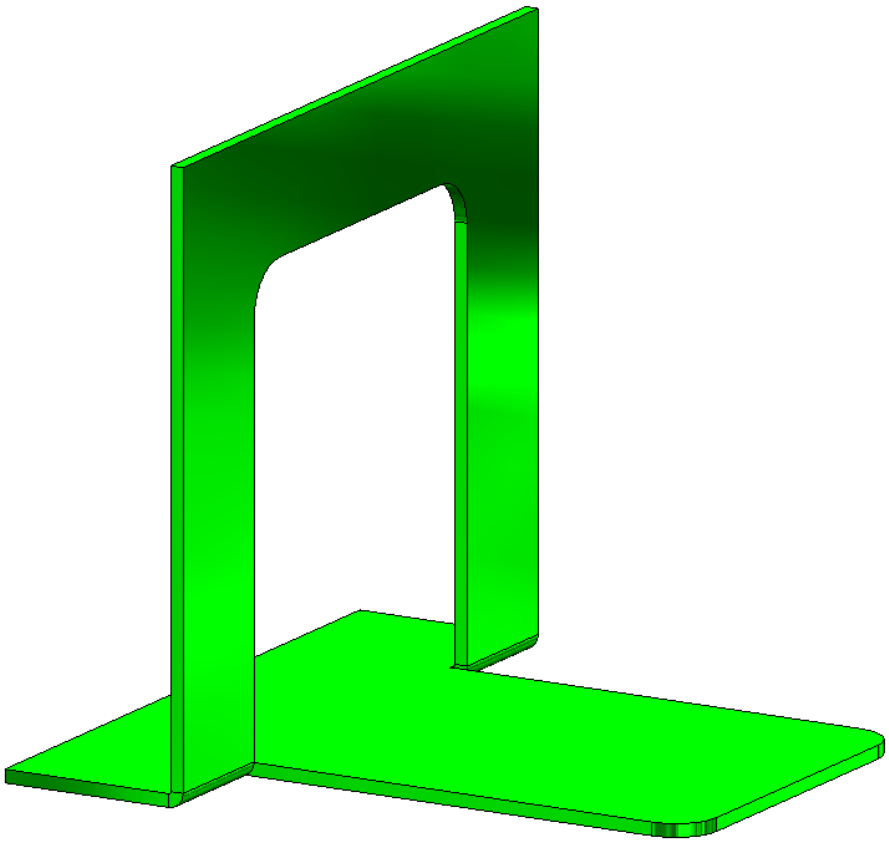
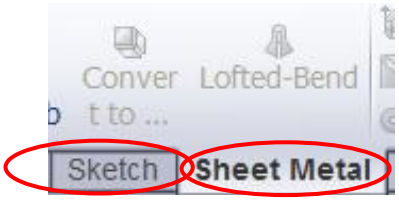
Bookend Exercise 3.



Prerequisite Knowledge	Previous knowledge of the following commands is required to complete this lesson; **Sketch (**Line, Centerline, Circle, Add Relations, Smart Dimension, Mirror Entities), **Sheet Metal tools** and **Edit Materials.**
Focus of lesson	This lesson focuses on designing a sheet metal part from the flattened state. In this case, you create a sheet metal part and then insert bend lines on which to fold the part.
Commands Used	This lesson includes Sketching, Base Flange**,** Extruded Cut and Sketched Bend.
New File	Create a new part file.
Save File	Save the file as '**Bookend'** to a folder called **'Bookend'** (**Continue to save periodically throughout the exercise**)

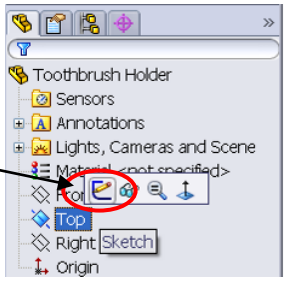
Getting Started Activate Sketch and Sheet Metal tabs on the command manager as outlined in earlier exercises



Creating a sketch How do we start to model the bookend as a sheet metal part?

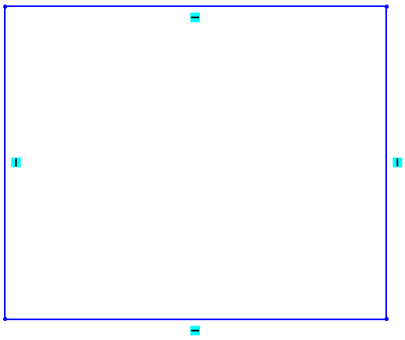
We begin by creating a sketch to generate the rectangular piece of acrylic required to manufacture the object.

Choosing a plane Choose the **Top plane** from the Design Tree and select the sketch icon from the pop up toolbar



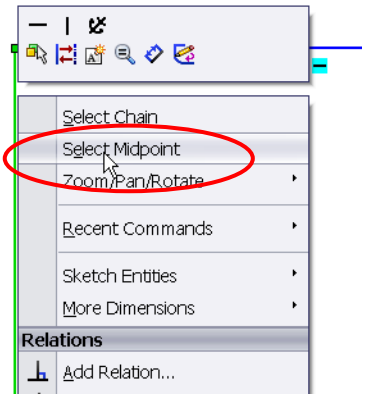
Creating a sketch Select the **Corner Rectangle** command and create a sketch of a rectangle as shown

Origin



We need to place the midpoint of one of the vertical sides of the rectangle on the Origin

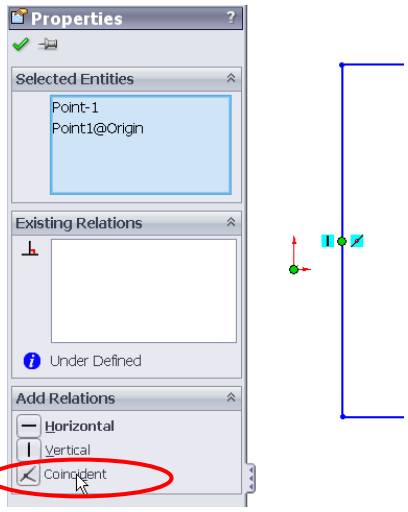
Select the vertical line and right click.



Choose ‘Select Midpoint’ from the pop up toolbar

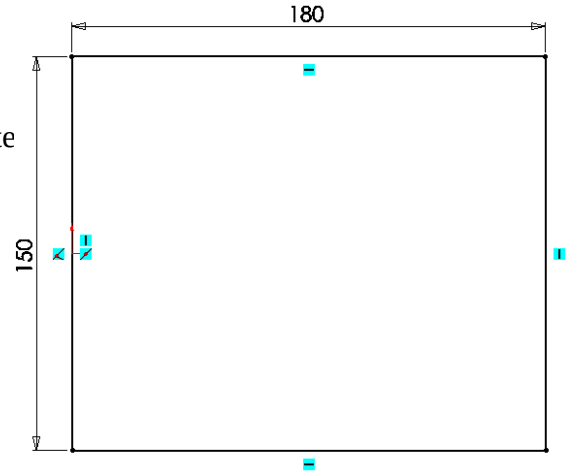
Hold down the ‘Ctrl’ key and select the Origin

Add a ‘Coincident’ relation between the two points



Smart Dimension

Dimension the sketch as shown opposite



Exit the sketch when fully defined

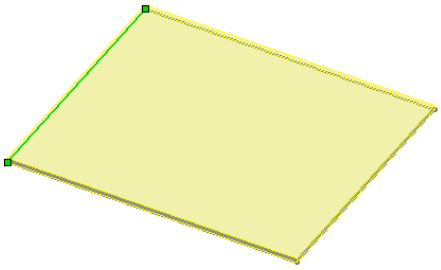
Creating the Sheet Metal Feature

Select Base Flange from the Sheet Metal toolbar

Select the sketch

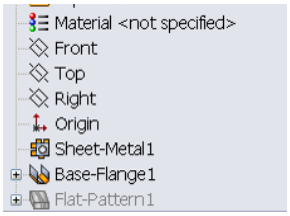
Apply a thickness of 3mm

Select Ok



You will notice that three items are added to the Design Tree:

- Sheet-Metal1 containing the properties of the part
- Base-Flange1 which is the feature just created
- Flat-Pattern1 which is suppressed

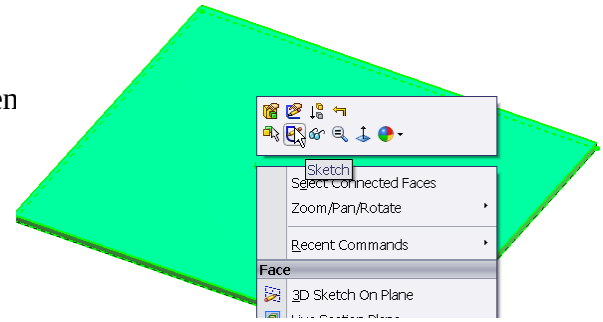


Rename Base Flange1

Rename this feature as '**Acrylic**'

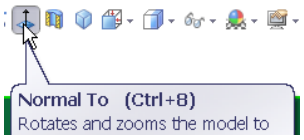
Saw Cut

Right click the top face as indicated. The chosen face will highlight in green as shown.



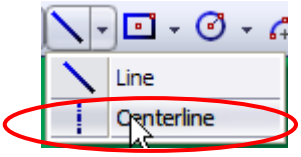
Select the sketch icon from the pop up toolbar

Select 'Normal to'

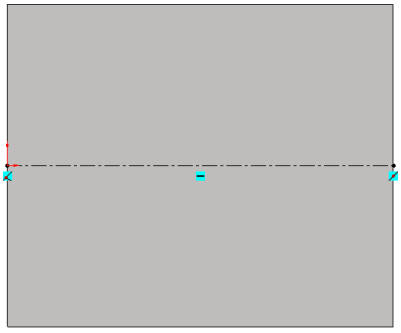


Creating the Sketch

From the sketch toolbar select '**Centreline'** from the drop down menu of the line command.

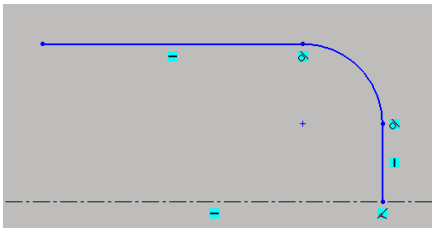


Sketch a horizontal centreline from the Origin

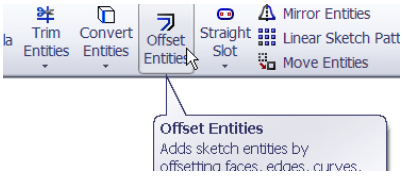


Using the 'Line' command, create a sketch of one side of the saw cut

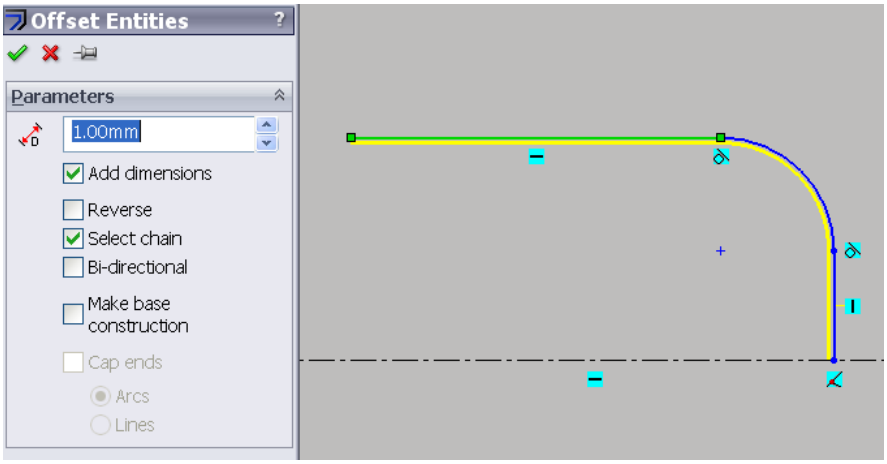
We will use '**Offset Entities**' to create the width of the saw cut



Select '**Offset Entities**' from the Sketch toolbar

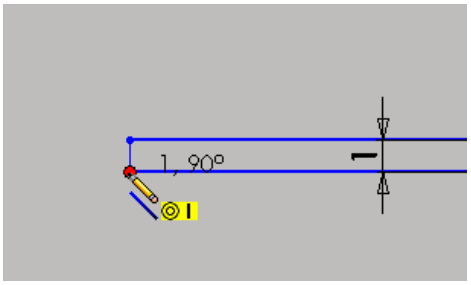


Choose an offset distance of 1mm (width of saw cut) and accept



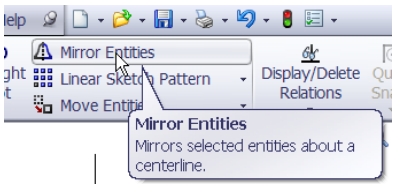
Join the end points of offset entities using the '**Line**' command as shown

Note: Do not join the endpoints on the centreline

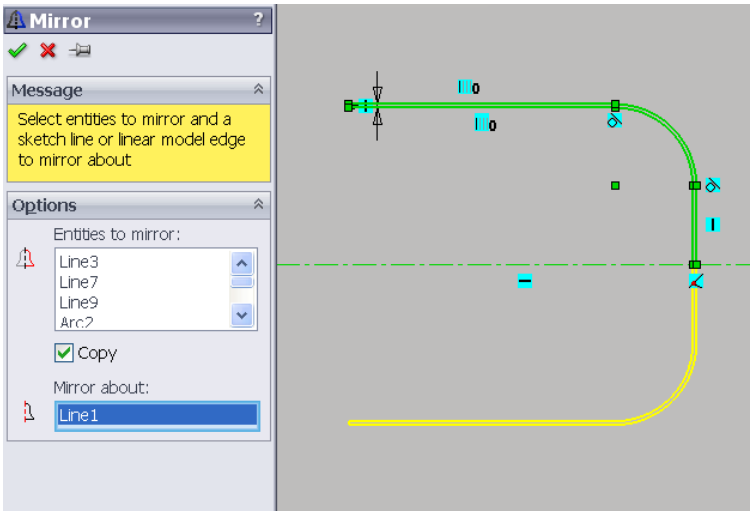


Mirror the Entities

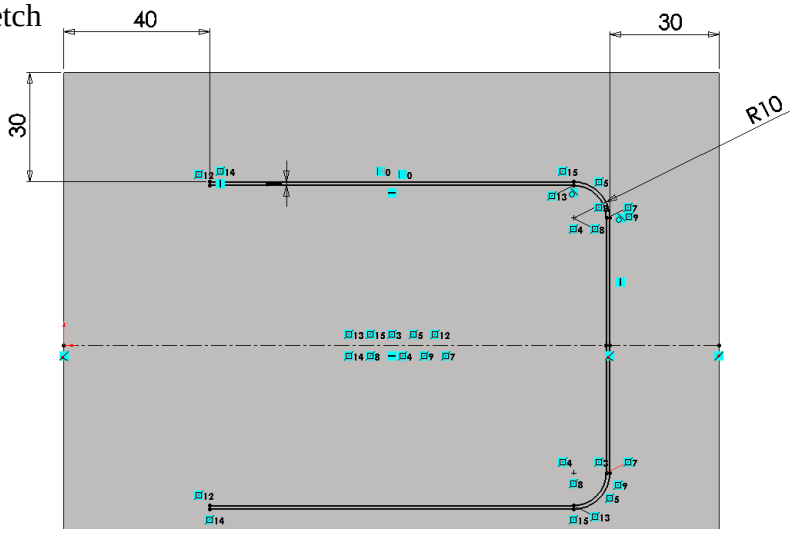
Select '**Mirror Entities**' from the sketch toolbar.



Select the lines to mirror. Mirror about the centreline of the face.



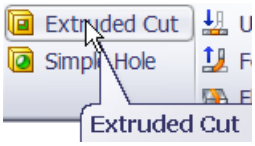
Smart Dimension the sketch as shown



Exit the sketch

Extruded Cut

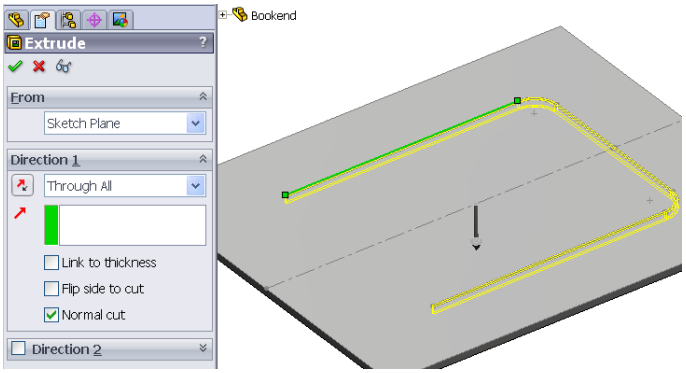
Select Extruded Cut from the sheet metal toolbar.



Select the previous sketch created

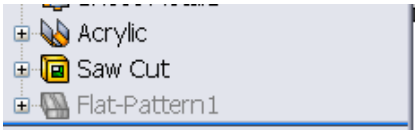
Choose ‘Through All’ as the end condition of ‘Direction 1’

Select Ok



Rename feature

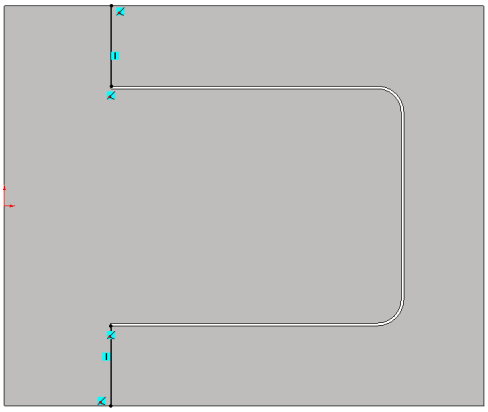
Rename feature as ‘**Saw Cut**’.



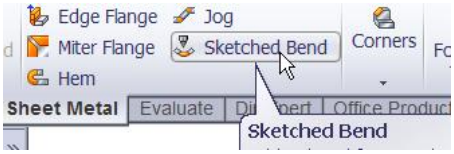
Sketched Bend

Create a sketch on the top face of the acrylic.
Using the **‘Line’** command, sketch two vertical lines coincident with the endpoints of the saw cut.
These lines will be used as the bending line.

Exit the sketch

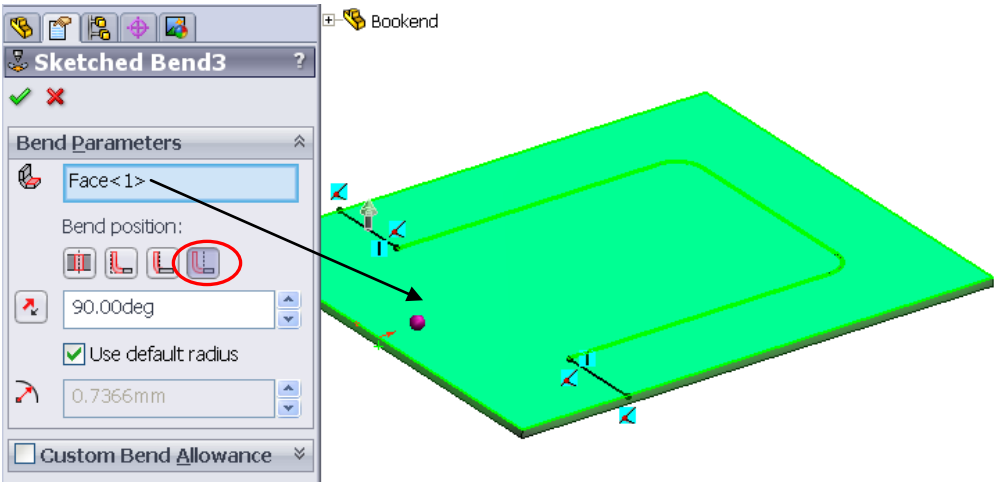


Select ‘Sketched Bend’ from the Sheet Metal toolbar.



Select the following options in the property manager:

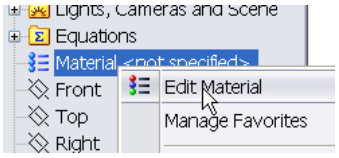
- The face that you wish to remain horizontal after the bending process
- ‘Bend Outside`’ as the Bend Position
- 90° as the bending angle
- Default radius as the bending radius



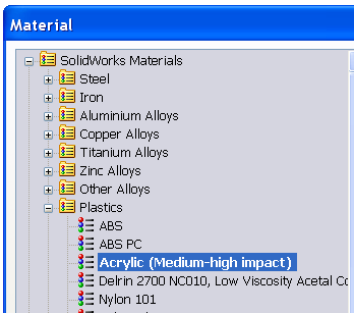
Select Ok 

Edit Material

Right click on ‘Materials <not specified> in the Design Tree and select ‘Edit Material’



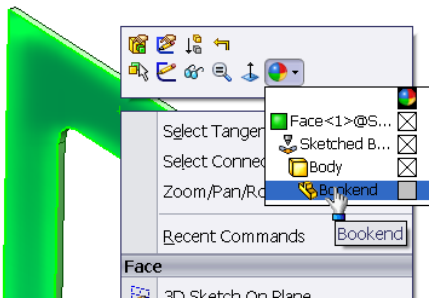
Scroll down to the ‘Plastics’ folder and select ‘Acrylic (Medium-high impact) and choose ‘Apply’ and ‘Close’



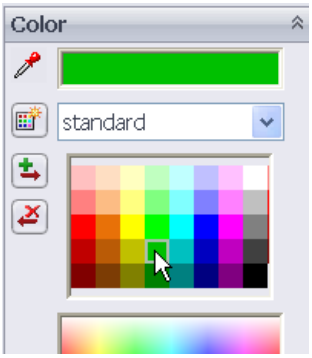
Apply Colour

Right click on any face of the bookend

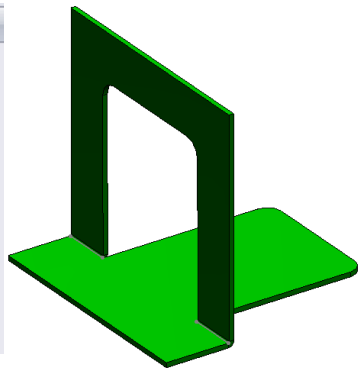
Choose the Appearance icon  and select the ‘Bookend’ part



Select a colour from the swatch in the Appearances Property Manager



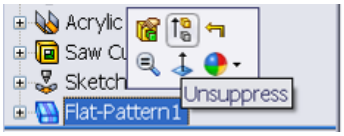
Select Ok 

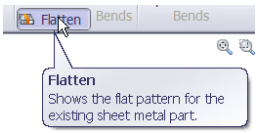


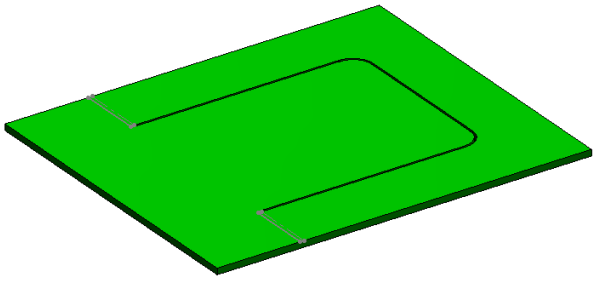
Improve the image quality if desired.

Unsuppress Flat-pattern

Right click on the 'Flat-Pattern1' feature and choose **Unsuppress** from the pop-up toolbar
or
Select 'Flatten' from the sheet metal toolbar







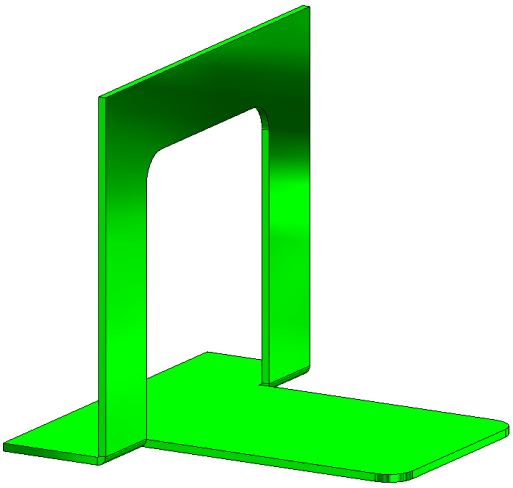
The sheet metal model flattens out into the surface development used to create it.

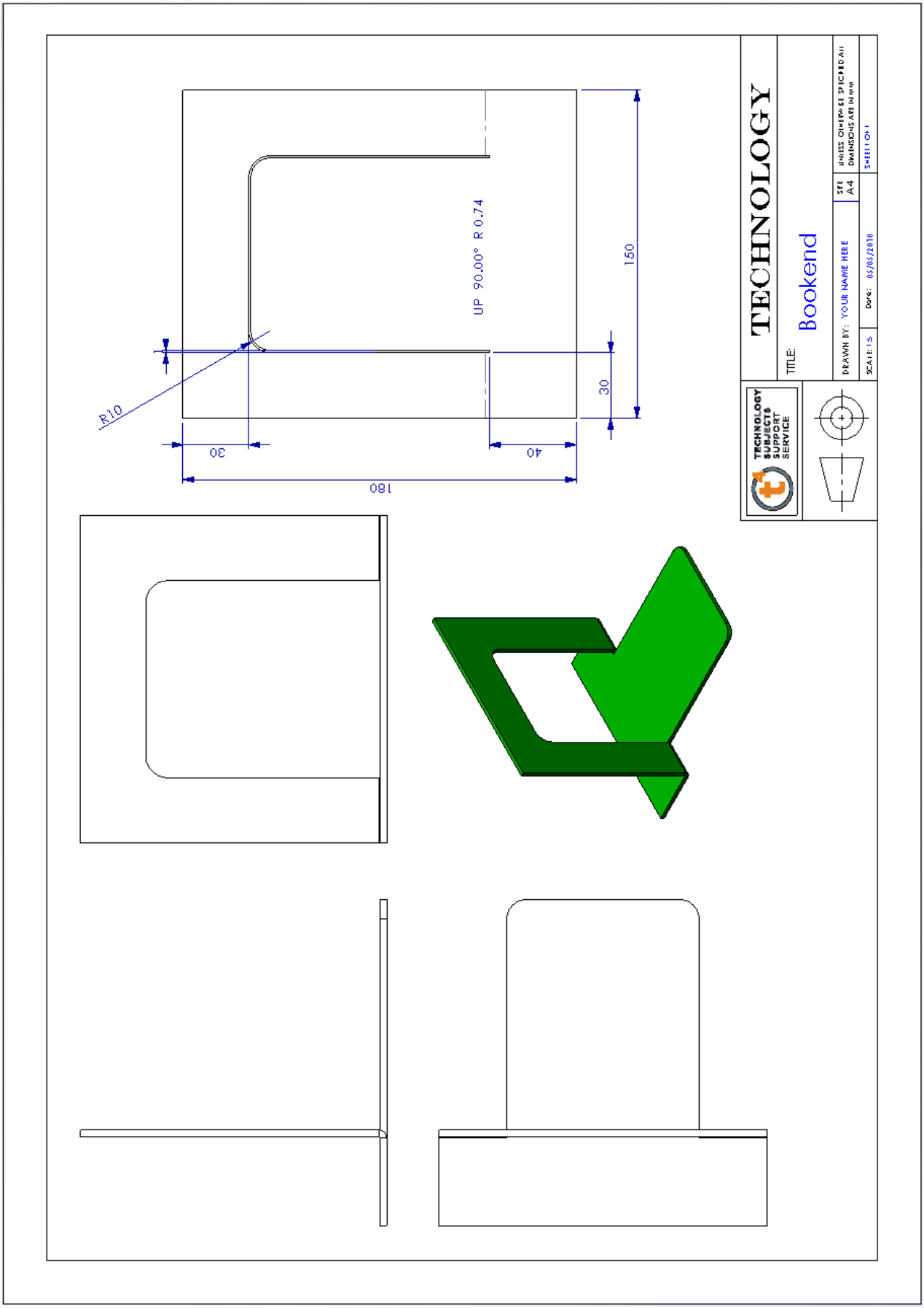
Suppress

Left click on **Flat-Pattern1** and choose **Suppress** to return to the unflattened state
or
Click on 'Flatten' in the sheet metal toolbar

Save

Save the 'Bookend' part file.




UP 90.00° R 0.74
150
30
R10
30
40
180
TECHNOLOGY
TITLE:
Bookend
DRAWN BY: YOUR NAME HERE
SCALE: 1:5
Date: 05/05/2010
SIZE
A4
UNLESS OTHERWISE SPECIFIED All DIMENSIONS ARE IN mm
SHEET 01 OF 1
TECHNOLOGY SUBJECTS SUPPORT SERVICE