Defining a Smart Object

Smart Objects are one of the very powerful features offered by ThinkDesign. Think of "Smart Object" as an 'umbrella' term that incorporates Profiles, Features, Shapes and Assemblies -- all wrapped up in a nice little package. One can think of them as adaptable features, parts and assemblies. Or...like a features library on steroids. This exercise will take you through the creation of a semi-advanced Profile, and then show you how to use the geometry from this Profile and other ThinkDesign features to create a Smart Object.

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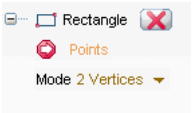
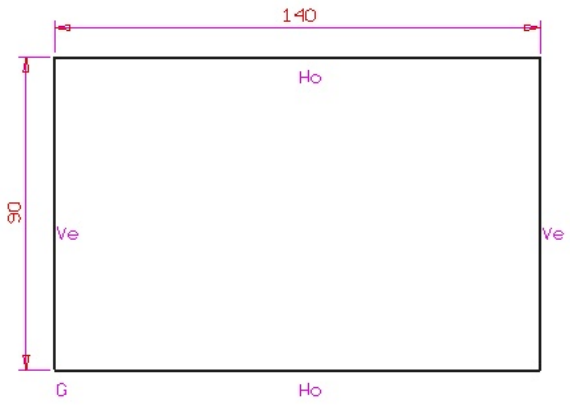
1. Profile Creation

Let's start with some geometry creation.

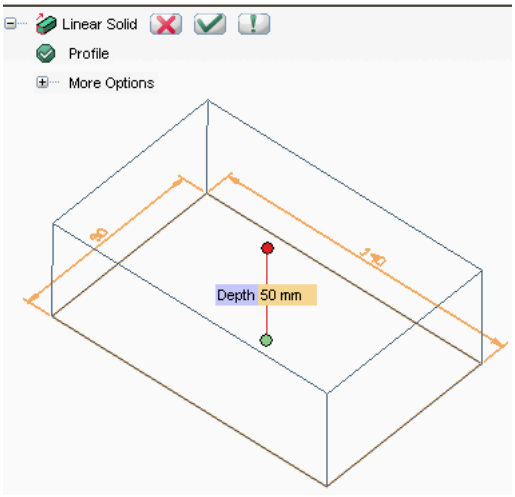
- **Open** a new file
- Right-click in the Graphics area and open the **`Options`** dialog
- Under the **`General`** tab, set the units of measure to **`Millimeters`**
- Hit F or **Fit View**
- Click on Insert > Profile > 2D
- Sketch a **Rectangle**



- Add dimensions using the **Smart Dimension** tool
- Use **Orientation Constraint** and **Ground Constraint** to apply the constraints as shown below

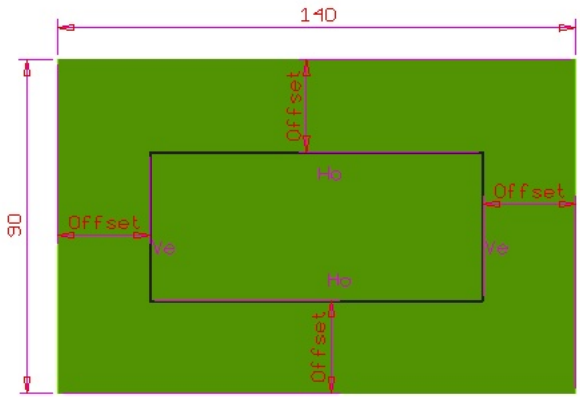


- Click the **Linear Solid** command to create a solid
- Select the **`Profile`** you just sketched
- Set Depth50
- Click Apply



Click Cancel to exit the command

- Right-click on the top surface of the solid and click **`Work PlaneHere`**, to re-position the Workplace
- Click on the 2D **`Profile`** tab.
- Note: If you cannot see the 2D or 3D Profile tab at the bottom of the graphics area, click on Options/Properties > System Options > General > Advanced and check Show tabs Model, 2D and 3D Profile.
- Draw a **Rectangle** on this face, and offset the edges inwards 25mm from the outer edges of the face of the rectangle
- Rename the 25mm offset dimension to "Offset".

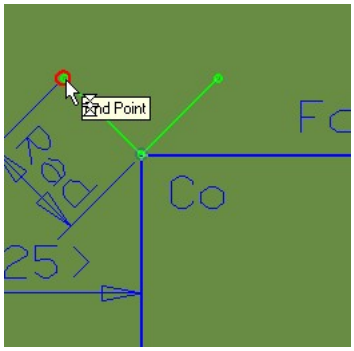


- Draw lines of 20mm length at the corners of the rectangle at angles of 45/-45 and 135/-135 degrees, respectively (see image below for reference). Be sure to use the **Intersection Point Snap** tool.

Let's focus on one corner, say the top left corner of the rectangle:

- Use the **Orientation Constraint** command and click the "Fixed Orientation Tab " tab in the **`Parameter area`** to fix the angle (Fx Constraint) of the 2 angular lines drawn

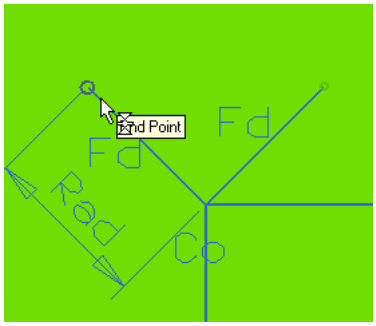
- Dimension one of the angled lines, and modify it to give it the expression **`Rad`**



- Click on the **Coincident Constraint** command

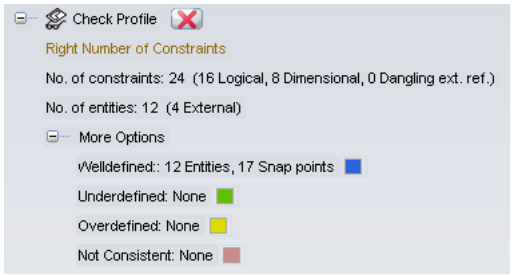
ThinkDesign will prompt you to select the **`First Special Point`** in the command prompt area.

- Pick the **`Y point`** tab that appears in the **`Parameter Area`** and select top end point of one angular line as shown below



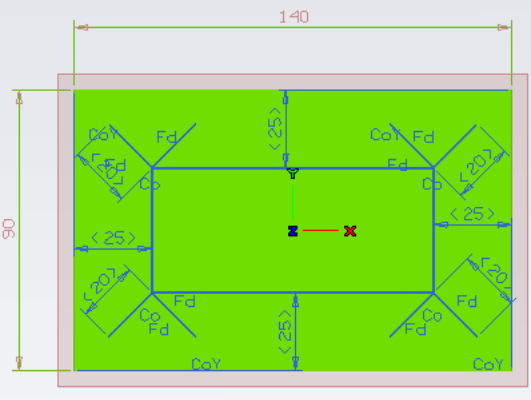
- Similarly for **`Second Special Point`** pick the top end point of other angular line, then hit ESC to exit the command

- Use **Check Profile** to ensure that the profile is fully constrained

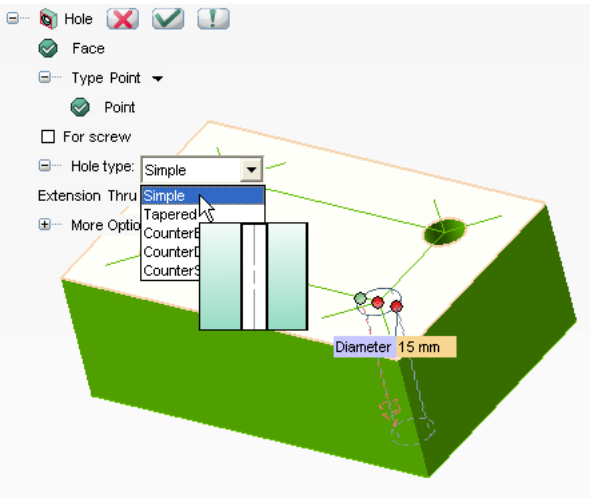


- Apply these same constraint conditions to the other 3 corners of the rectangle. Use the **Check Profile** periodically to see the constraint status of the Profile.

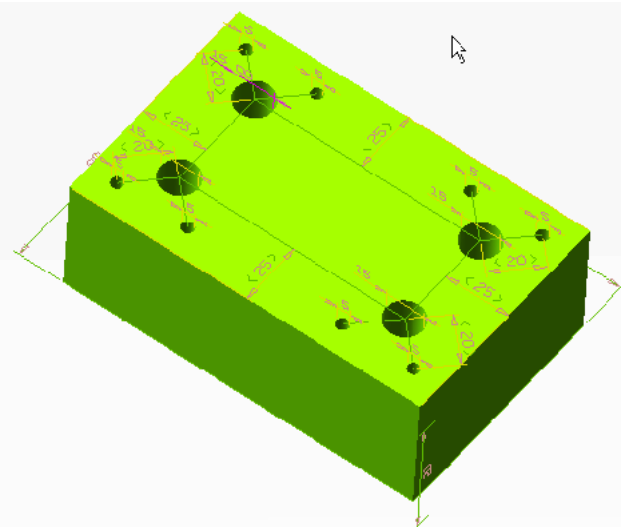
  The Profile should look as below at this point.



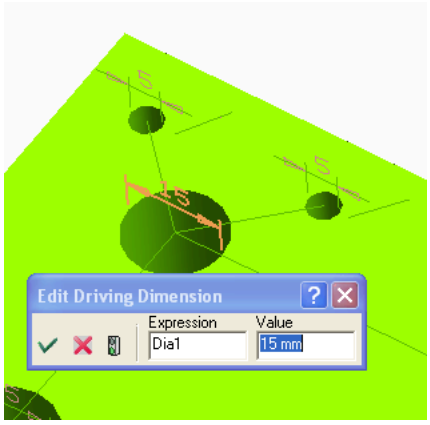
- Using the **Hole** command, create 4 holes of Dia.**15** mm at the corners of the rectangle. Make their Extension Thru all.



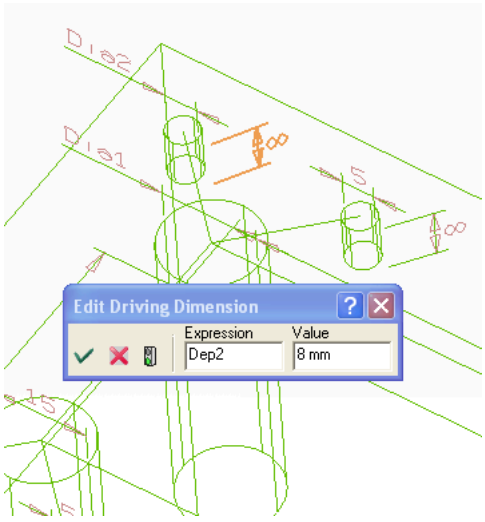
- Create eight holes - again using **Hole** - of **5** mm Dia. at the end points of the angular lines. Make their Extension Blind, and set the Depth8. See image below for reference.



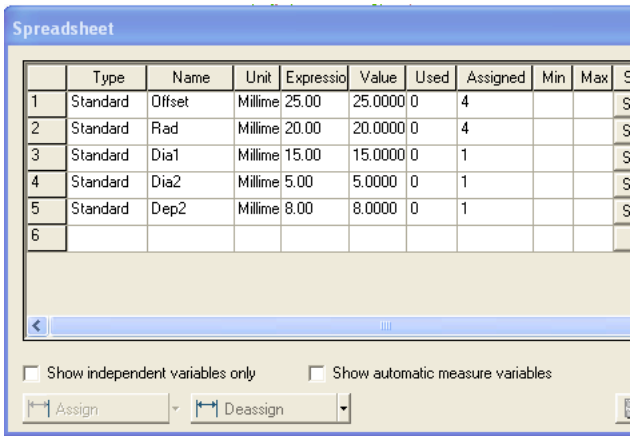
Double-click on one of the larger hole diameter dimensions and rename it to Dia1:



Do the same for one of the smaller hole diameter dimensions, and the depth. Call them Dia2 and Dep2, respectively:



Now let's look at the **`Spreadsheet`** using the **Spreadsheet** command:



	Type	Name	Unit	Expressio	Value	Used	Assigned	Min	Max
1	Standard	Offset	Millime	25.00	25.0000	0	4		
2	Standard	Rad	Millime	20.00	20.0000	0	4		
3	Standard	Dia1	Millime	15.00	15.0000	0	1		
4	Standard	Dia2	Millime	5.00	5.0000	0	1		
5	Standard	Dep2	Millime	8.00	8.0000	0	1		
6									

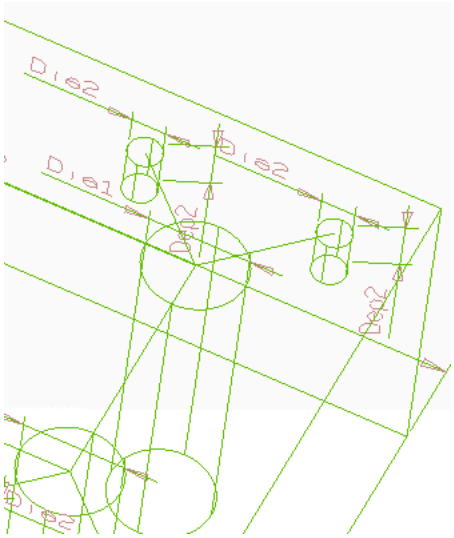
Let's assign the same name - Dia1 - to all of the larger hole diameter dimensions, using the Assign button in the Spreadsheet form:

- Select the line number containing the dimension Dia1 we want to Assign.
- Click the Assign button from the spreadsheet form (this should have become active when you selected line)
- Select all of the other larger hole dimensions from the model - you will see the name of the dimension

change after you select it

- Do the same for Dia2 and Dep2

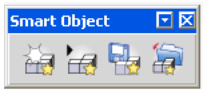
All of the model's dimensions should look like the image below when finished:



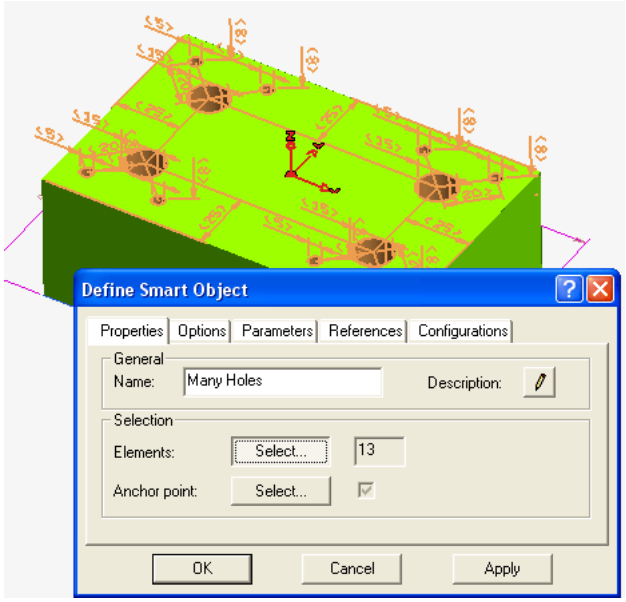
OK...we have completed first part of the task. Now, we shall start "**`Defining the Smart Object`**"...

2. Smart Object Creation and Re-Use

We shall use the Profile and Features we just created to make a Smart Object.

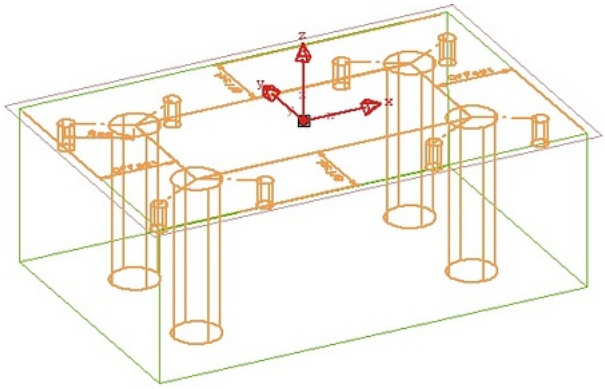


- Go to **Tools**➪**Customize**Toolbars. Select the Smart Object option to get the toolbar shown above
- Click on the first icon of **Define Smart Object** to display the Define Smart Object form



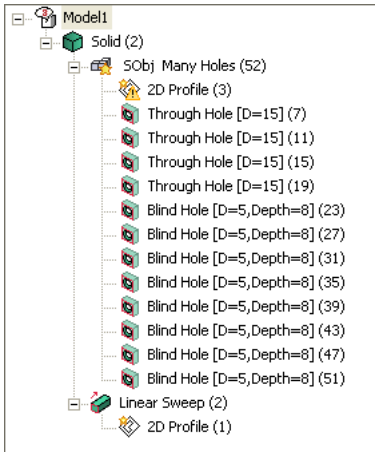
- Change the name of the Smart Object from **`No.1`** to **`Many Holes`**

- You will be prompted to "Select the Feature" -- select all of the hole features on the part, and also select the Profile used to place the holes. The total number of features selected should be 13.
- Keep the anchor point in place, as shown below:

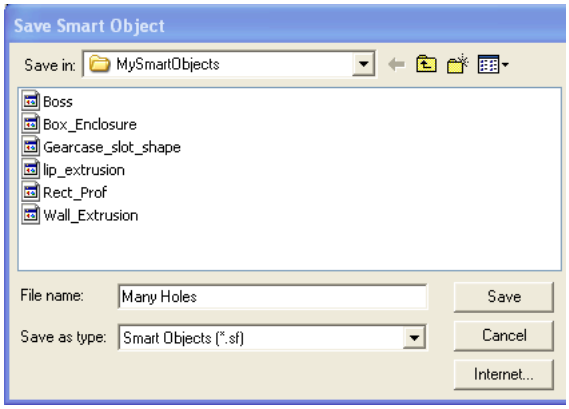


Notice the other tabs of the Smart Object form: **`Parameters Reference Configuration`**. These can be used to customize your Smart Object by re-naming dimensions, or creating custom configurations of the selected Profiles and Features. Click OK in the Smart Object form to create the Smart Object.

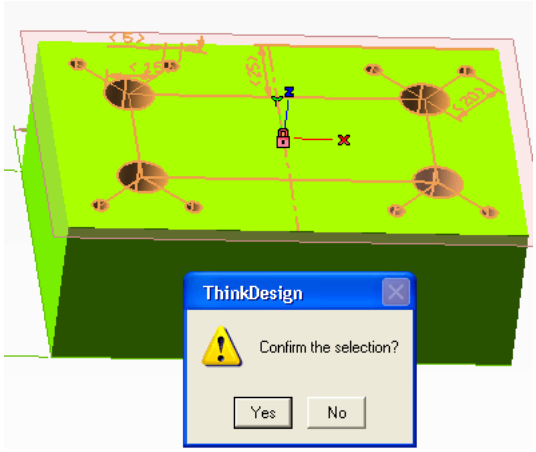
Notice the History Tree, while the Smart Object creation and after clicking OK from the Smart Object form as well. You can determine which items are part of a Smart Object by the 'lightning bolt' picture next to the item in the History Tree.



After creating the Smart Object, save it. Use **Save Smart Object** and give your Smart Object a name (Many Holes). Browse the directory of files until you find the think3 Smart Object libraries that are installed along with the software. They are located at /Program Files/think3/relXX/thinkdesign/SO_Libraries for files made in metric units (and SO_Libraries_inch) for files made in English units. See image below for reference:

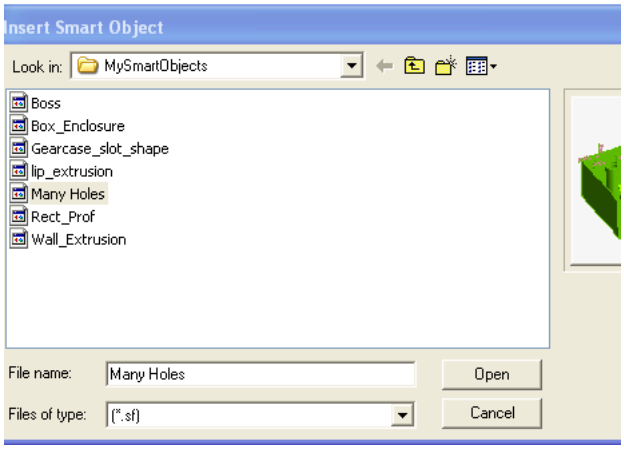


You will be prompted to 'Select a Smart Object' -- select any of the cylindrical faces of the holes and the entire Smart Object will be selected. Click Yes at the "Selection ok?" prompt (see below). This will save your Smart Object as **`Many Holes.sf`** in the directory you specified.

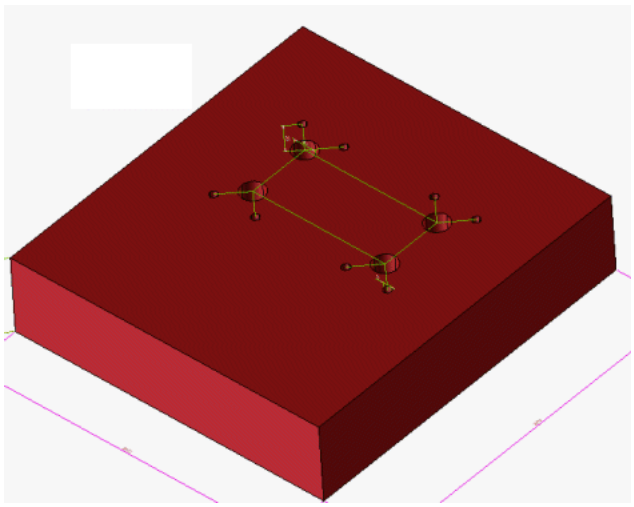


Now let's re-use this Smart Object! Open a **New Model**...

- Create a rectangle of 210 x 225 mm and sweep it by 50 mm (and change the color if you want to add some variety!)
- Click on the icon in the Smart Object toolbar to **Insert Smart Object**
- Select the new Smart Object "Many Holes" - see image below



- Select the face on which to place this new Smart Object
- Select a position for the anchor point
- Click OK to create the Smart Object



Finished! You have just created your first Smart Object! Re-use this Smart Object on other parts, and change the settings in the Selection List to display all of the Parameters -- thereby allowing you to change the dimensions on the Profile or the depth of the Holes before placing the Smart Object. CONGRATULATIONS !!

A.

- Rules for Profiles and Constraints.