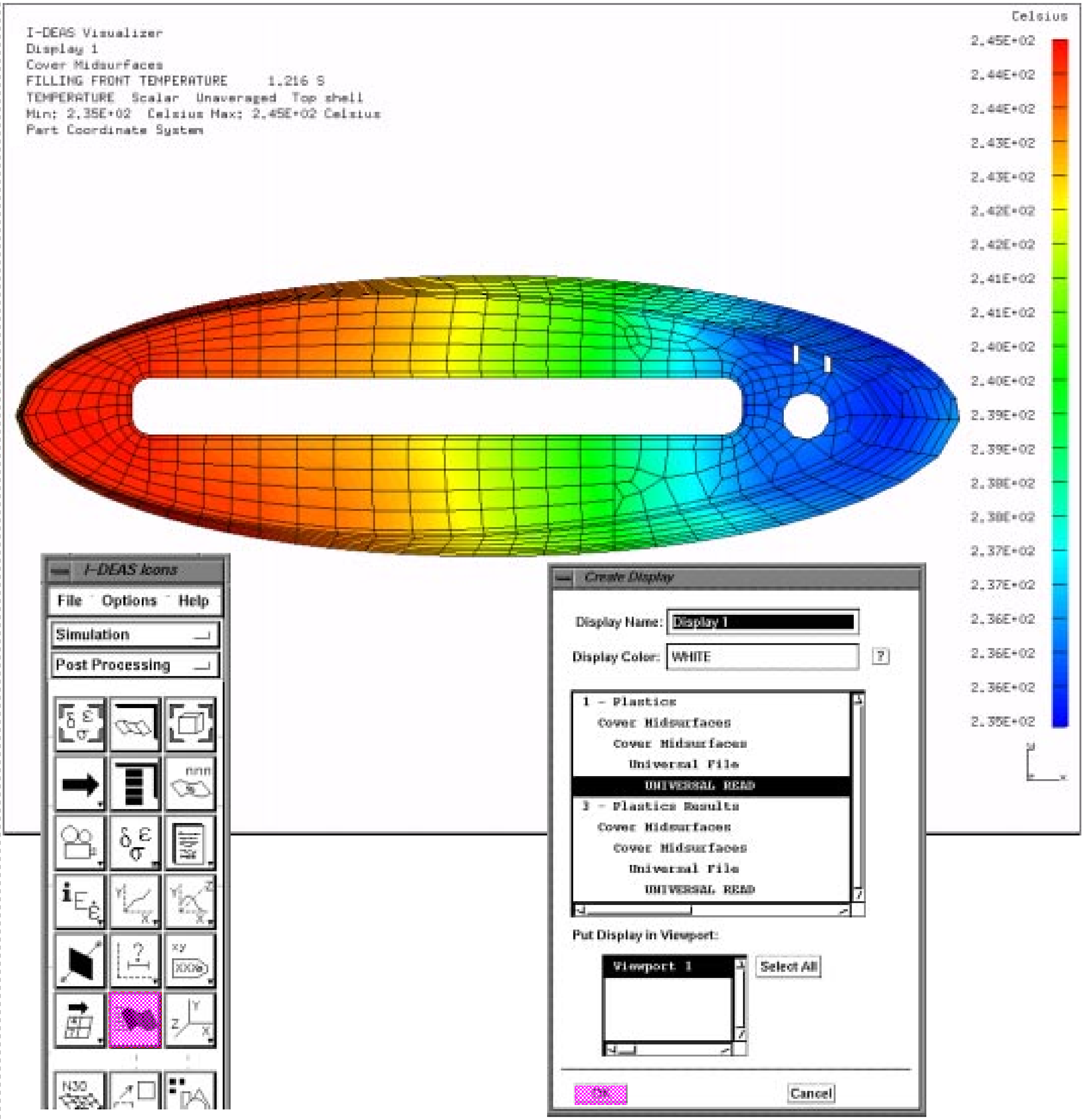
- **Flow Results...**

1. Highlight the 'Results Names'
2. Pick 'Retrieve Results'
3. Hit 'Filling Result Types'
4. Toggle on 'Front Temperature' & 'Instantaneous Temperature'
5. Dismiss
6. Hit 'Load Results'
7. Dismiss



Moldflow ... Post Processing

- **Front View**
- **Autoscale**



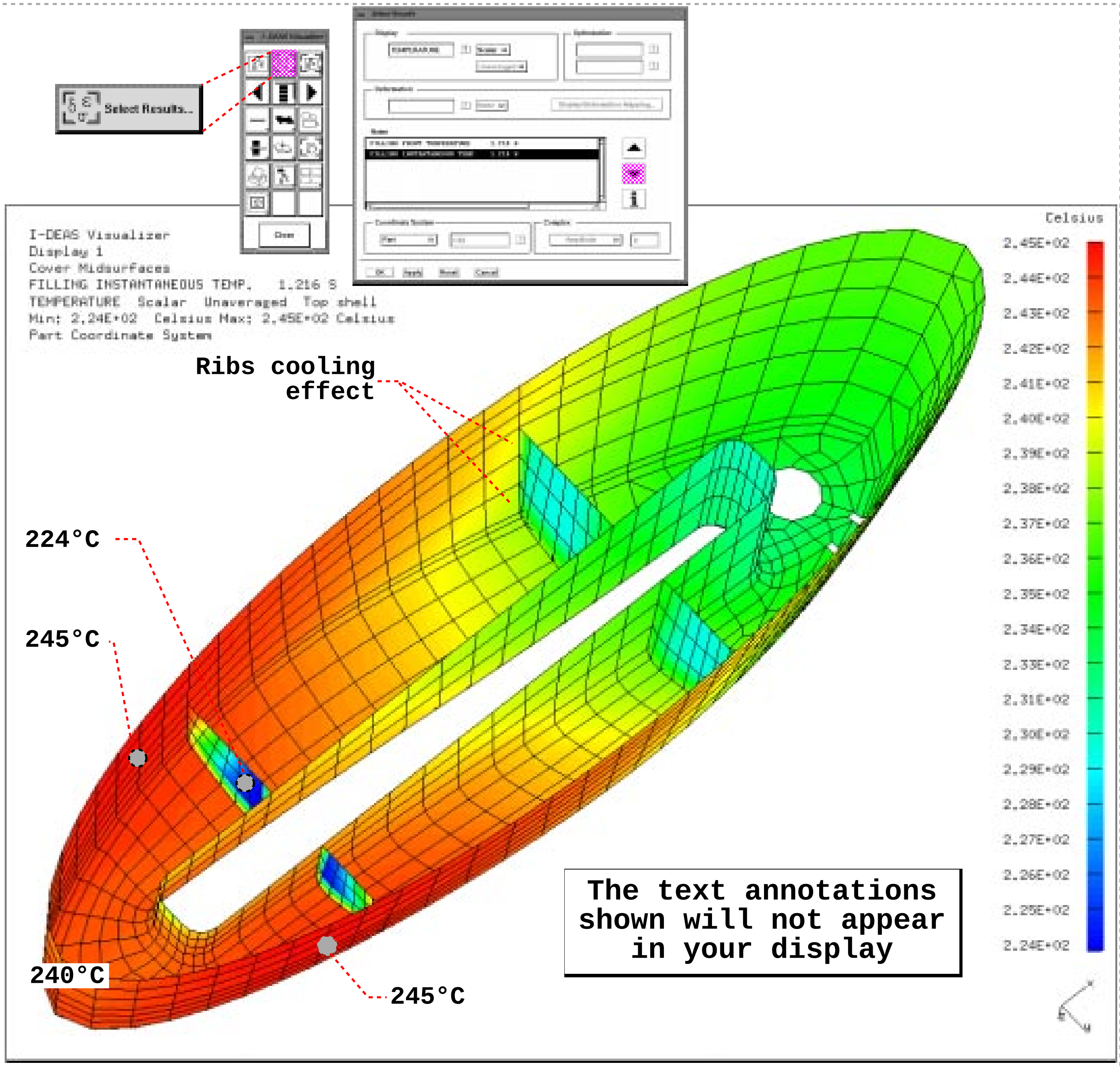
- **I-DEAS Visualizer**

On the ‘Create Display’ form, there are 2 sets of results available. Set #1 is from the live solve you just performed. Set #3 is a pre-solved set. Use set #3 if you did not have the time/inclination to do a live solve.

- Highlight the ‘Universal Read’ from set #1.

- OK

- The graphics change to the ’FILLING FRONT TEMPERATURE’ display.

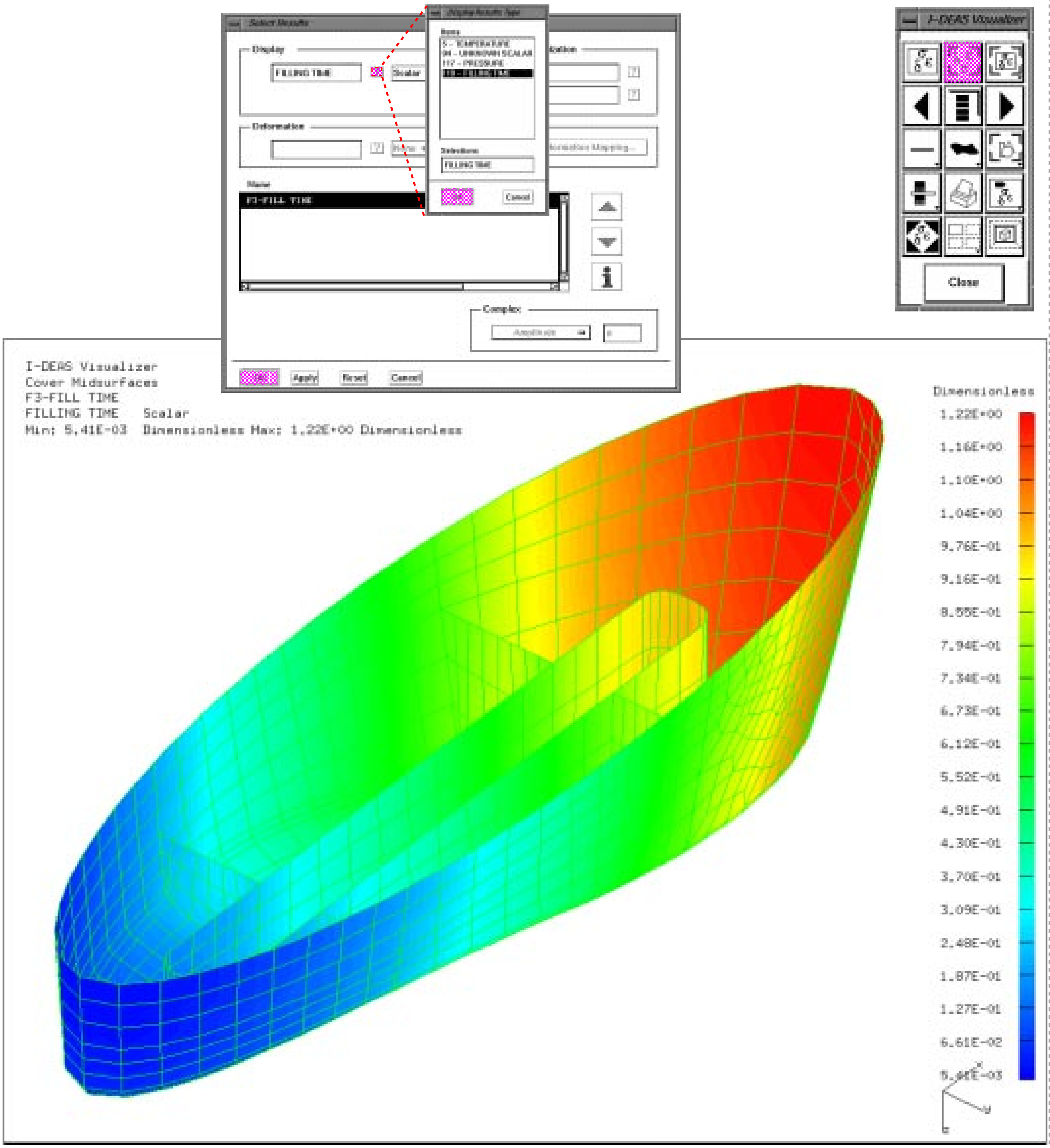


- **Select Results...**

>Change the display from ‘Filling Front Temperature’ to ‘Filling Instantaneous Temp’, by hitting the down arrow. Notice how quickly the display updates.

- Hit ’OK" (Use dynamic viewing to get the view shown)

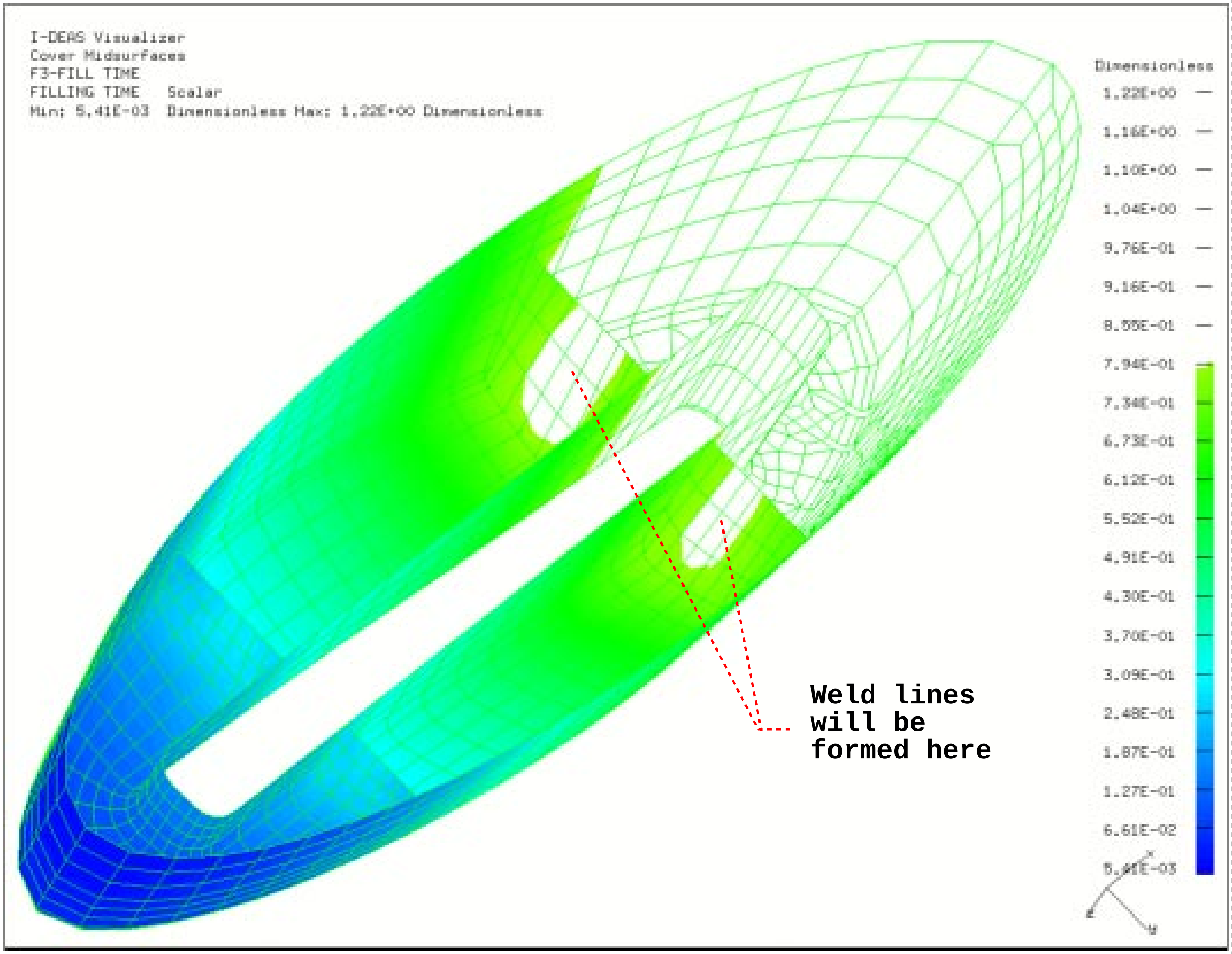
> The contours show that the temperature at the gate is 240°C which is no suprise since the manufacturer recommended melt temp is 240°C. As the front makes its way around the cover, the temperatures rise to 245°C, due to frictional shear heating. Note the cooling effect the ribs have on the cover side walls. Also note the melt temperature of 224°C at the first set of ribs. Even though the contours are blue here, the temp is still above the manufacturer minimum melt temperature of 220°C.

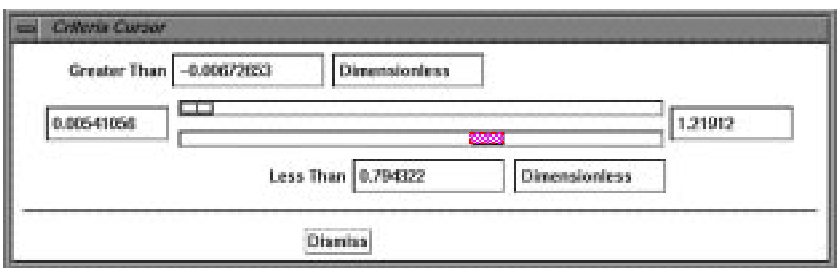


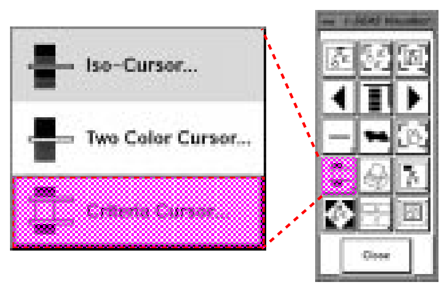
• **Select Results, ?**

Change the display results to ‘Filling Time’, ok.

• The blue contours represent zero time (the gate); the red contours show time 1.22 seconds which is right at our requested time. If we had requested a time that was too long the fill front would have frozen and the part would have shorted (filled partially).







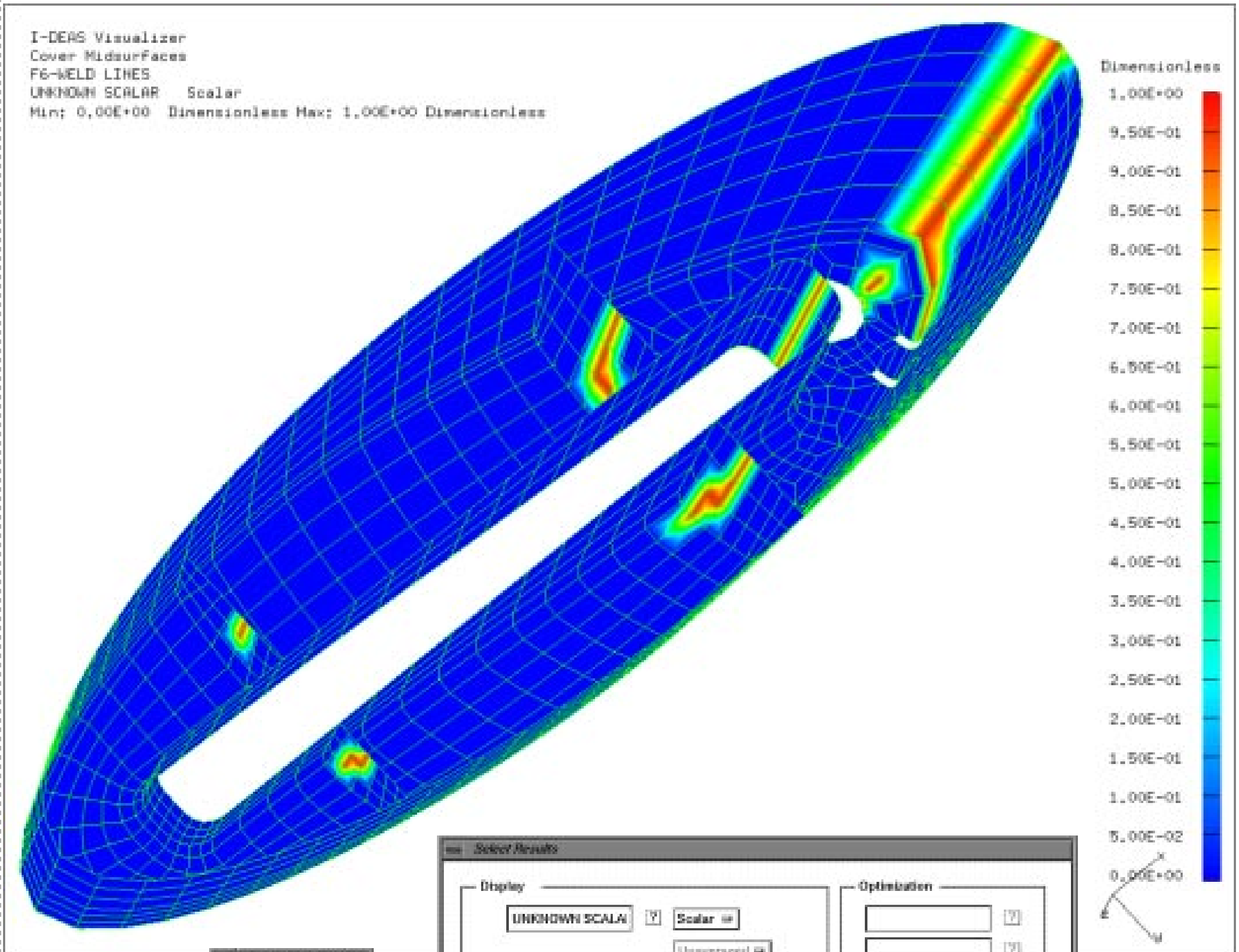
- **Criteria Cursor...**

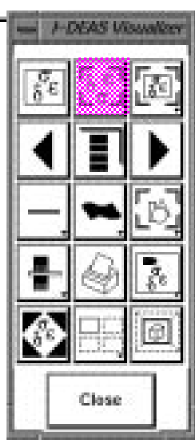
> Pull down to the criteria cursor icon.

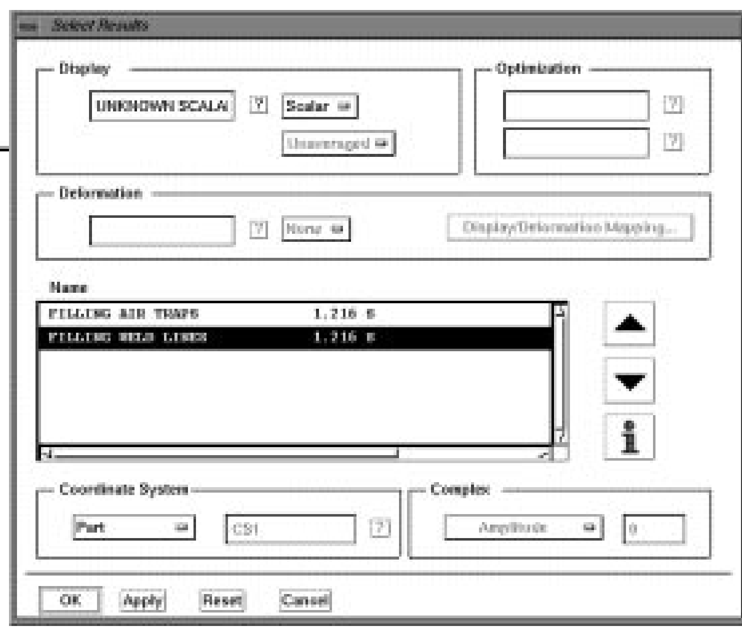
> Slide the lower slider bar all the way to the left.

> Use dynamic viewing to get the view shown.

> Now pull the lower slider bar to the right. As you do, notice that the part 'fills'. Watch as the front collapses on the ribs. This is an area where a weld line will be created. Identify other possible weld line formation areas and air entrapment areas.



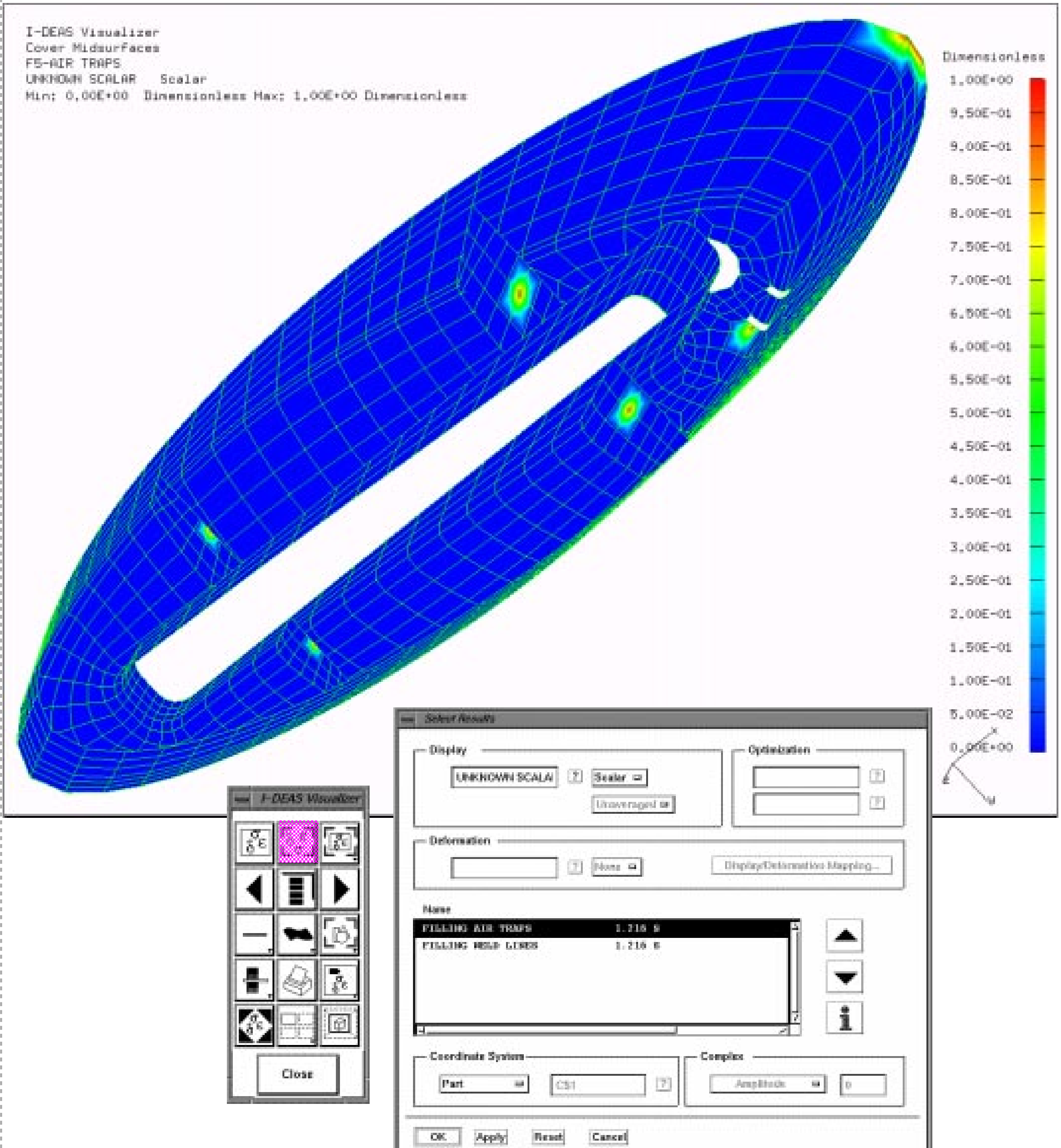




- **Select Results...**

Set the Display to ‘UNKNOWN SCALER’, Name ‘Filling Weld Lines’, ’OK’

> Weld line are formed wherever flow fronts converge. Weld lines are cosmetically undesirable and structurally inferior. Being able to quickly and accurately predict weld line location allows the designer to try multiple gate locations/configurations. Moving the gate or introducing more gates is a typical way of relocating the weld lines.



- **Select Results...**

Change the results type to ‘Filling Air Traps’, ’OK’.

>Understanding where air gets trapped helps the mold designer locate vents. Identifying these locations early helps to minimize mold rework.

***** End of Vignette *****

Time saving suggestions if needed:

1. Skip creating the runner geometry and use a node gate
2. Don’t really solve; there are results already in the model file
3. Skip creating the cooling system. Delete the pre−existing nodes.

Other Comments:

1. Provide feedback to richard.dickerson@sdrc.com