

Solidworks/2014

3D Modelling Tutorial

L2



SOLIDWORKS

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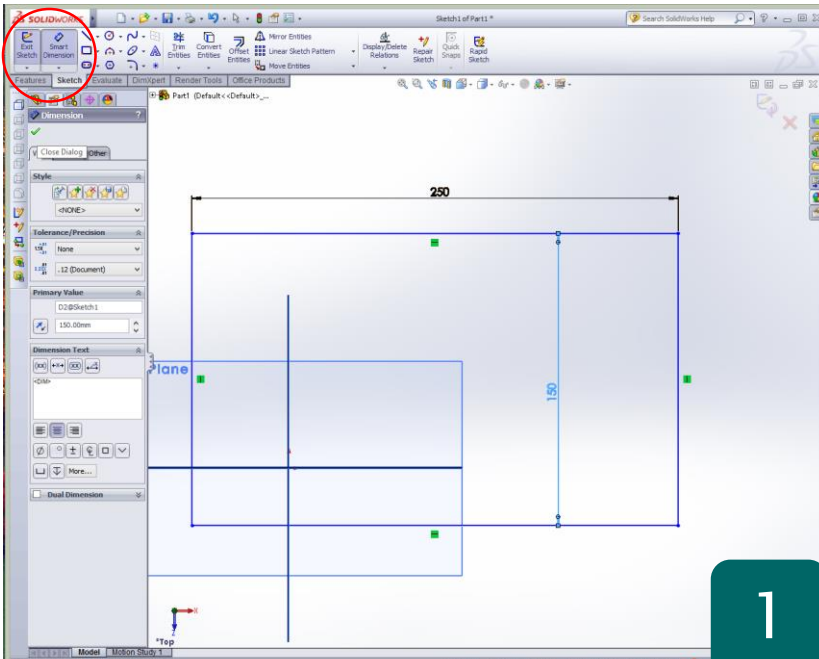
Learning Outcome; Coke Bottle Mould

Skill Level; 2 - Intermediate

3D; Assembly, Mate, Split, Cavity, Render

2D; None required

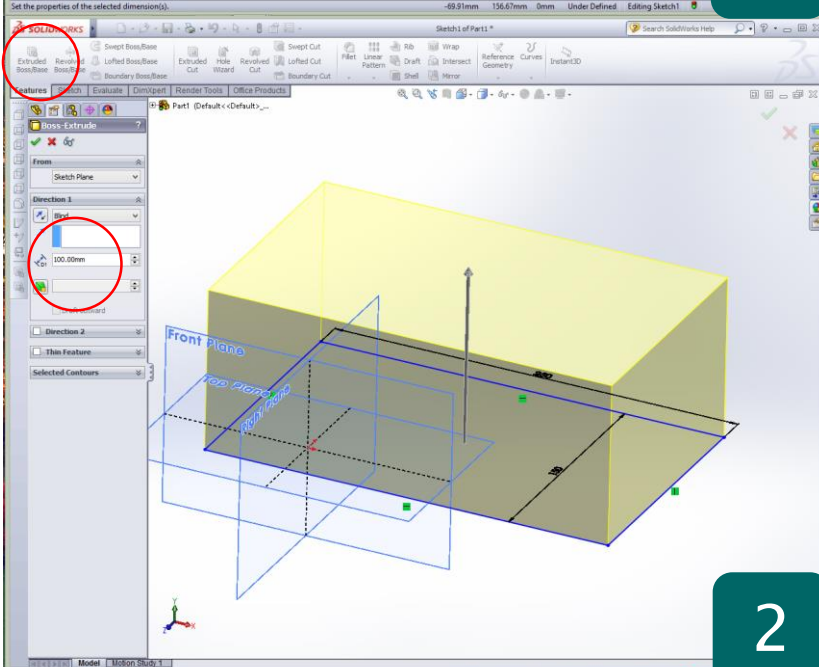




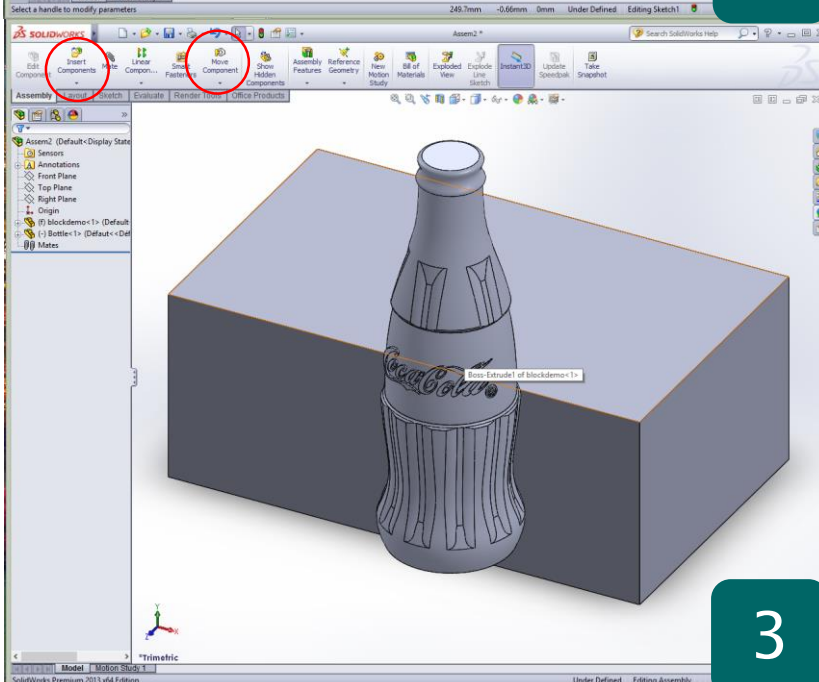
- Open Solidworks and start a new Part file
- 'Show' all work planes in the model tree
- 'Sketch' a rectangle on any plane and use 'Smart Dimension' to make it 250 x 150mm
- 'Exit Sketch'

- This tutorial will look at the use of the 'Cavity' and 'Split' features. The first uses one model to make a cutaway in second making it ideal for creating mould blocks for use in injection moulding etc.

- The Split tool then removes the two halves of the mould into separate part files



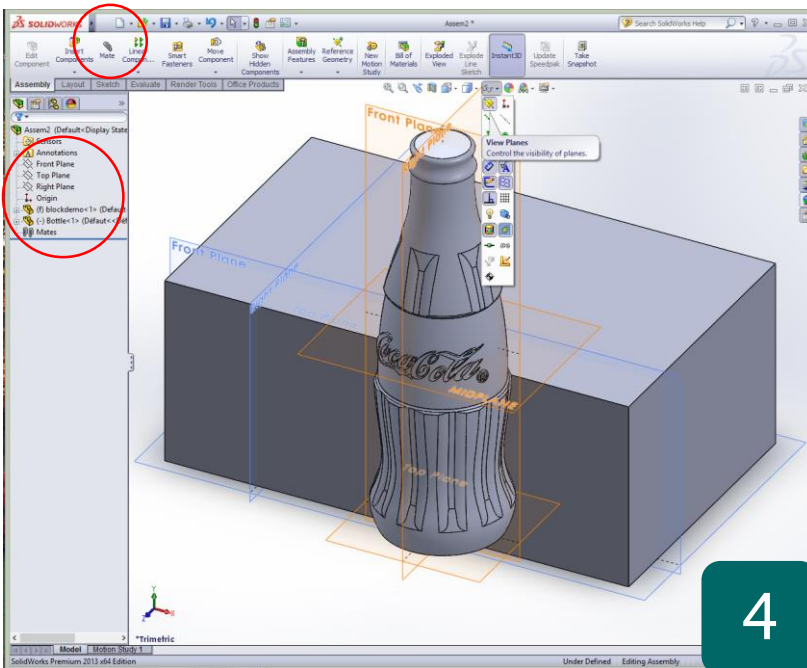
- Use 'Extruded Boss' to create a cuboid with a depth of 100mm
- Confirm with the green tick
- Go to the top toolbar and click File > Save
- Save as; 'MouldBlock' in your documents



- File > New > Assembly
- 'Insert component' in the 'assembly toolbar' and locate the 'MouldBlock' file
- 'Insert component' and this time find the 'Bottle' file from the shared area
- Shared > Design Technology > Mr Billington > CAD Tutorials
- Insert it into the assembly with the block
- Use 'Move Component' to line it up near the 'MouldBlock' file

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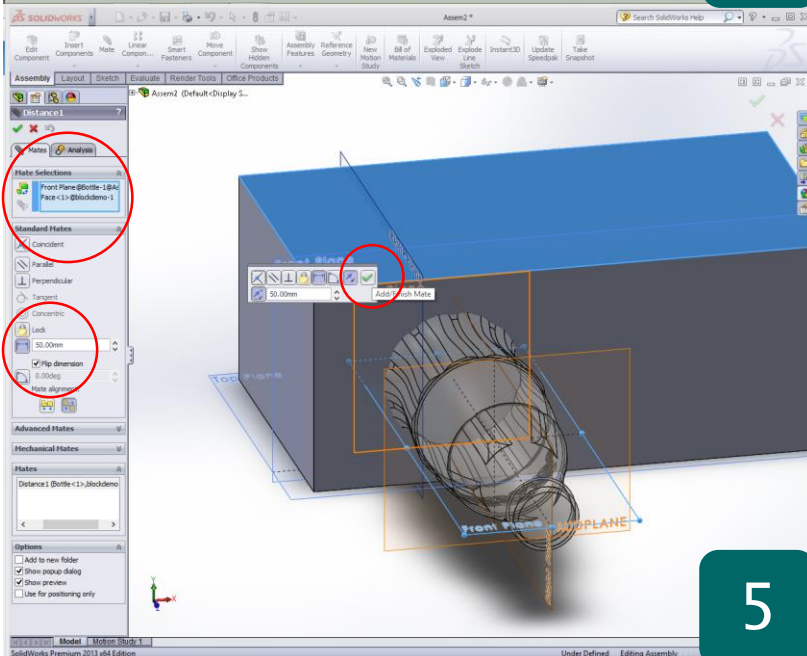
- Why? – As an assembly different features become available and allow multiple parts to affect each other's geometry



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- Click on the 'Hide/Show' items in the central toolbar
- Click on 'View planes'
- This will show the workplaces for both the block and the bottle
- This is vital for assembly as one part is cylindrical and the other a cuboid

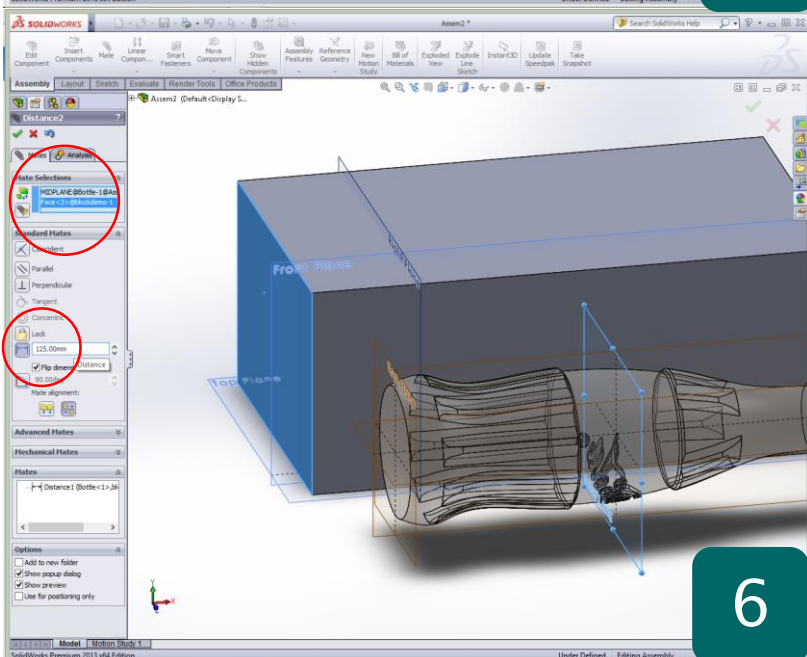
Why? – In this example the part is cylindrical and therefore they must be mated using the work planes. Often in an assembly this is the only method to mate two parts together so they are fully constrained



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- Click 'Mate' in the 'Assembly toolbar'
- Start by mating the; front plane of the bottle > Top face of the block
- Set the 'Distance' constraint in the feature menu to 50mm
- If it pushes the bottle away from the block, click 'Flip dimension'
- Confirm with the green tick

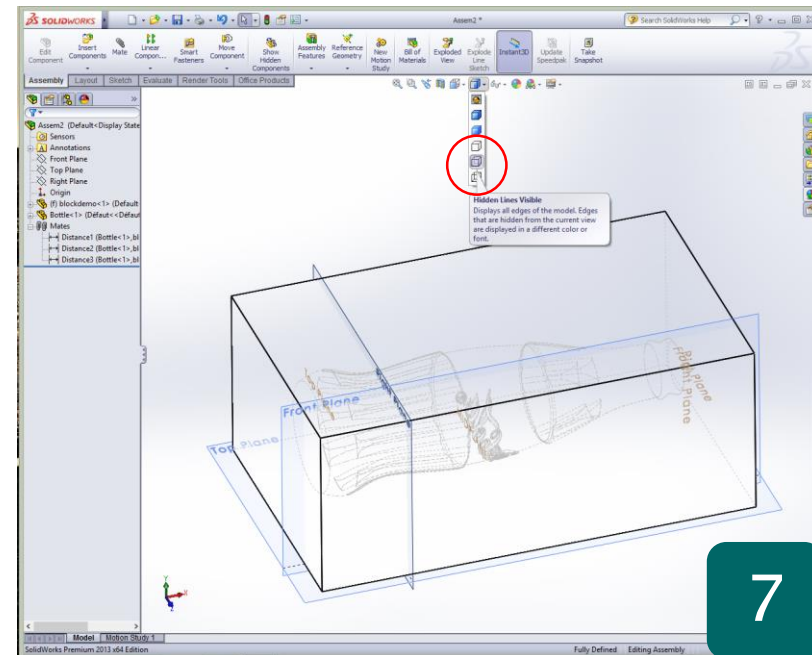
Why? – The bottle must be in the middle of the block so that when the 'Cavity' feature is used it removed materials in the centre allowing for 2 halves. The part can be mated anywhere if another outcome is required in the design



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- Apply the next 'Mate' using the work plane at the middle of the bottle
- Mate to end face of block
- Set the distance constraint to; 125mm
- Use the 'Flip dimension' option if required
- Confirm with the green tick

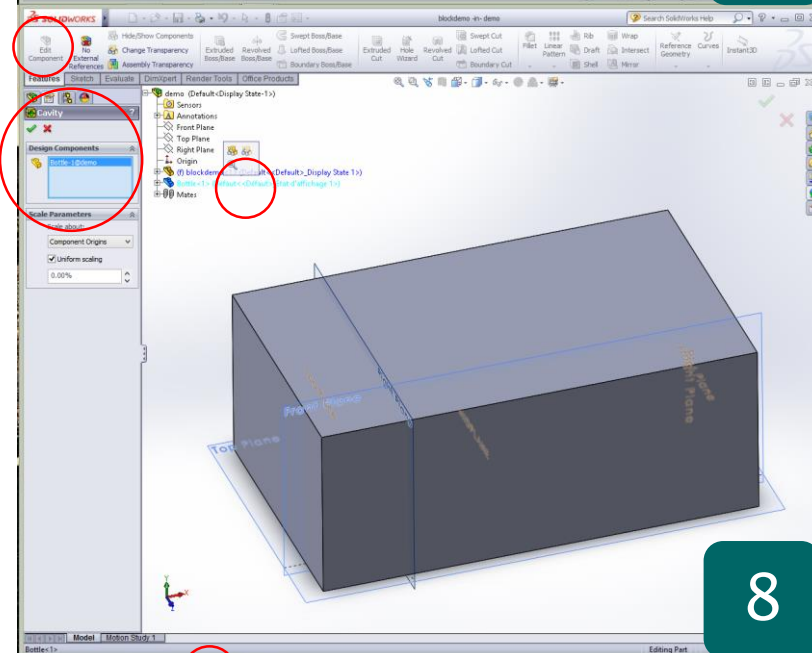
Why? – When mating objects as before they must be fully constrained unless the design intention is for them to move. When using the 'Cavity' tool it is necessary to constrain the parts fully in the X, Y & Z direction



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- 'Mate' and complete with the third mate using the side face of the block and the corresponding final plane of the bottle
- Set the distance constraint to **75mm**
- Check the location of the bottle by clicking on 'display style'
- Change the view to 'Hidden Lines Visible'
- The model should appear as shown
- Switch back to the standard display state

Why? – Often models may have hidden geometry which can be viewed simply by changing the display state. Over options such as 'wireframe' and 'render' can be very useful.

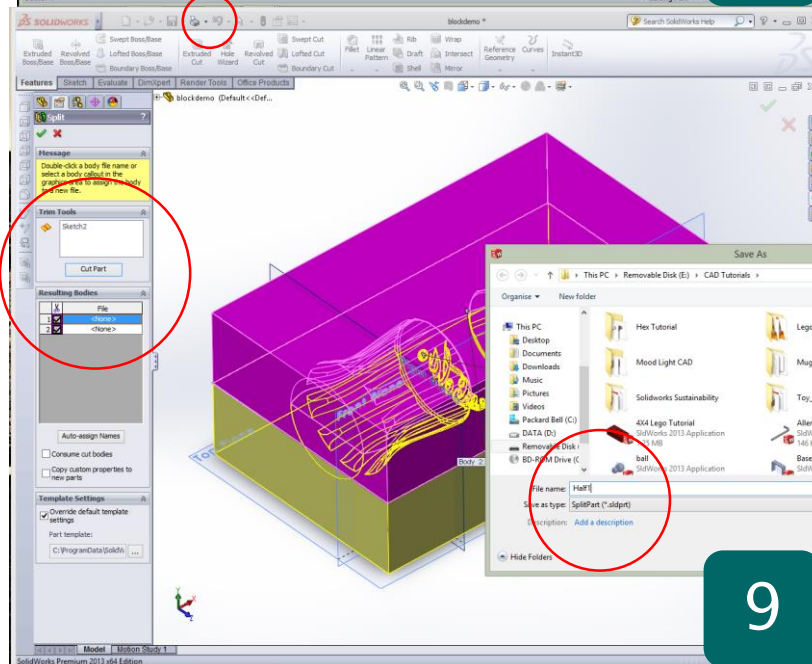


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- Click on 'MouldBlock' in the model tree and click 'Edit component' in toolbar
- Access top menu toolbar and click 'Insert'
- Scroll down the list to 'Features'
- Open this sub menu and click 'Cavity'
- This will load the feature menu shown
- Access the model tree at the top left corner of the workspace and select the 'bottle'
- Confirm with the green tick
- Save and close the Assembly file

- The bottle will have formed an indent into the mould block

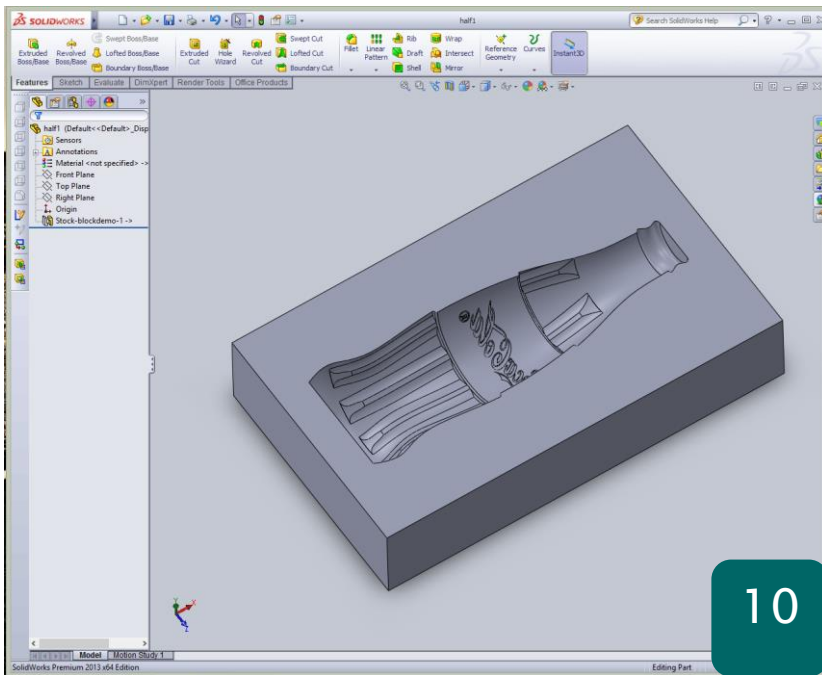
Why? – In the menu toolbar many of the features and other tools are found that are not displayed in the workspace toolbars such as 'Cavity'.



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- Open the 'MouldBlock' part file and notice 'Cavity' feature is now in the model tree
- The mould block now need to be split
- Select the end face and sketch a line from midpoint to midpoint horizontally
- **Exit Sketch**
- Access the top menu and click 'insert'
- Scroll to 'Split' and click to load feature
- Select the sketched line as the 'trim tools'
- Click 'Cut Part'
- Tick both boxes that appear & double click on the 'file' section to save; Block1 & Block2
- Confirm with the green tick

Why? – Each section of the model can now be saved as separate part files which can now be opened and edited to suit



- Save and close the 'MouldBlock' part file
- Open 'Block1' from the saved directory
- This part file can now be edited however required for the model and has no link to the original file
- Add **8mm** holes diagonal corners and a channel into the mould if required
- Apply fillets to improve the render and finish of the block
- Repeat with 'Block2'
- Model a 'pin' file with a **8mm** diameter to insert into each corner

Why? – The final finishing stages are optional and allows for a more realistic mould block. The pins would be used to secure the half together perfectly if used in the real world

