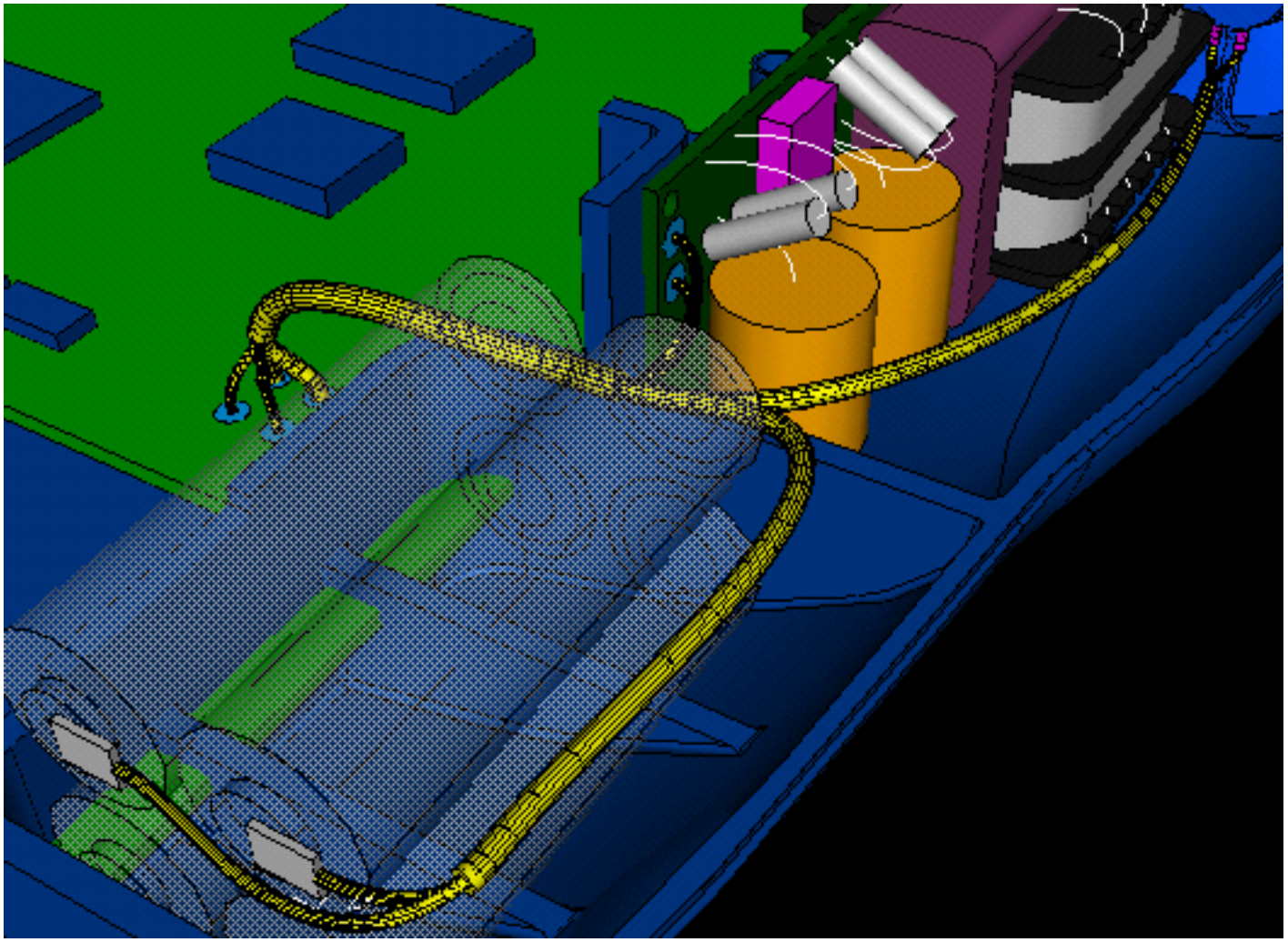
Zip Demo
Harness Vignette



Demonstration Particulars

Installation

- 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 = **Zip_Harness**
  Application = **Design**
  Task = **Harness**

Files:

Model files Unix	Zip_Harness.mf*
Model files NT	Zip_Harness_nt.mf*
SGI Showcase documentation	Zip_Harness.sc
Printable documentation Postscript files	Zip_Harness_xx−xx.ps

Notes on running in a team environment

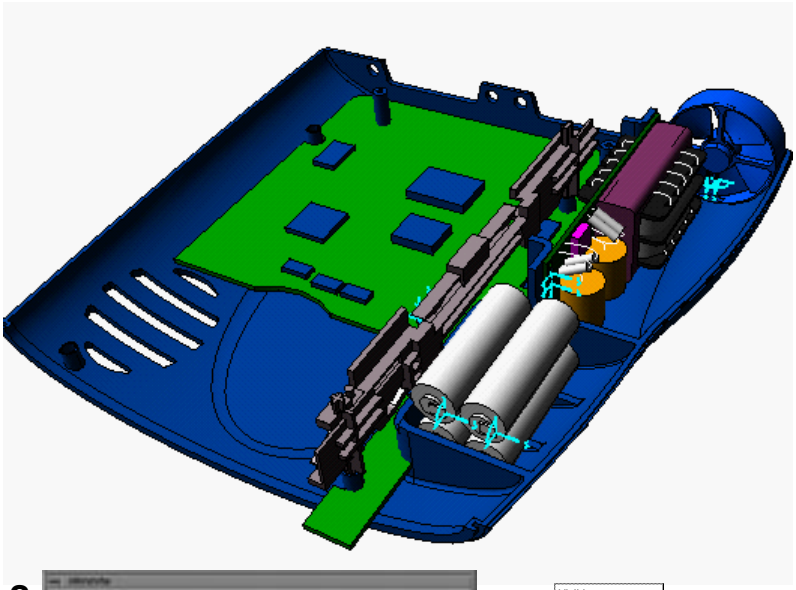
The demonstration begins with a the Zip Drive Assy shown in a ‘pruned’ state. The pruning is predone with no relations to any library, which is appropriate for this standalone vignette

If you are running in a team environment, live, with the ws1 and ws2 seats, import the model file into the Zip project and then delete everything except the harness. You should then get from library and prune the Zip Drive Assy to get the same start assembly. (If you instance the harness at the top level (as is done in this standalone version), then you will have to have the Zip Drive Assy checked out.)

Notes:

1. This material was developed with I−DEAS MS5m2
2.

Note: You may want to complete this step prior to the start of your presentation



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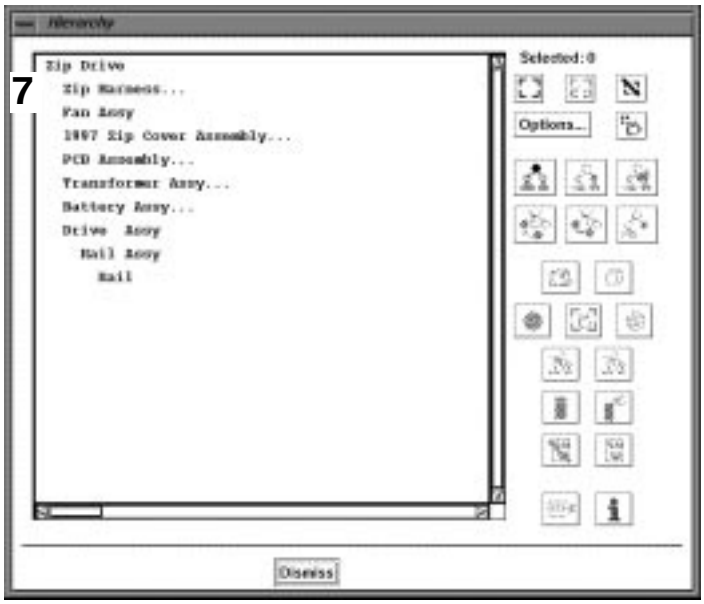
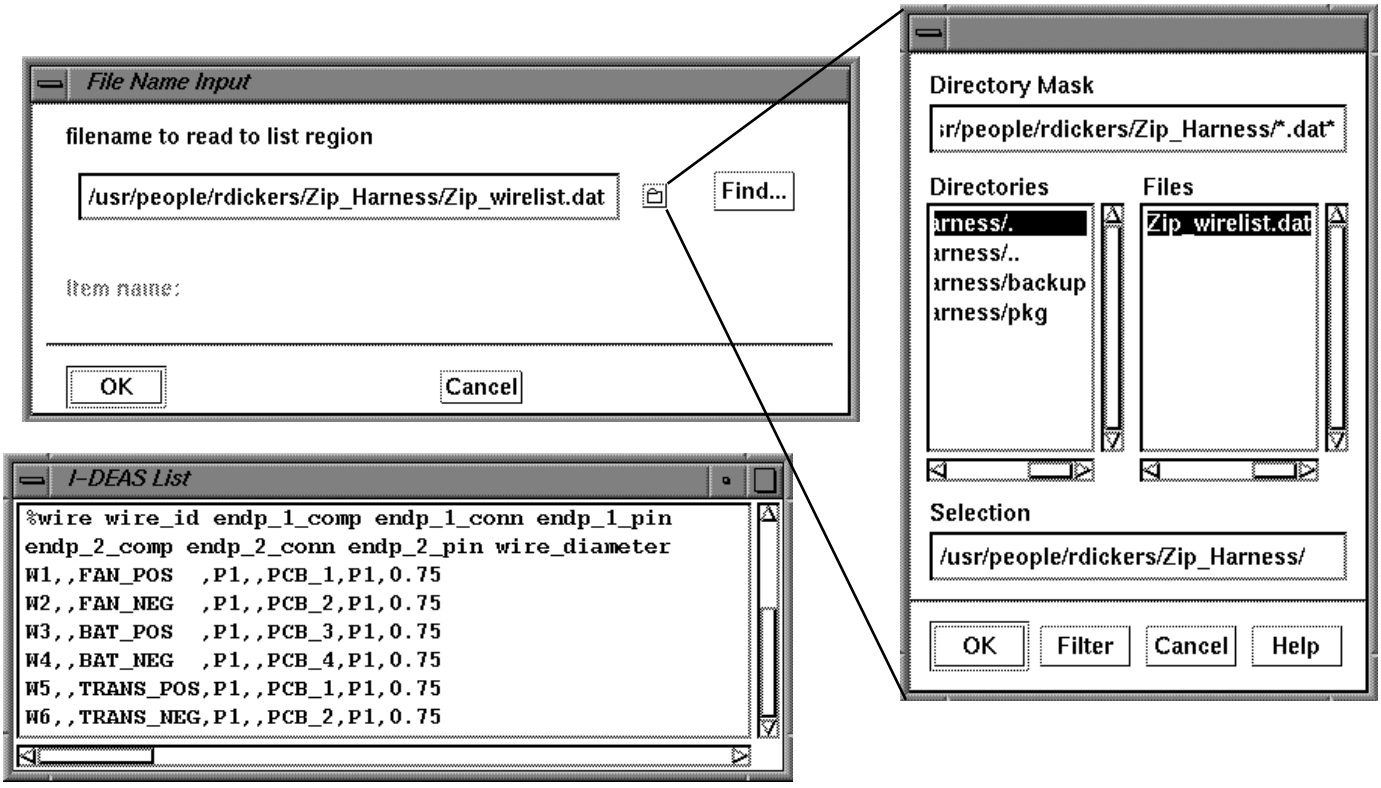


- **Hierarchy**

>Instance the ‘Zip Harness’ onto the top level of the ‘Zip Drive Assy’
1. Pick ‘Hierarcy Icon’
2. Select top level assy
3. Pick ‘Add to Assy’
4. MB3, Get,
5. From_Bin
6. Select ‘Zip Harness’ from ‘Harness’ bin, OKAY
7. Your Hierarchy should look like this now.

- **Update** 



Creating a wire harness is the process of converting the electrical schematic into a (digital) physical mock-up.

1. In this presentation, you will start with a wirelist that has been created by the ECAD group.

2. You will read the wirelist into I-DEAS where it will be instanced into an assembly.

3. You will assign connectors, which is the process of telling I-DEAS which solid parts correspond to the connector names in the wirelist.

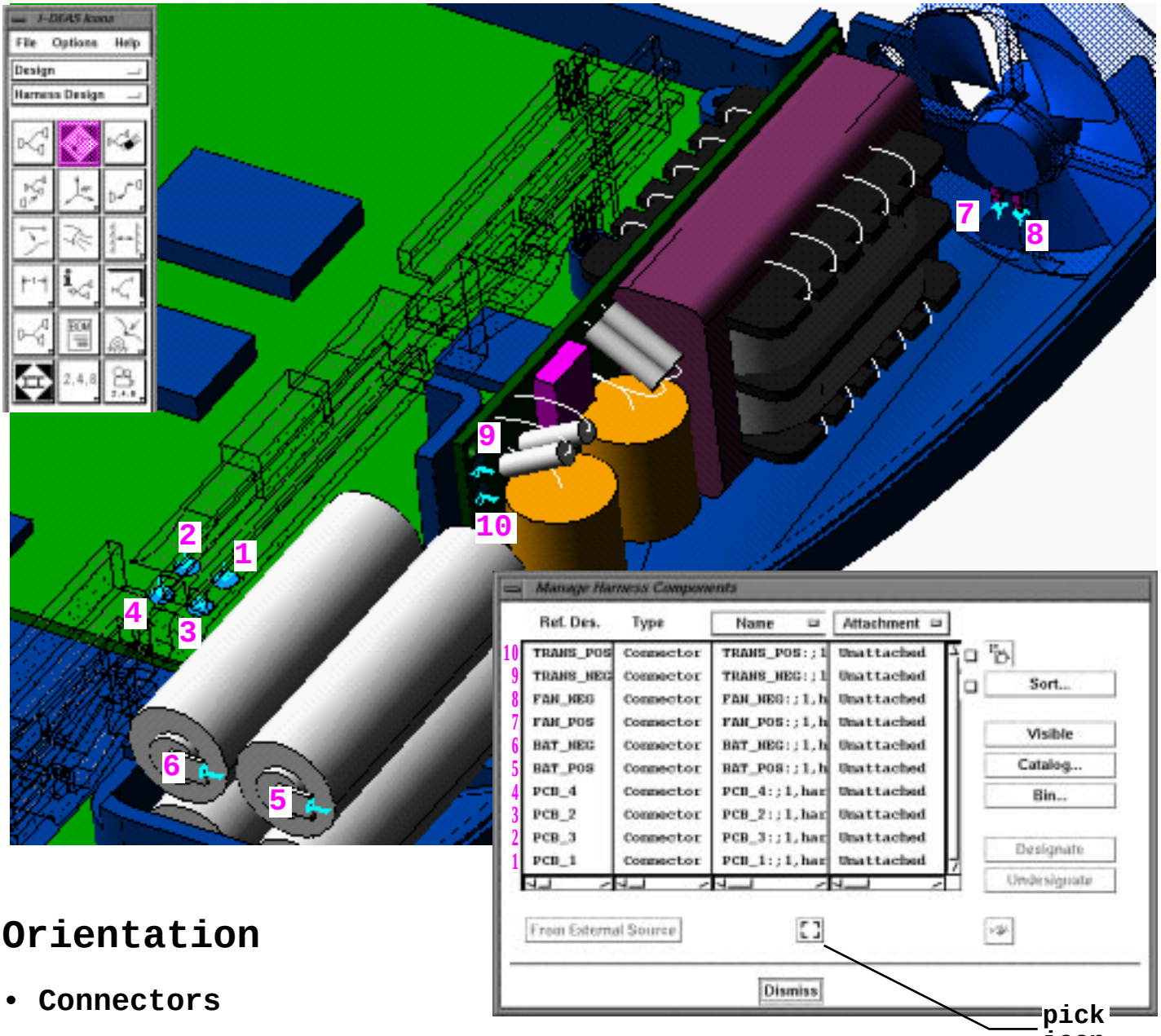
>The three preceeding steps have already been performed. Be aware of this in case someone asks. Also, a wire harness does not have to start from a wirelist. You can create paths and manually assign bundle diameters.

- **'xq'**

>Typing 'xq' will bring-up a dialog box. Put the name of the wirelist, 'Zip_wirelist.dat' in the 'File Name input' box.

>The wirelist is output in the I-DEAS List window.

- **Master Assembly ... Harness Design**



Orientation

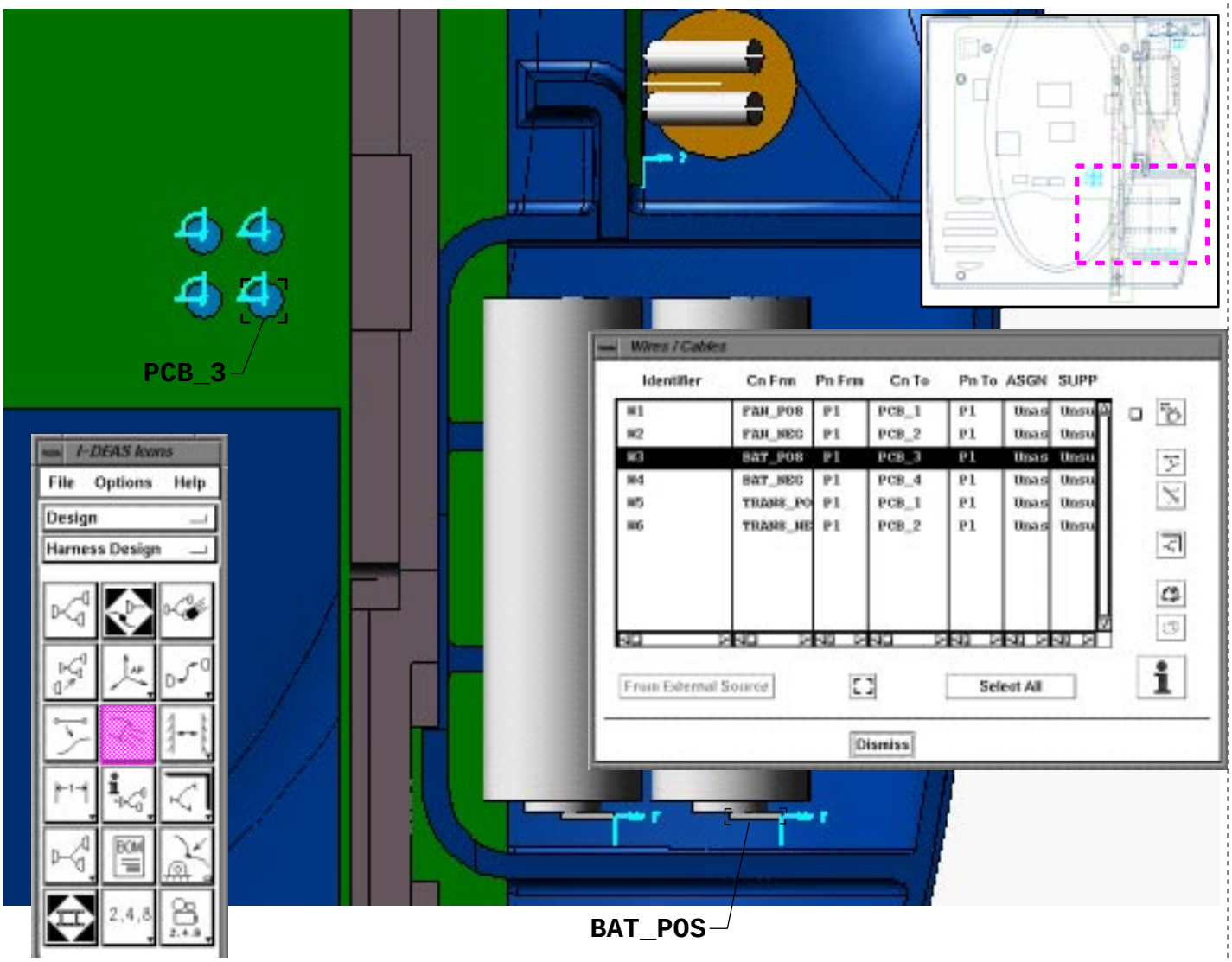
- **Connectors**

>Show the 'Manage Harness Components' form. The data on this form comes from the wirelist. Our goal is route paths that will represent electrical connections called-out in the wirelist.

>Note that as you pick 'Reference Designators' names on the form the corresponding part is highlighted (in the graphics window) with a bounding box.

>Alternatively, you can use the pick icon from the form, pick graphically and have the corresponding name highlight on the form.

>> Graphics highlighting keeps the designer informed. Because of the bounding box dispay, it is obvious which parts correspond to the names from the wirelist.

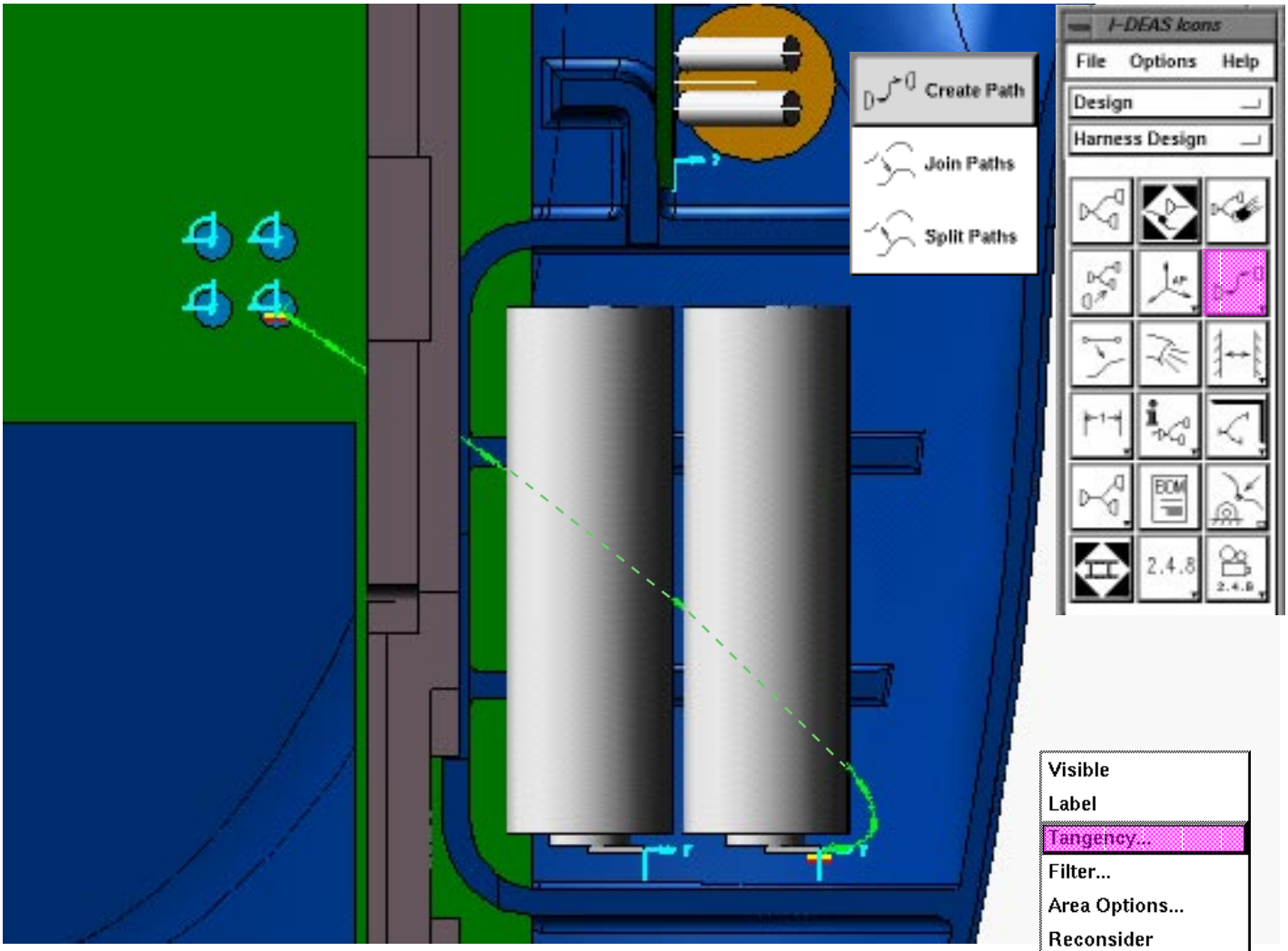


- **Wires/Cables**

>Point out the cross referencing that occurs between the information on the forms and that on the screen.

>In this example, picking wire 3 on the form causes bounding boxes to appear around the 'BAT_POS' connector and the 'PCB_3' connector. This helps the designer understand how to create the proper routes.

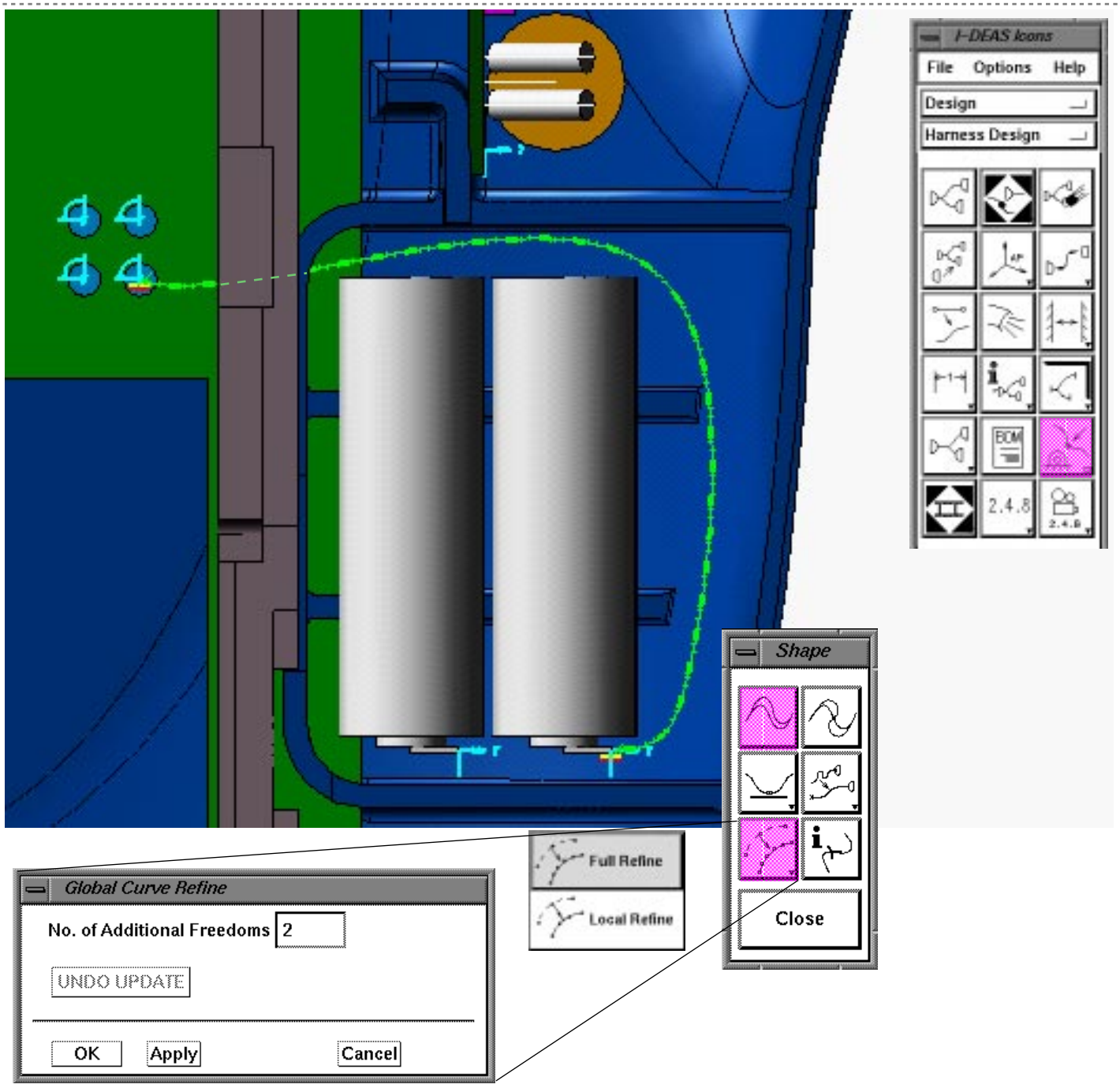
>> The benefit is that the designer does not have to guess which physical connections represent the logical connections. This saves time and helps eliminate mistakes.



- **Create Path**

>Create a path from the ‘BAT_POS’ connector to the ‘PCB_3’ connector. During the creation process, use MB3 to verify that ‘Endpoint/thru-point tangency’ is on.

>>Design rules like endpoint tangency simplify the task of making the digital mock-up accurately represent the real model. In general, wires bend fluidly (as shown at the ‘BAT_POS’ connector). I-DEAS represents this condition with no interaction from the designer.

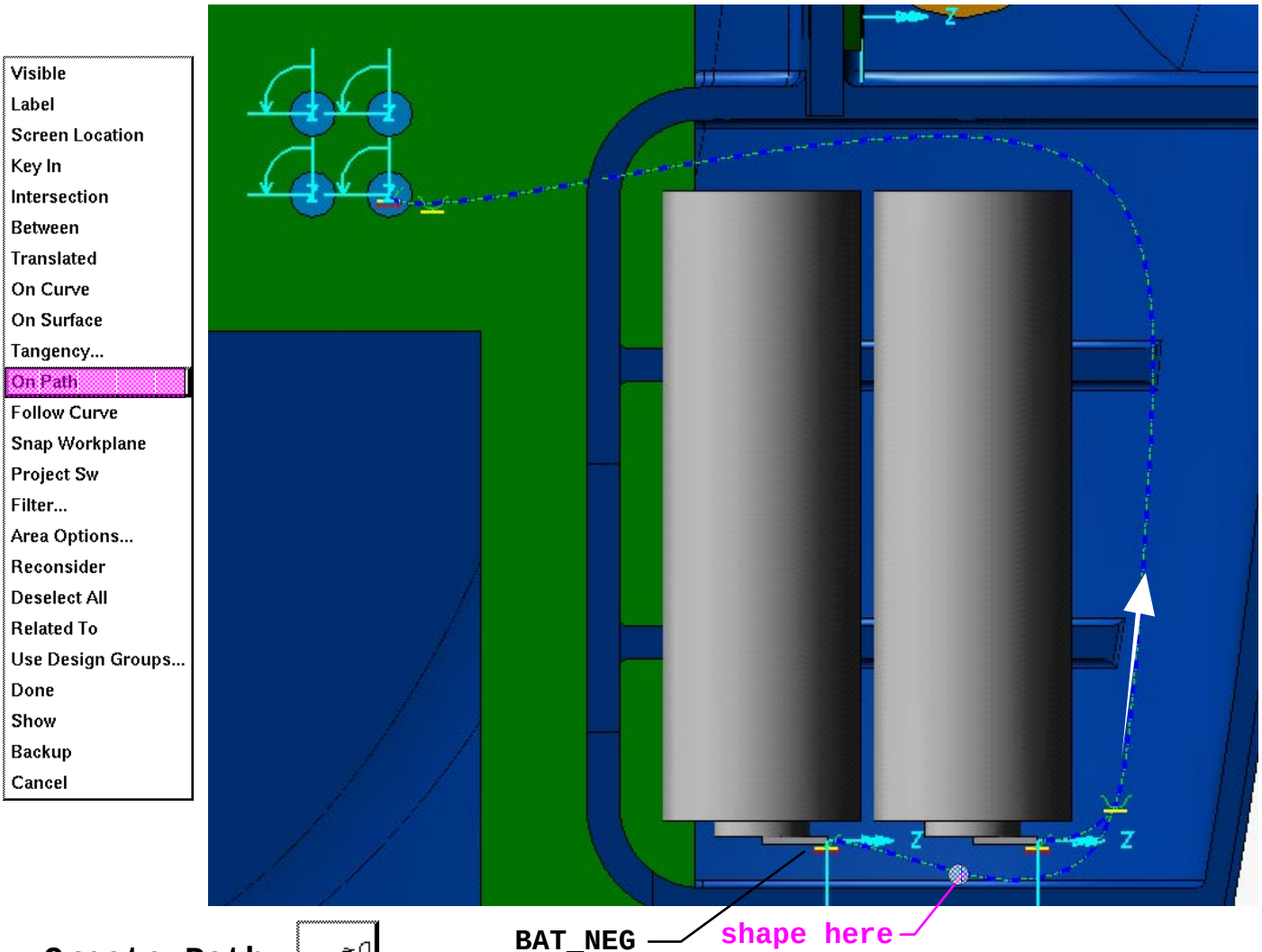


- **Full Refine**

>From the shape palette, add 2 DOF to the path. This will make the path more shapable.

>Use the 'Drag Point' icon to shape the path around the battery as shown. Shape in the view plane. Add other DOF as necessary to get the path to shape as desired.

>>The ability to dynamically shape the wire harness paths is unique. This powerful functionality allows the designers to interact with the geometry



- **Create Path** 

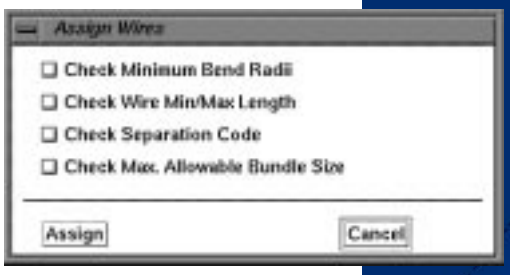
> Pick ‘BAT_NEG’ connector (notice bounding box on ‘PCB_4’)
> MB3, ‘On Path’, slide along existing path and pick at the approximate location shown
> Verify tangent arrow direction.

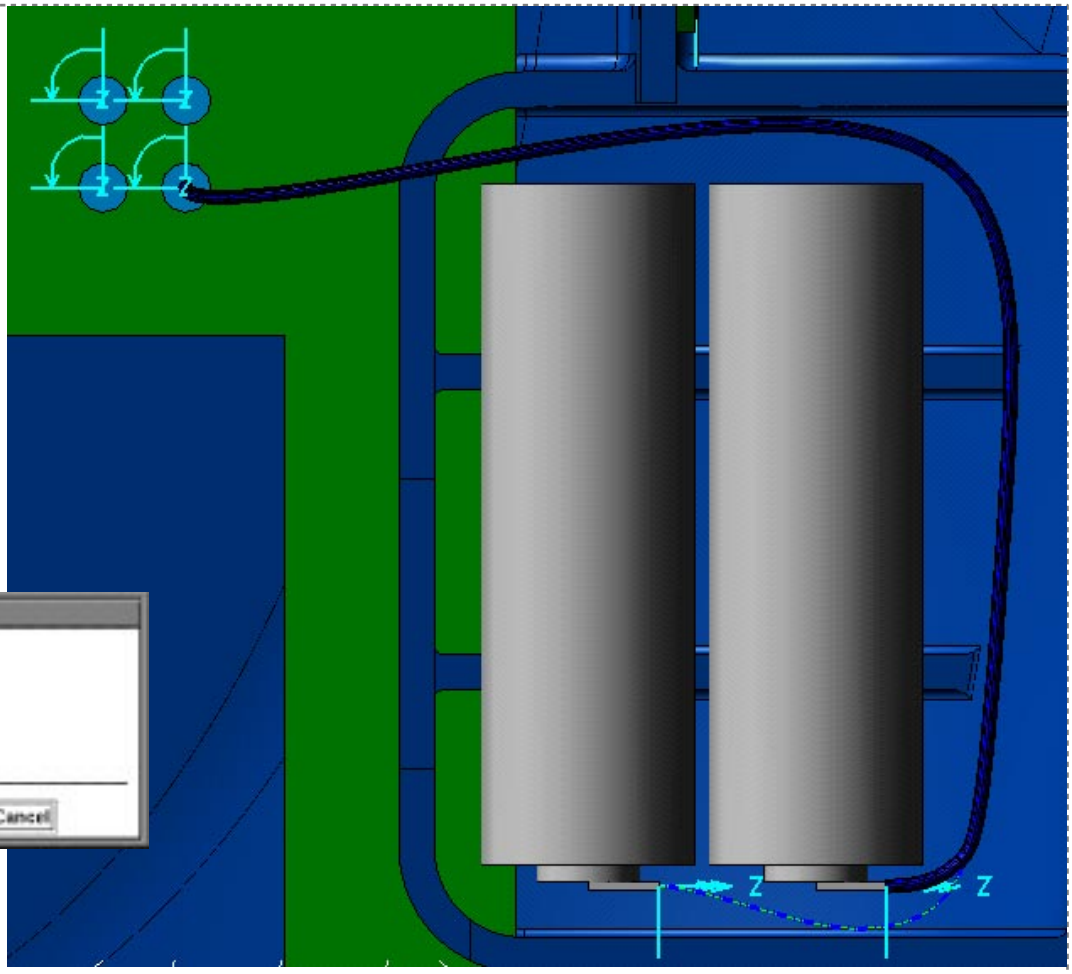
- **Drag Point** 

> Shape the newly created path. Pull it away from the ‘BAT_POS’ connector using tools from the shape palette.

>>The designer can see the destination connector(s) during the route operation. The default path splice tangent direction is also previewed graphically. Extensive graphics inform the designer helping to identify errors early.

The designer routes paths rather than individual wires. This time saving technique allows many wires to run along the same path.





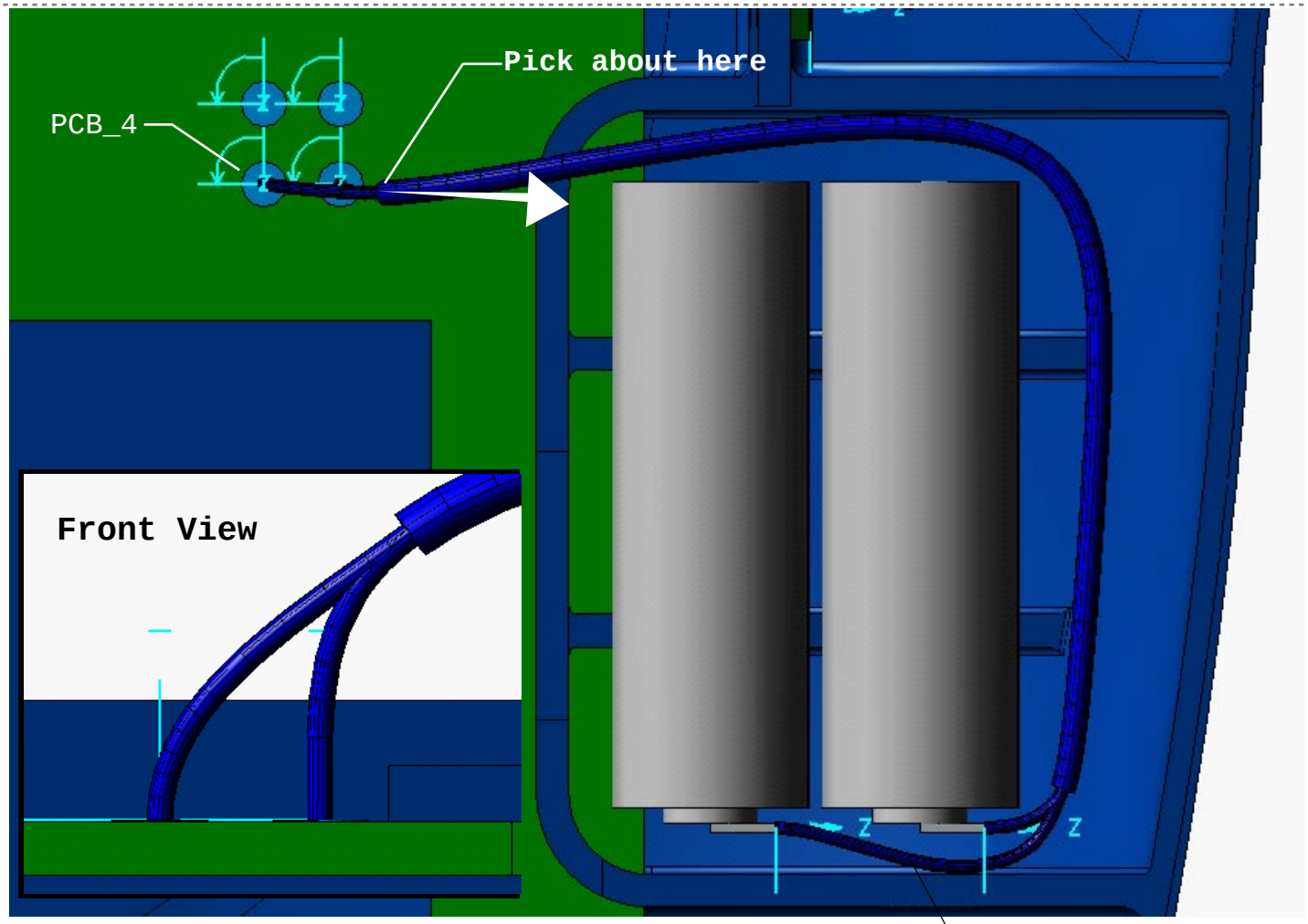
- **Assign Wires**

> Verify that all of the checks are off.
> The path from the battery to the PCB board is thickened. Notice that the 'BAT_NEG' path did not get assigned. This is correct as there is no connection on the PCB board yet, i.e., the destination is not yet connected

- **Appearance** 

>Double click on the harness path, MB2. Set the 'Calculated/Assigned' color to a color that shows-up well against the mostly blue parts. I usually use yellow. [For this documentation (which is done against a white background), blue is used].

>>I-DEAS checks the wirelist before assigning wires to paths. If a path exists, yet no signal runs along that path, then no wire assignment is made. If only part of a path exists, then no wire assignment is made. This helps eliminate errors.



- **Create Path** 

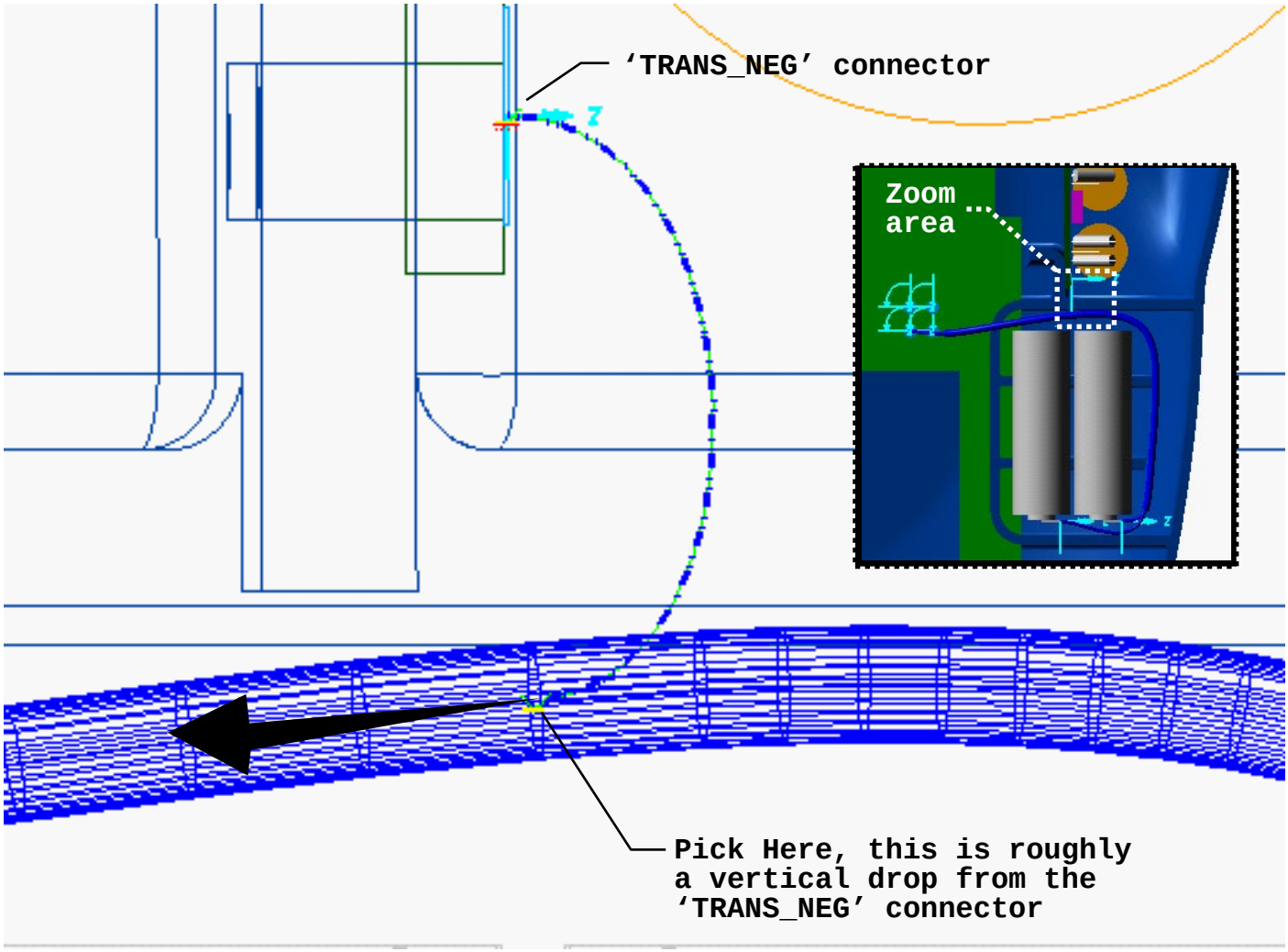
> Pick ‘PCB_4’
> MB3, ‘On Path’, slide along existing path and pick at the approximate location shown. There is nothing "hard" to pick here...just eyeball a pick near the location shown.
> Verify tangent arrow direction to be the same as that shown.

As you create paths by picking on existing paths, I-DEAS automatically splits the path at the pick location. Keep this in mind as new paths are spliced in. It is good practice to co-locate all the splices. This will make sense once you create the paths on page 13.

- **Assign Wires** 

> Notice that wires are now assigned to the ‘BAT_NEG’ path.
> Notice the bundle diameter change. These diameter changes are scaled to the wire diameter.

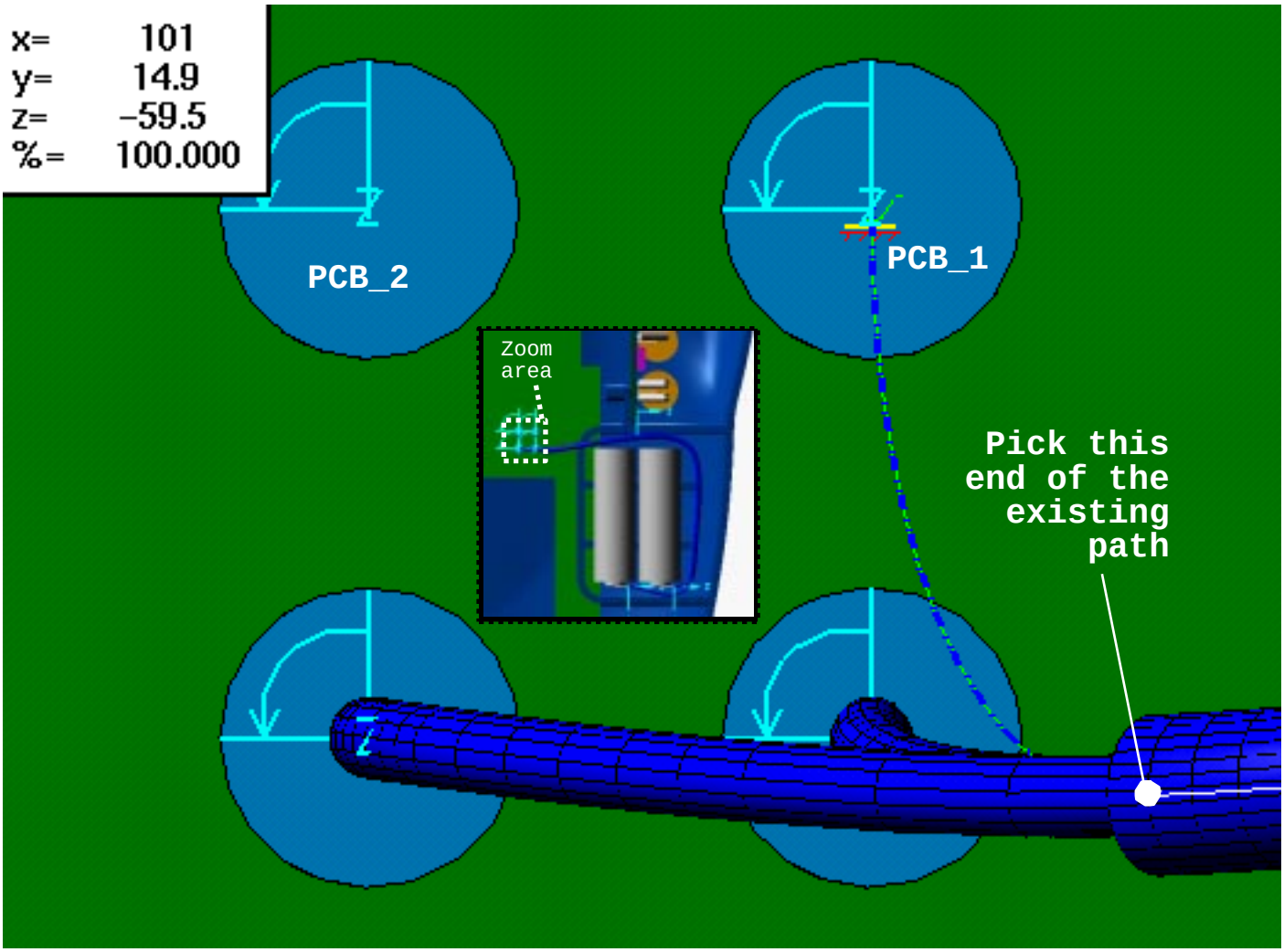
>>I-DEAS represents the bundles per the wire diameters specified in the wirelist. If the ECAD engineer mis-specified a wire diameter, you would catch it using I-DEAS, thus saving time and money. Using I-DEAS, you will return your company to profitability.



- **Top View** 
- **Zoom in around area shown**
- **Create Path** 

> Pick the 'TRANS_NEG' connector (it is the one on top)
> MB3, 'On Path', slide along the existing path and pick in the approximate location shown by the arrow.
> Verify tangent arrow direction to be the same as that shown.

>>Because of the interactivity you have with the Harness Design product, you can quickly create smooth paths

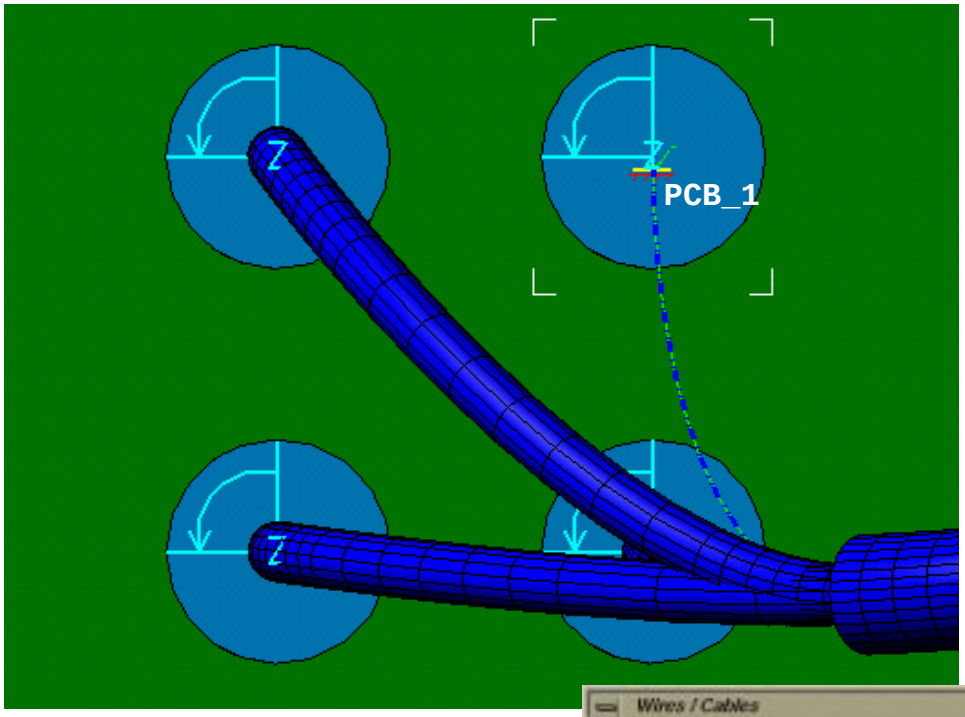


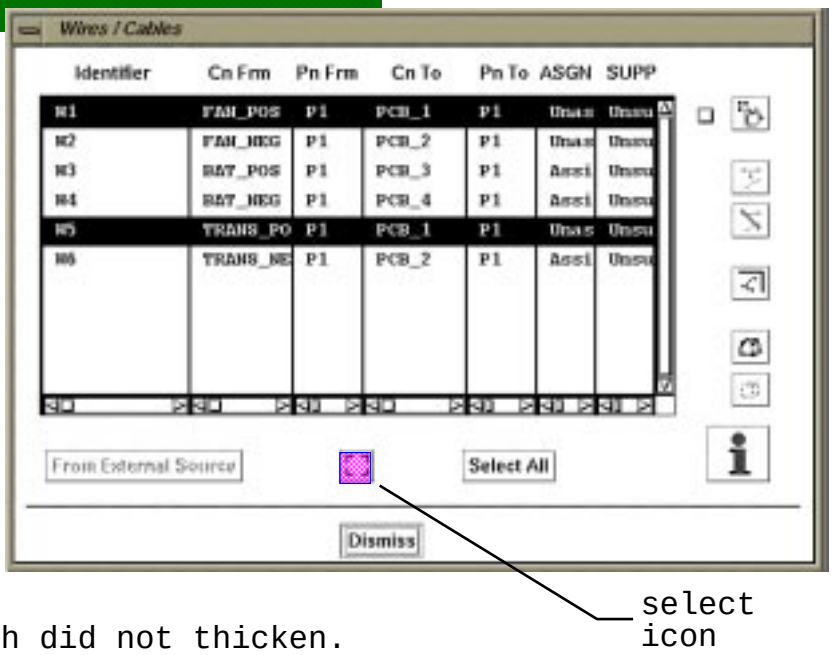
- **Top View**
- **Zoom in around area shown**
- **Create Path** 

> Pick the ‘PCB_1’ connector
> MB3, ‘On Path’, slide along the existing path and pick at the "end". The odometer should read 100%.

- **Create Path** 

>Repeat the above for the ‘PCB_2’ connector





- **Assign Wires** 

> Notice that the ‘PCB_1’ path did not thicken.

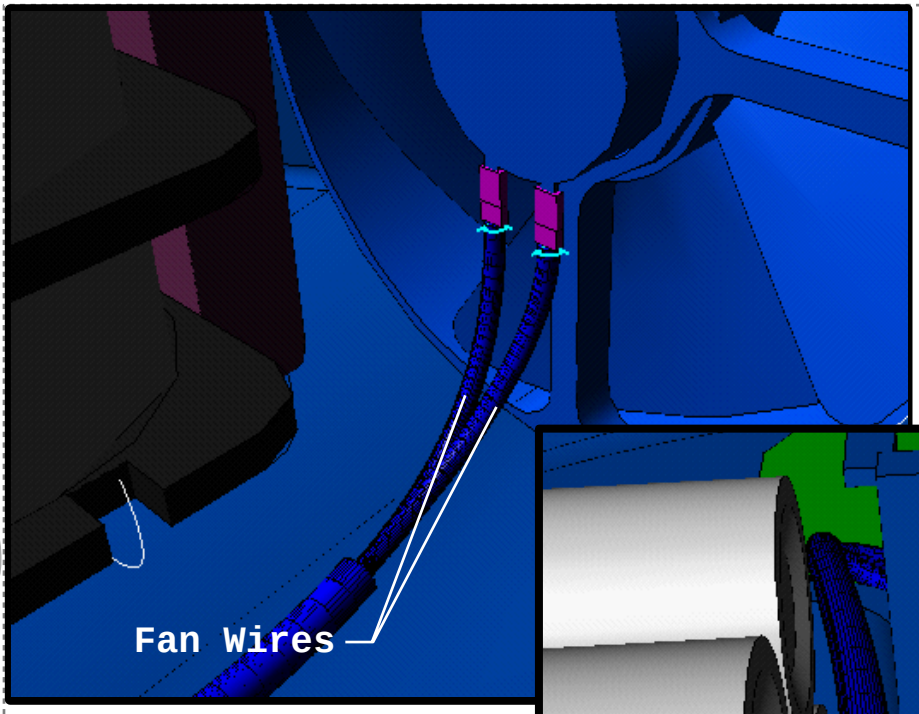
>Interrogate the ‘PCB_1’ connector.

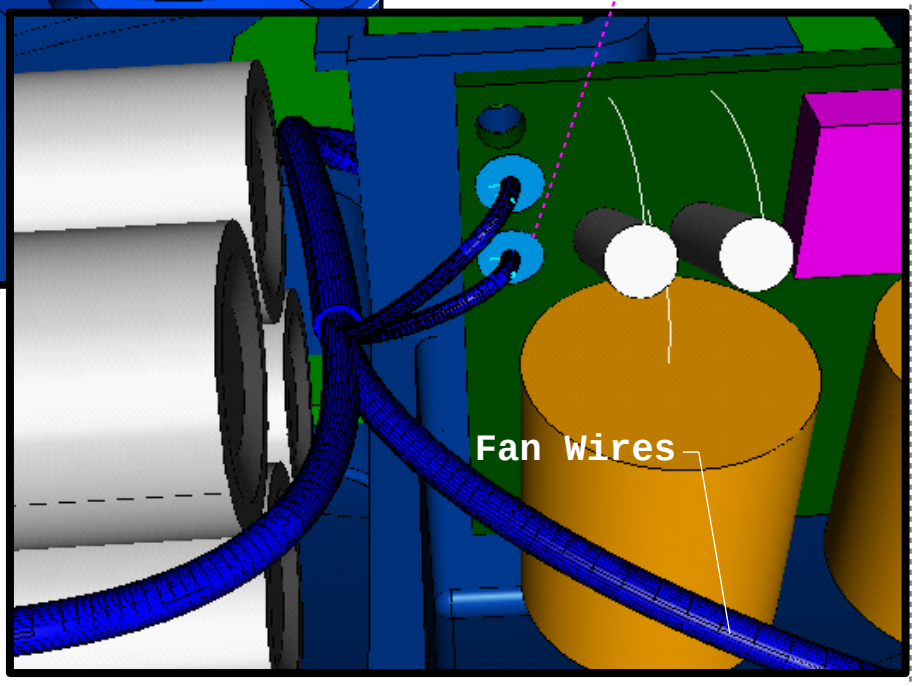
- **Wires/Cables** 

> Hit the select icon from the form
> Select the ‘PCB_1’ connector (it will show a bounding box), MB2
> Notice the form shows two highlighted wires. Both wires are ‘Unassigned’ because the ‘FAN_POS’ and ‘TRANS_POS’ connections are not yet made.

- **Dismiss**

>>Another example of early problem diagnosis made possible by the coupling of form data to screen graphics data.



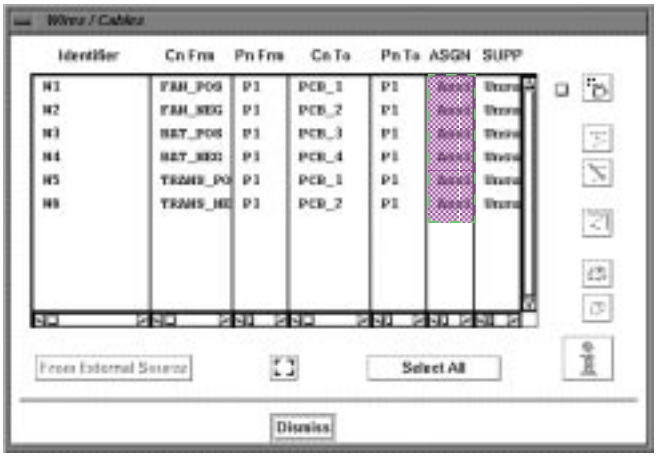


•Create Path 

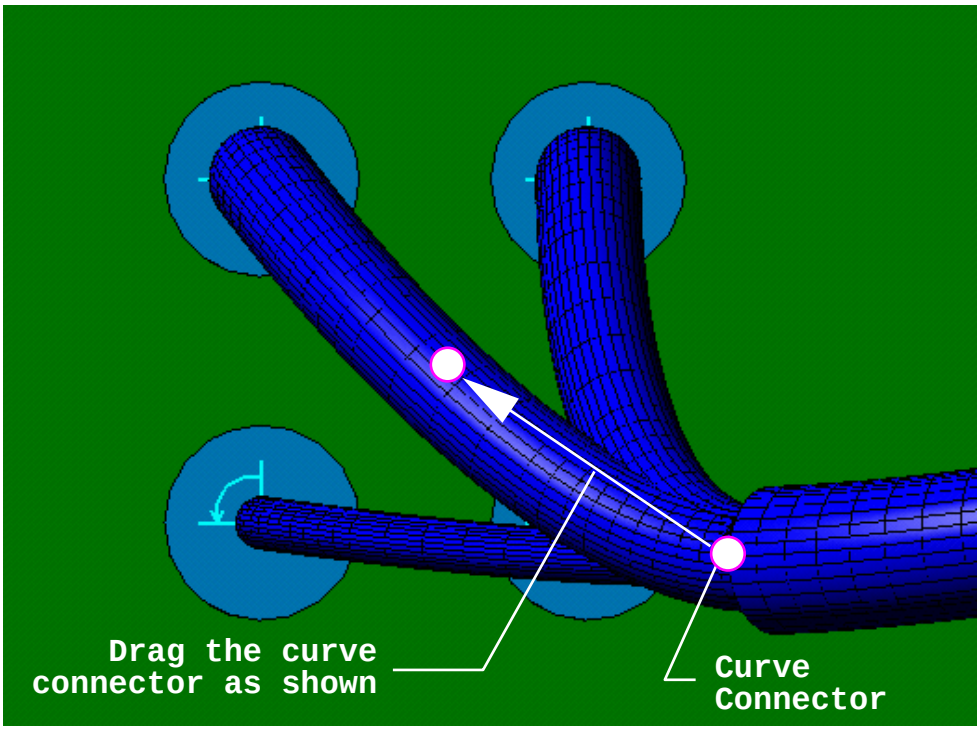
> Finish creating the paths using the previously shown techniques.

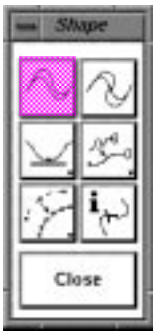
•Assign Wires 

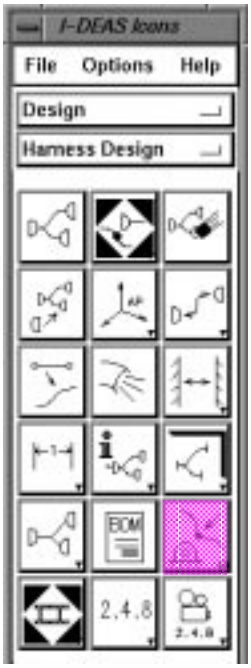
>All of the wires are now assigned.

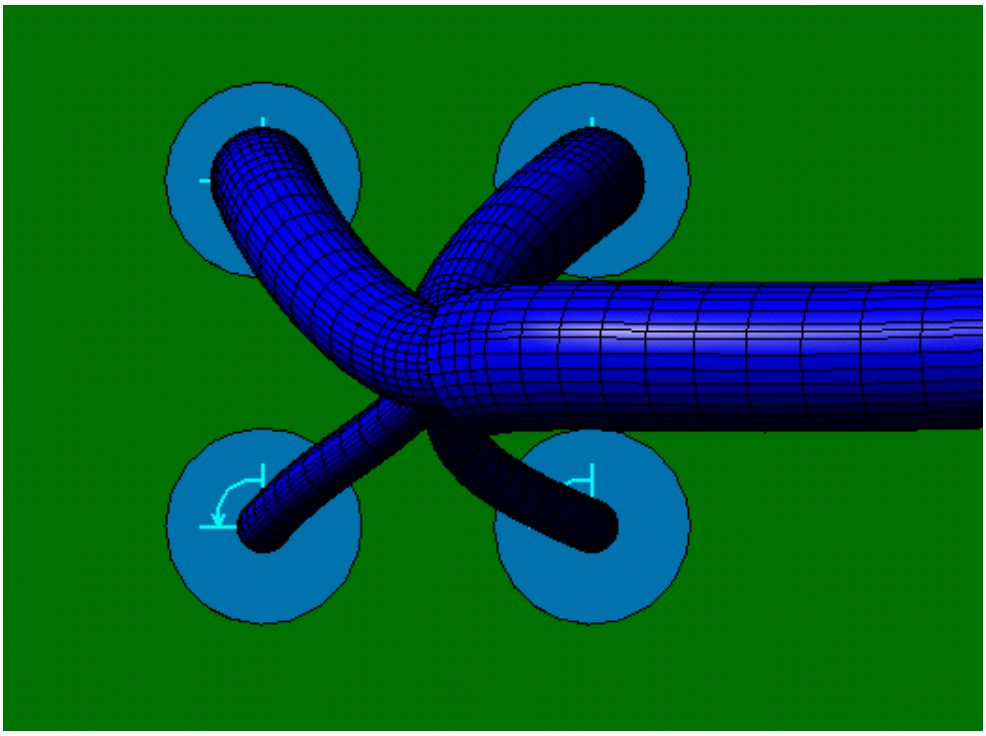


****Not shown or discussed in this vignette but worthy of mention.... During the assignment process, you can have I-DEAS check for violation of 4 design rules as shown on the form. If the path violates one of the design rules then no wires are assigned. This is another example of the intelligence built into the Harenss Design Package.**





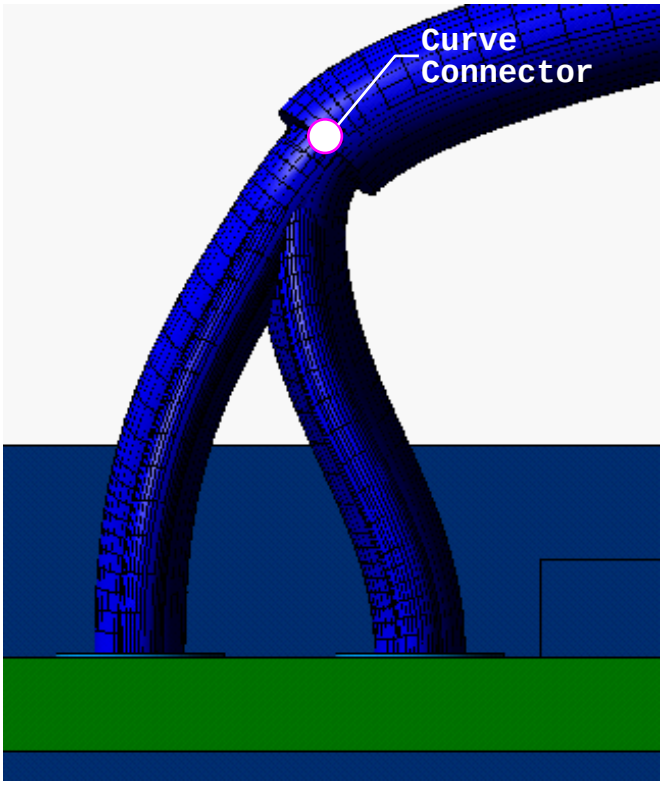


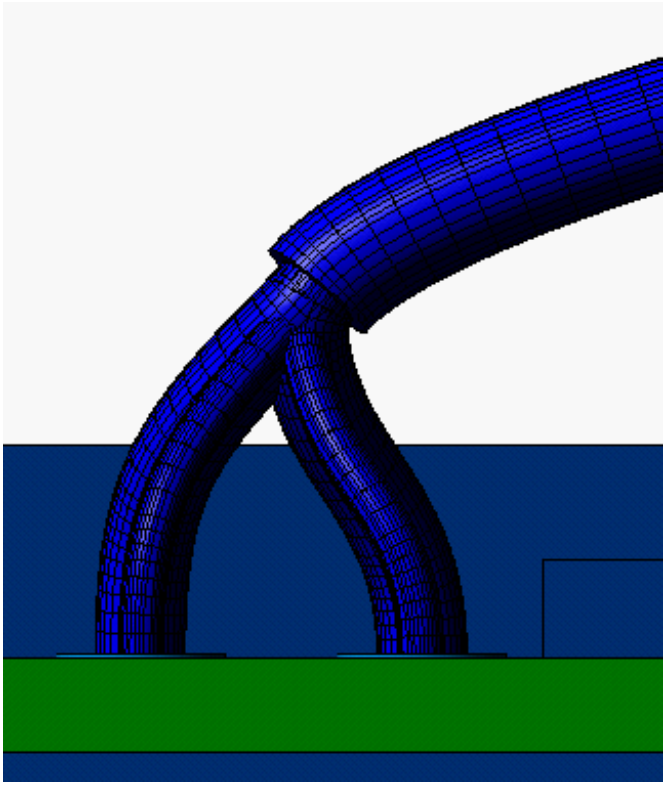


- **Top View**
- **Zoom** (zoom around the 4 PCB connectors)
- **Drag Point**

>From the Shape palette, Pick the curve connector and drag it to the middle of the 4 PCB connectors. Shape in the view plane. You might want to perform this step in line display mode.

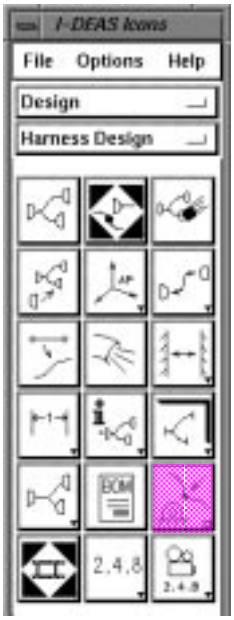
>>I-DEAS has the intelligence to know that moving a junction point requires adjusting all the paths that run through the junction.



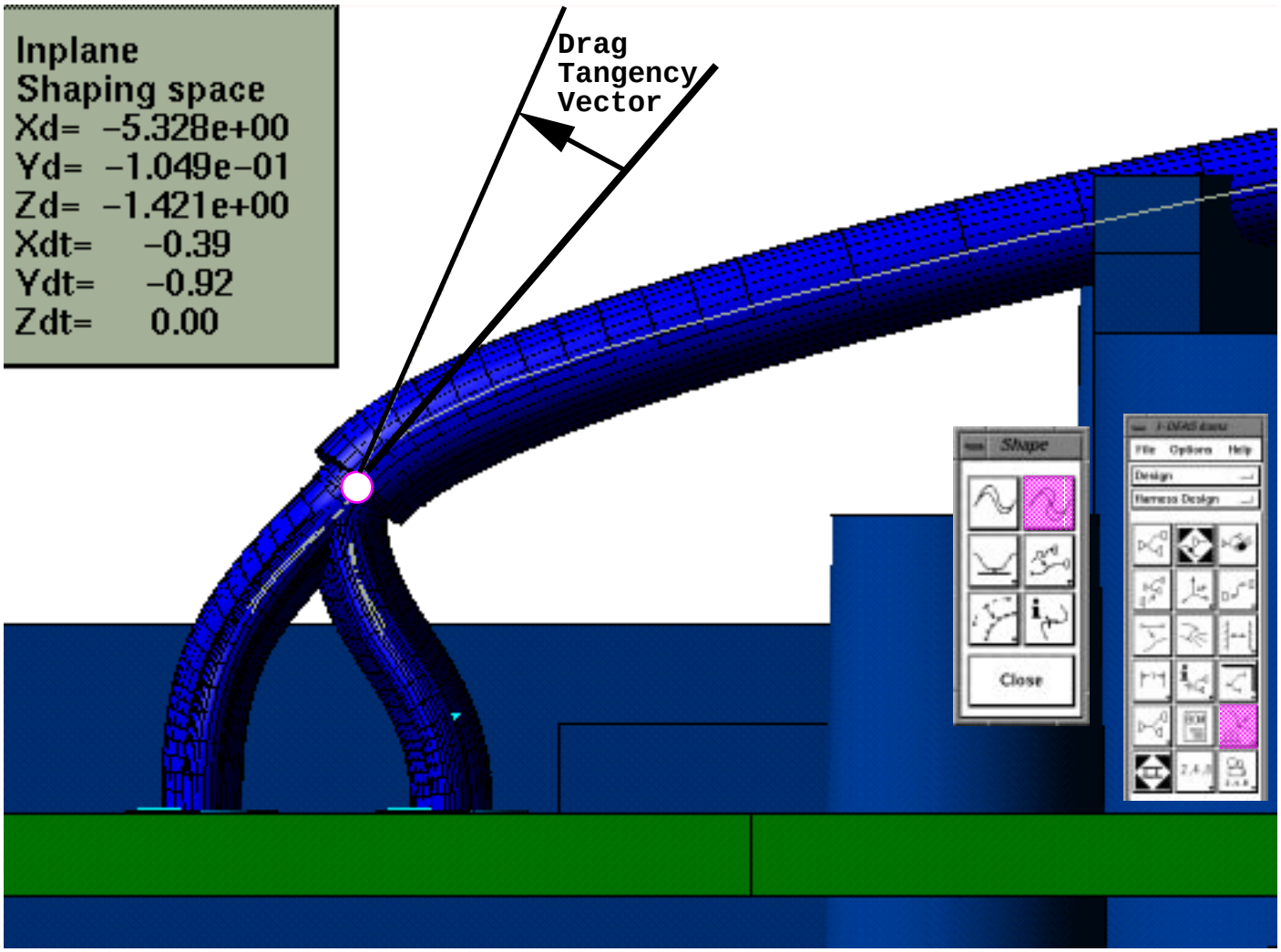


- **Front View**
- **Zoom** (zoom around the 4 PCB connectors)
- **Drag Point**

>From the Shape palette, Pick the curve connector and drag it down. Shape in the view plane. You might want to perform this step in line display mode.



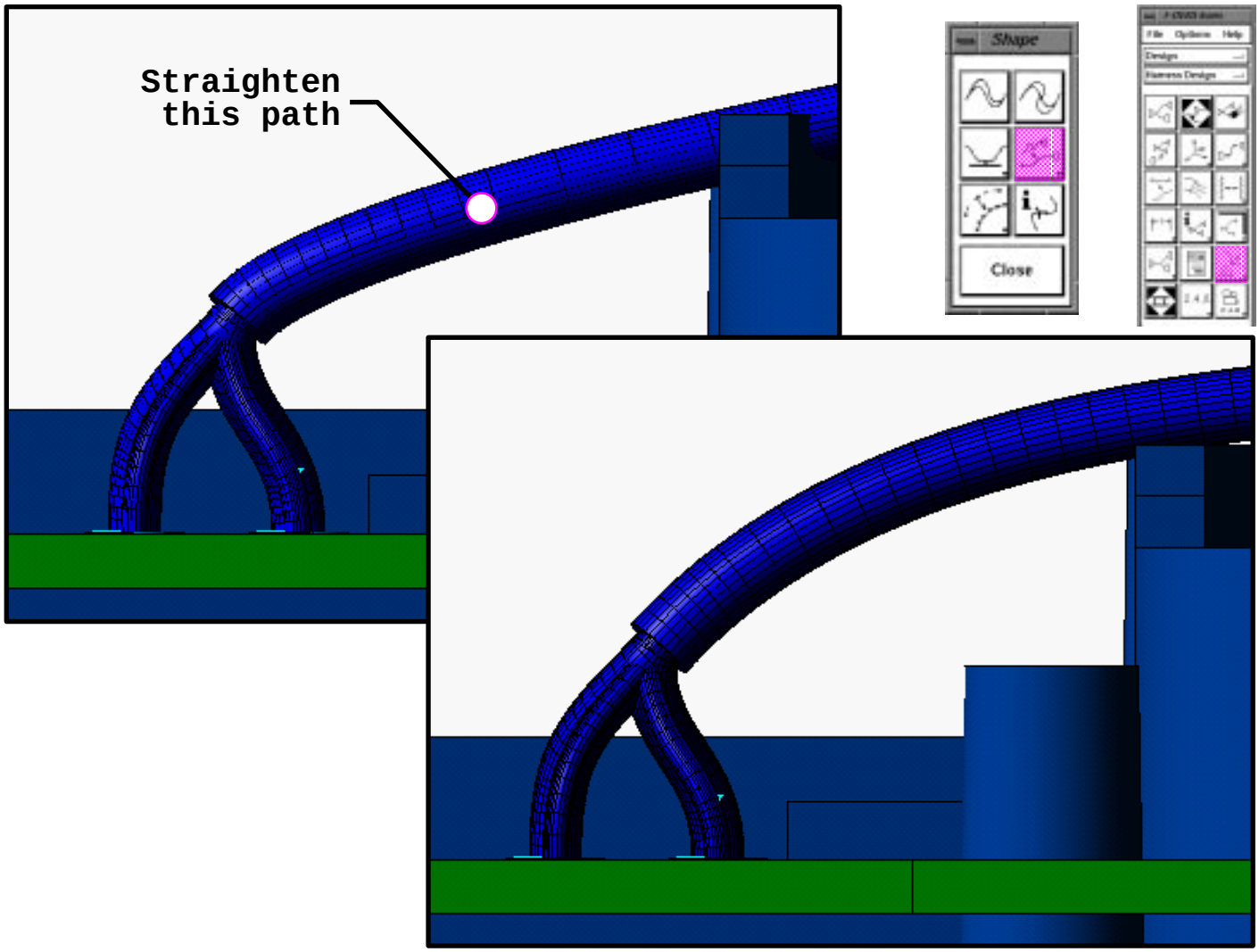
>> By default, I-DEAS shapes in the view plane. This powerful default allows the designer to predictable interact with a 3-D shape using a 2-D medium. Additionally, the display can be dynamically rotated and panned during the shaping operation, with the shaping plane updating appropriately. This is a huge conpetitive advantage.



•Drag Tangency 

>From the Shape palette, Pick the curve connector and rotate it counterclockwise. This will allow control over the angle the wires meet. (Shape in the view plane. You might want to perform this step in line display mode.)

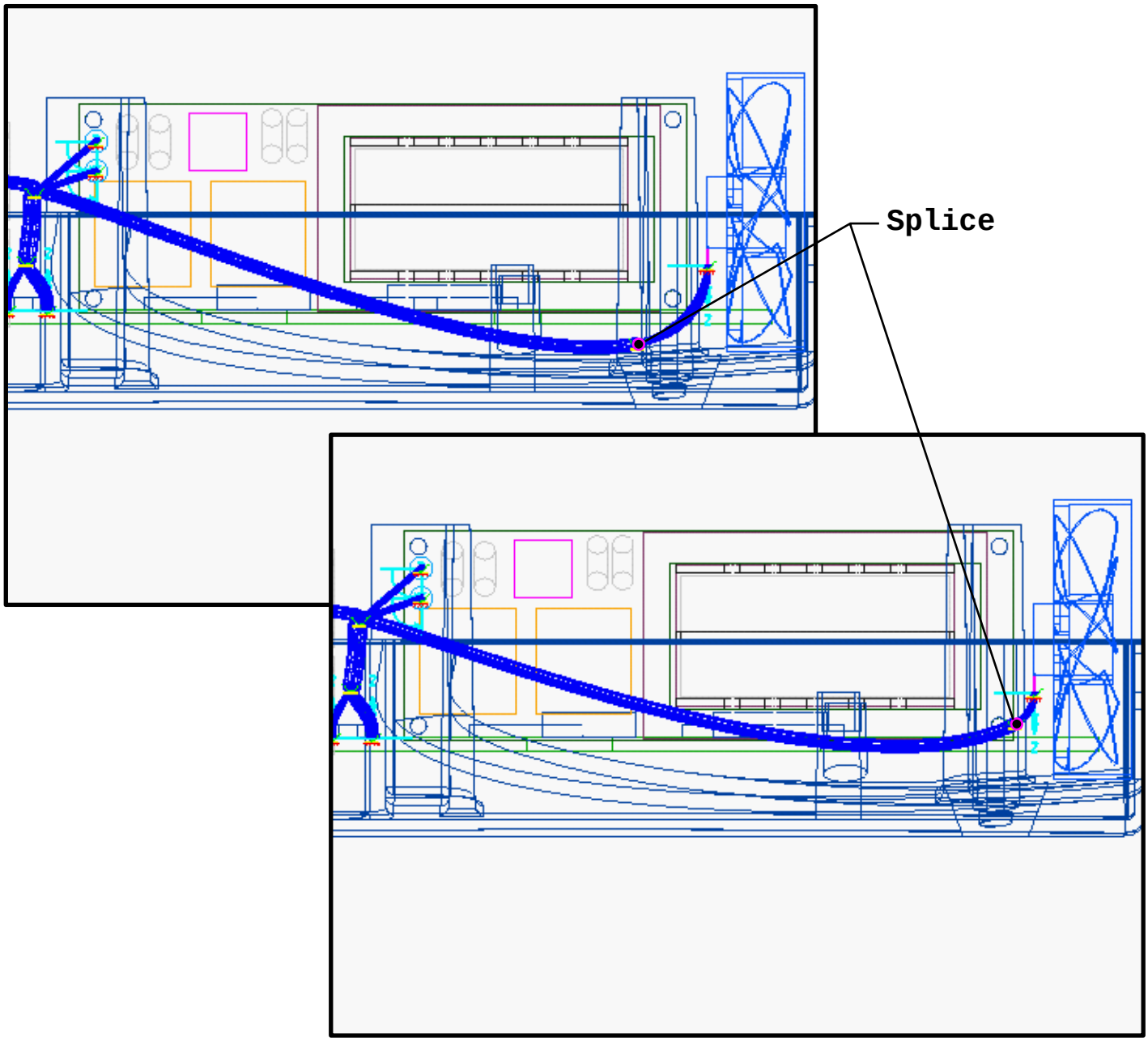
>>The designer can also twist the path. This tool is also handy if it becomes necessary to apply slack to a path as in the case of a service loop.



•Straighten–Smooth Path

>From the Shape palette, relax the path shown. The path becomes ‘tight’ due to the move/rotate operations. The straighten operation will relax the path and provide clearance over the rail.

>> The straighten operation is a helpful ‘oops’ tool. If you perturbate (move/twist) the path beyond repair, this tool may be a good quick fix (another good fix may be to ’control–Z’ – with harness demos, save often).



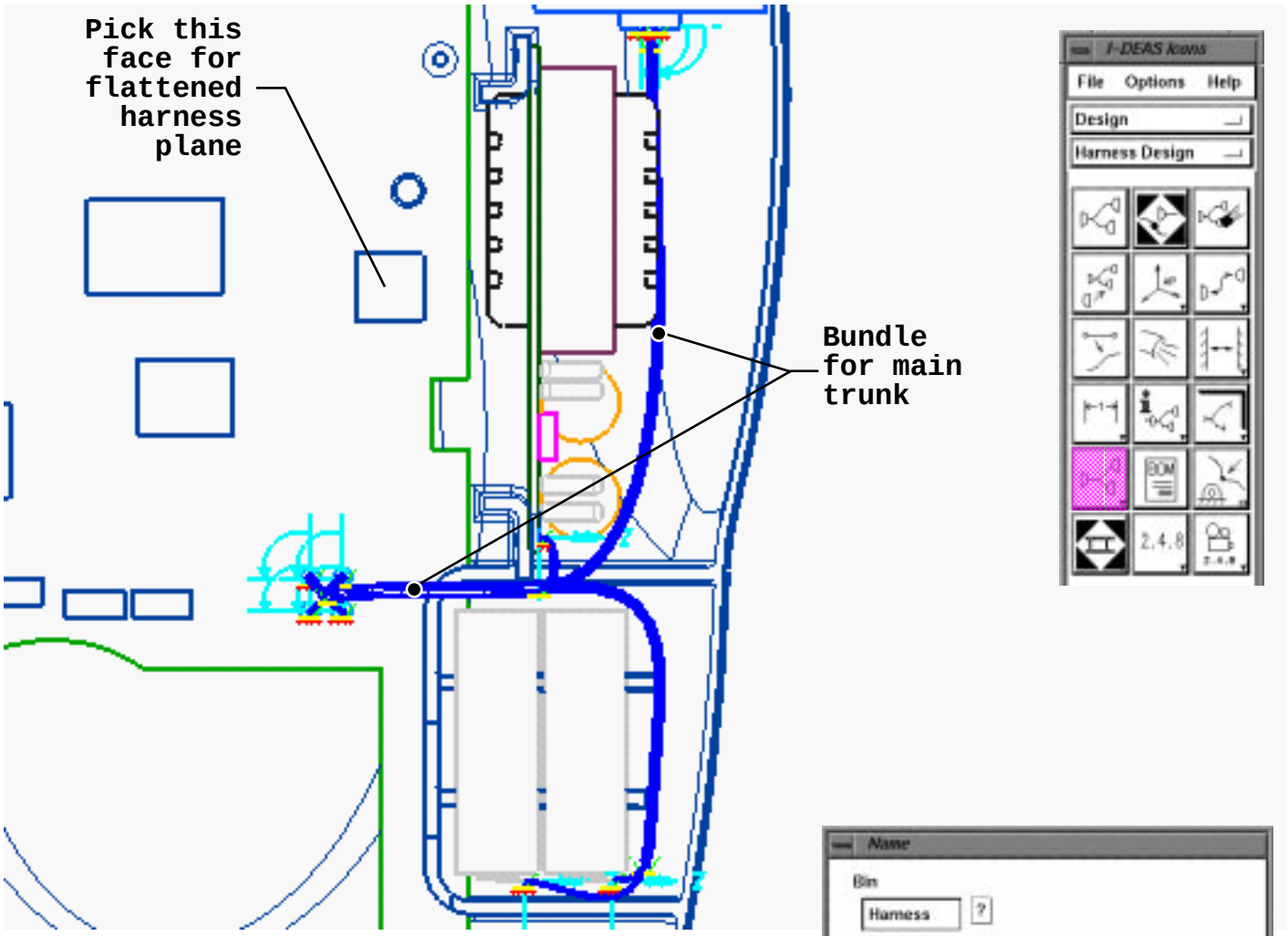
•Side View

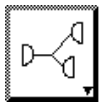
•Line Display

•Drag Point...Straighten Path...

>Using the tools and techniques previously shown, adjust the fan wires:
1. Move the splice closer to the fan
2. Use the ‘straighten’ tool to relax the 2 short fan wires.
3. Use ‘drag point’ to take some of the droop out of the path (add dof if necessary using full refine)

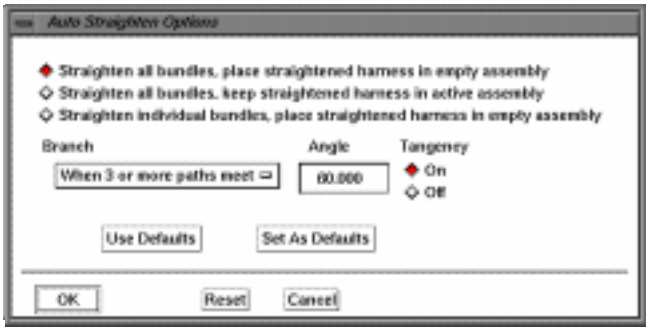
>> Excess wire increases the cost of the harness. Use the ‘drag’ tool to take some of the droop out of the fan wires.



- **Top View**
- **Auto Straighten** 

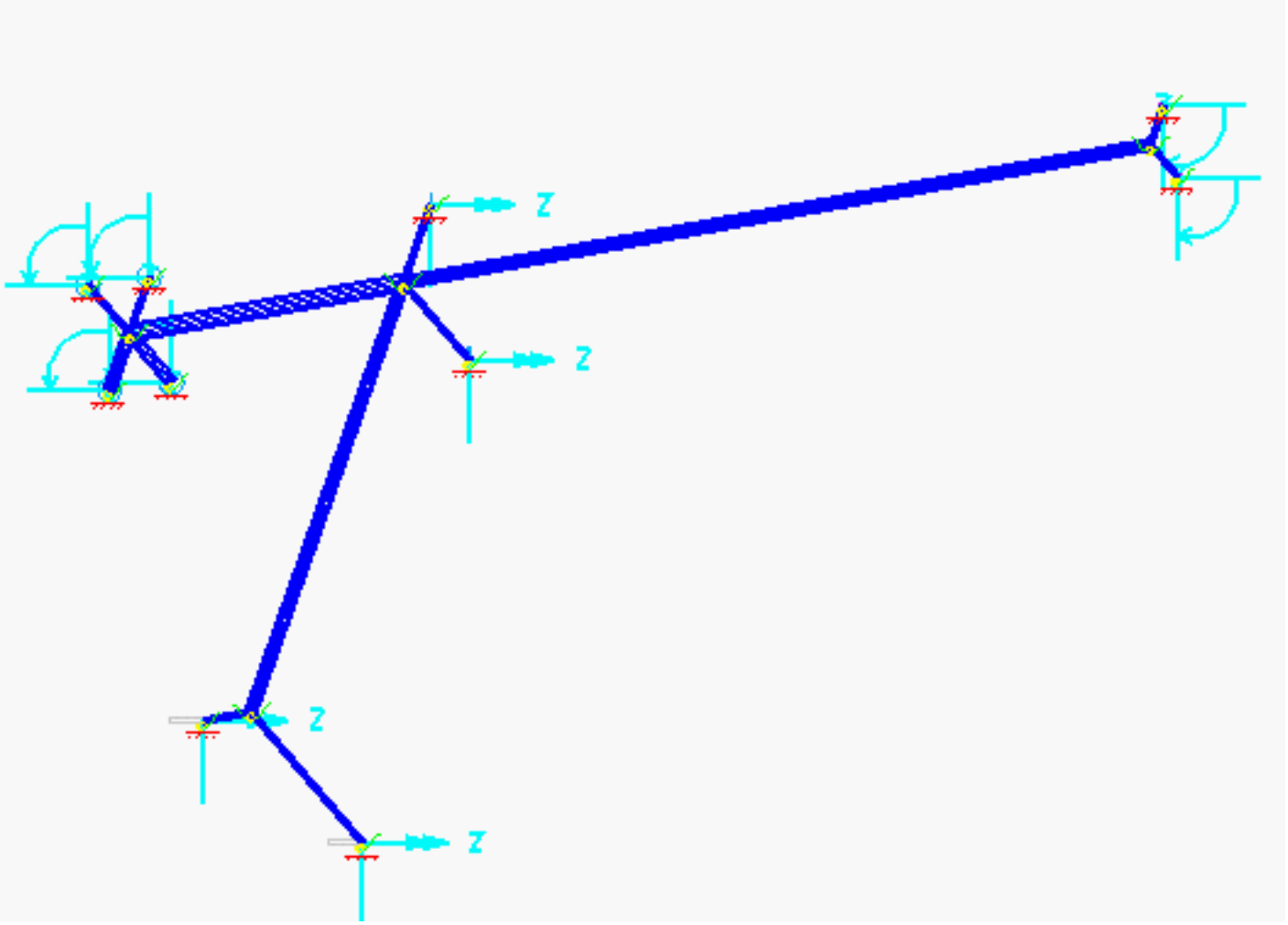
>Flatten the harness.

1. **'Pick bundle for main trunk'**, pick as shown, MB2
2. **'Pick plane for flattened harness'**, pick a plane parallel to screen
3. Fill-out form as shown



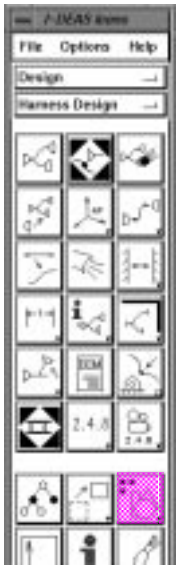
4. Create new assembly, 'Zip Harness MFG', OK.

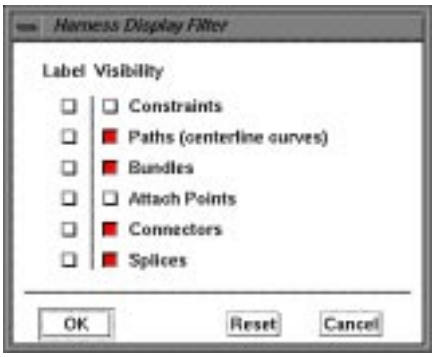
>>Flattening the harness is a necessary 1st step to producing a formboard drawing.



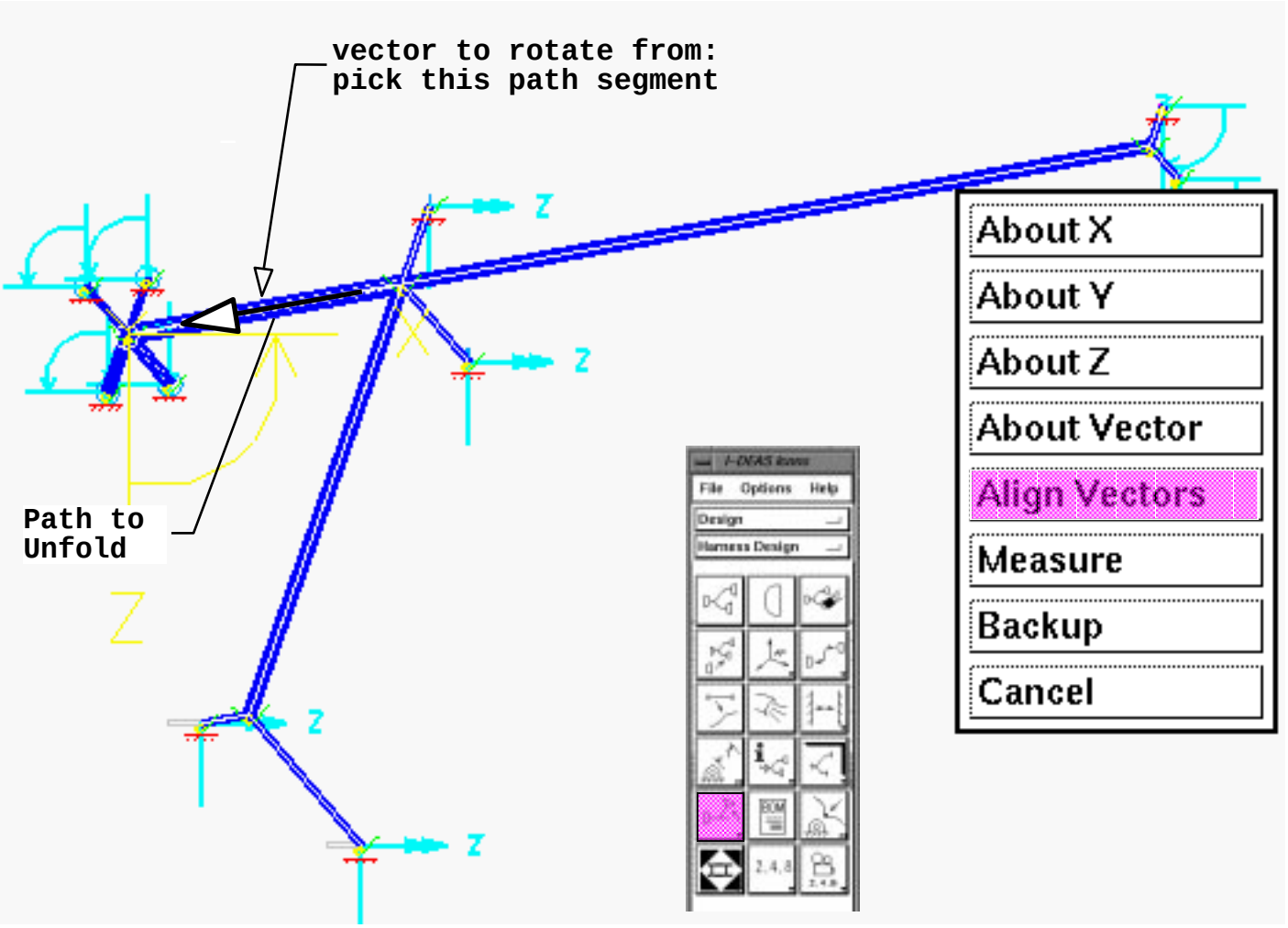
- **Update** 

>The harness will initially be shown in red becuase it is not updated. Updating the harness will turn it back to the design color.

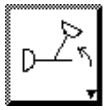




- **Display Filters, Harness, Attach Points, Constraints, Off, OK, OK**



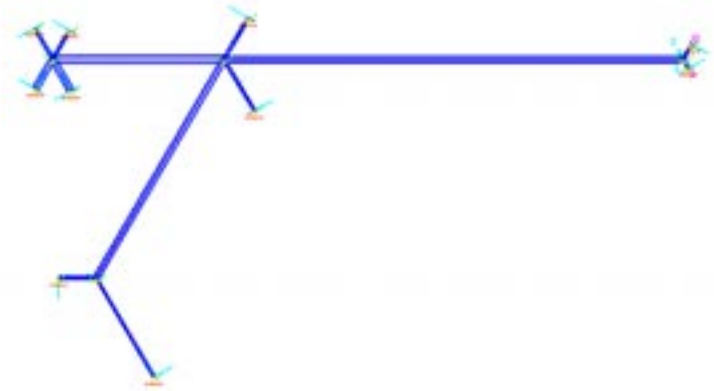
Adjust the flattened harness to fit the form board

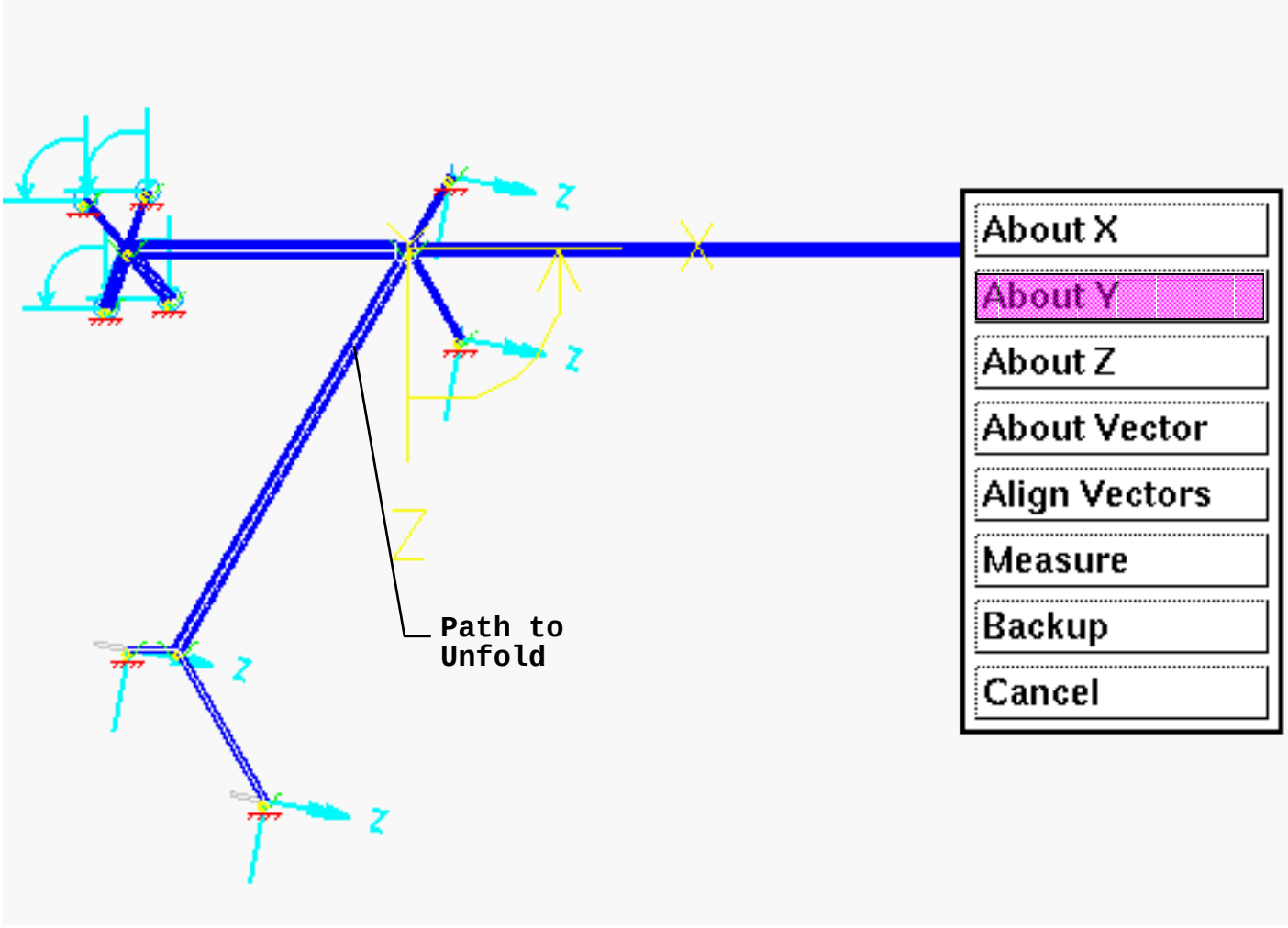
•Unfold 

>Rotate the harness such that the main trunk is horizontal (in developing this material about 50% of the time this happened automatically. If so then skip this step).

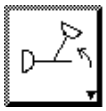
1. **'Pick path to Unfold'**, pick as shown
2. **'Enter rotation angles'**, select 'Align Vectors' from the menu
3. **'Pick vector to rotate from'**, pick as shown, 'Yes'
4. **'Pick vector to rotate to'**, MB3, Heading, Neg X-axis, Done, Yes

Your harness will look like this ->



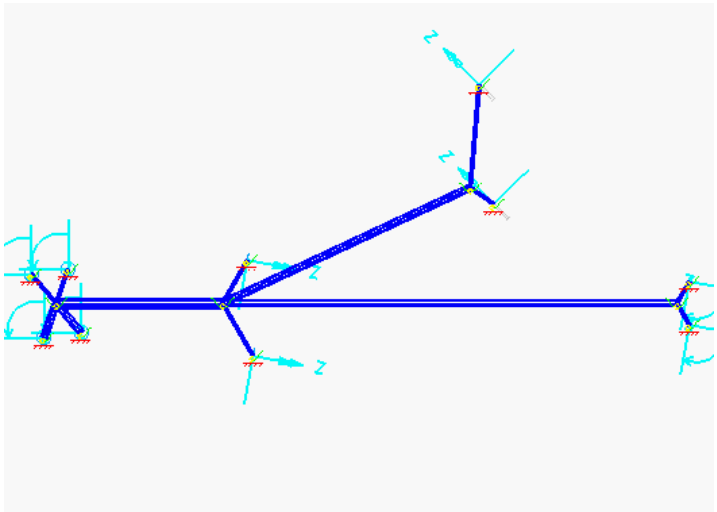


Adjust the flattened harness to fit the form board

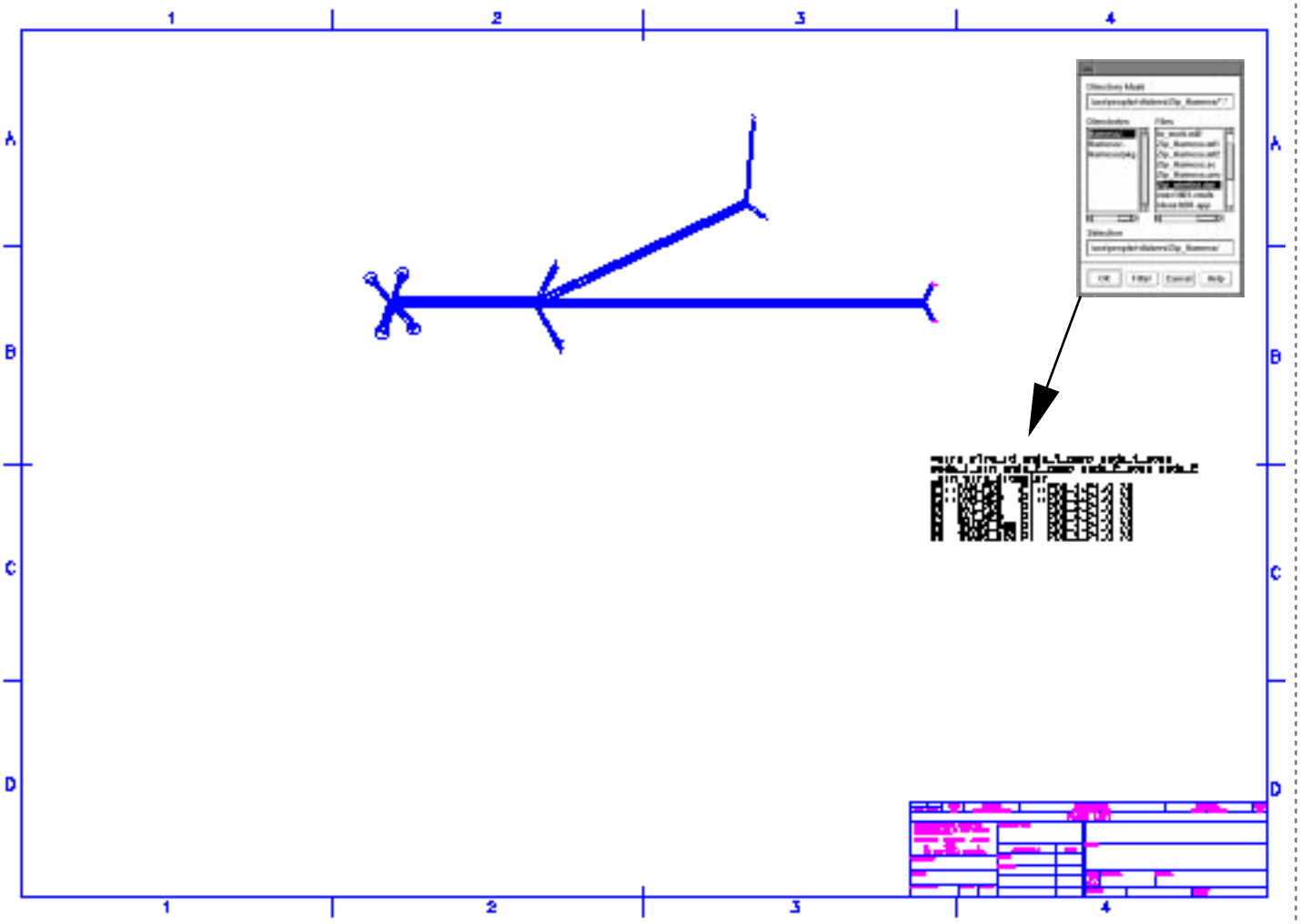
•Unfold 

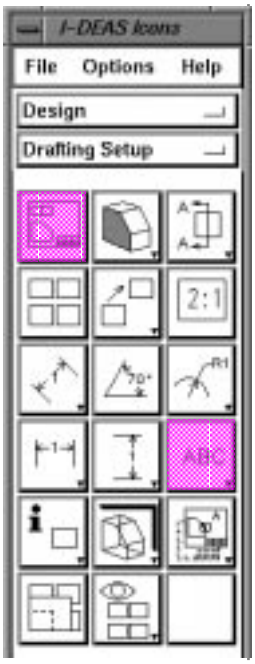
>Rotate one of the branches such that it prutrudes from the top rather than the bottom

1. **'Pick path to Unfold'**, pick as shown
2. **'Enter rotation angles'**, select 'About Y' from the menu and enter **145°**



>>The unfold tool gives you control over the branch angles. It also allows you to lift a branch out of plane to support 3-D form boards.

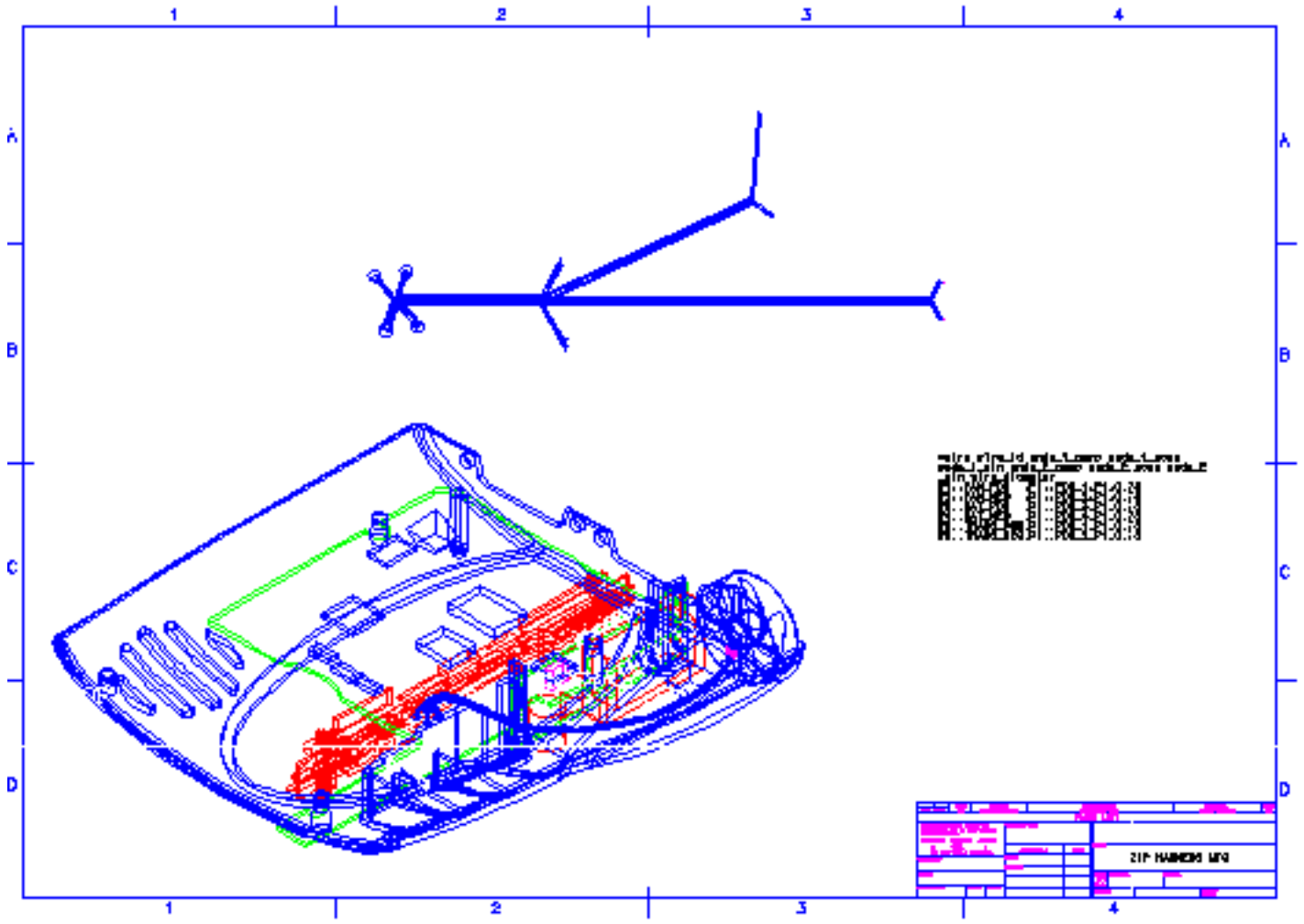


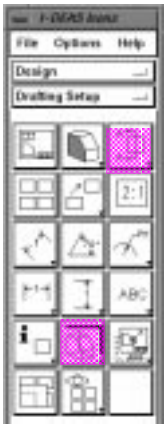


Create a Drawing

•Create Layout

>Create a layout of the ‘Zip Harness MFG’ assembly.
>Use a wireframe ‘Harness Drawing Display’
>Place a top view, scale=2 in the middle of the drawing
>Place the wirelist on the drawing.

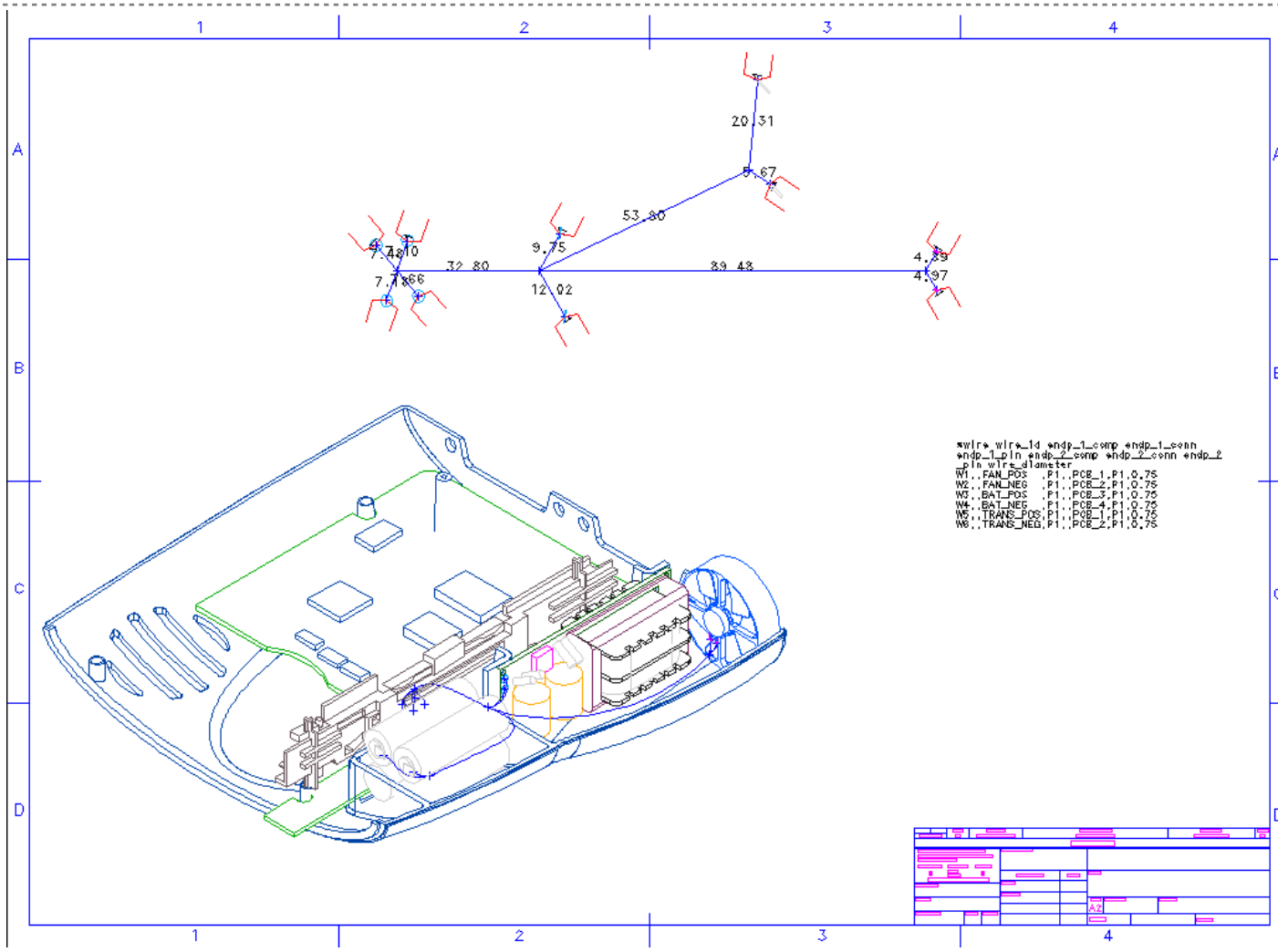




Add a view of the ‘as designed’ harness

•Change geometry 

>Add a user defined view. Change geometry to the ‘Zip Drive’ assembly. Define the view direction by eye, (1,1,1). Set the scale to 1.5



Process to Detailing

•Detailing 

>Process the layout.

>>Notice that the path are automatically annotated with the current lengths.

END