

# Manufacturing Research

## Vacuum Forming



Vacuum forming is a technique that is used to shape a variety of plastics. In school it is used to form/shape thin plastic, usually plastics such as; polythene and Perspex. Vacuum forming is used when an unusual shape like a 'dish' or a box-like shape is needed. Below you can see the stages involved in vacuum forming.



To the right is an example of a vacuum formed toy. The simple 'lorry' mould has been placed in a vacuum former and a compressed polystyrene sheet has been placed above it. The polystyrene has been heated and then vacuum formed to the shape of the mould.

Many everyday items have been vacuum formed in this way. Look around your home - list some examples. as a guide - some food products are packaged in vacuum formed materials.

I am now going to describe each stage of the vacuum forming process

By V.Ryan



1. First, a former is made from a material such as a soft wood. The edges or sides are shaped at an angle so that when the plastic is formed over it, the former can be removed easily.

2. The former is placed in a vacuum former.



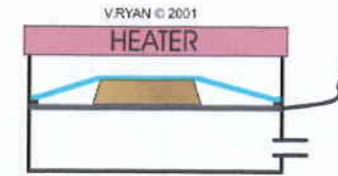
PLASTIC SHEET IS PLACED ABOVE THE MOULD AND CLAMPED SECURELY.

4. The heater is then turned on and the plastic slowly becomes soft and pliable as it heats up. The plastic can be seen to 'warp' and 'distort' as the surface expands.



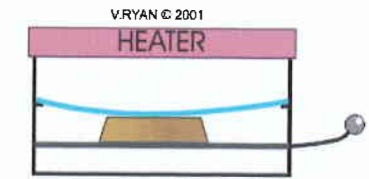
THE ELECTRIC HEATER IS TURNED ON TO WARM THE PLASTIC SHEET.

5. After a few minutes the plastic is ready for 'forming' as it becomes very flexible.



MOULD MOVED UPWARDS

6. The heater is turned off and the mould is moved upwards by lifting the lever until it locks in position.

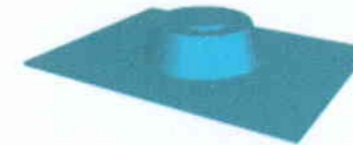


THE PLASTIC BECOMES FLEXIBLE WHEN HEATED

7. The 'vacuum' is turned on and this pumps out all the air beneath the plastic sheet. Atmospheric pressure above the plastic sheet pushes it down on the mould. At this stage the shape of the mould can be clearly seen through the plastic sheet. When the plastic has cooled sufficiently the vacuum pump is switched off.



THE AIR IS PUMPED OUT OF THE AREA BELOW THE PLASTIC AND MOULD.



8. The plastic sheet is removed from the vacuum former. The sheet has the shape of the former pressed into its surface.

9. The excess plastic is trimmed so that only the plastic bowl remains - the completed item. An enlarged view of the final dish is seen opposite.



The final completed dish is the result of vacuum forming. Without a material such as polystyrene or a similar type of plastic, it would be very difficult to manufacture a dish like this.

Vacuum forming allows us to make unusual shapes with ease. You may find it is a good technique for your projects. The final completed dish is the result of vacuum forming. Without a material such as polystyrene or a similar type of plastic, it would be very difficult to manufacture a dish like this.

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## EVALUATION

From my research I found that injection moulding will be the best method for making my helmet because this method is good for thermo-set plastics and the material that I am going to use is a thermo-set plastic and also it is a short and effective method.

I didn't choose the other methods because they required more time and also they were more complicated methods to use where as injection moulding was a simple and effective method for making my helmet However the Vacuum forming method is also a very good and effective way to make my cricket helmet and I will be using this method because I do not have the equipment to injection mould my product even though injection mould is what may be used by helmet manufacturers because of how good it is.

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