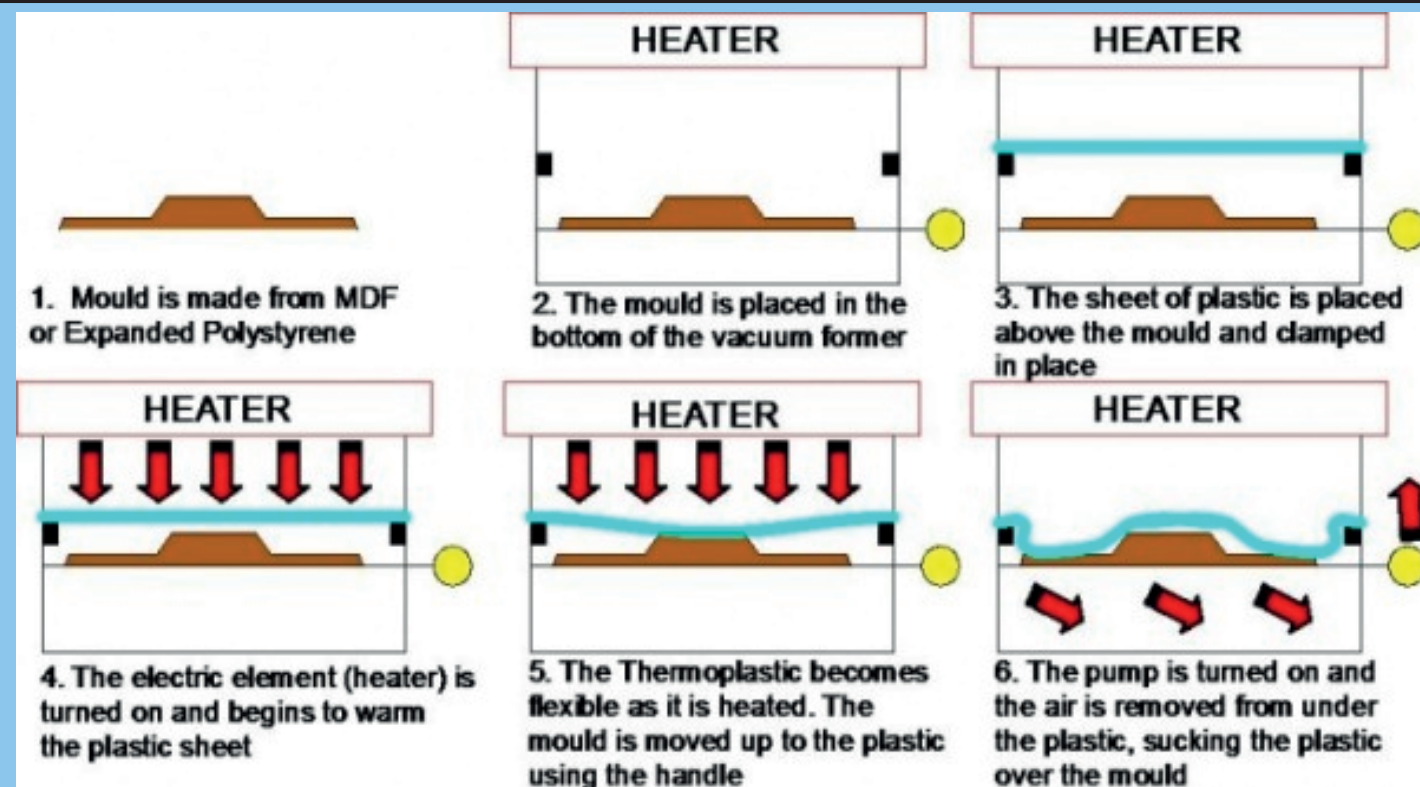


VACUUM FORMING

Vacuum forming is a type of thermoforming. Thermoforming is one of the oldest and most common methods of processing and forming plastics. Vacuum formed products are everywhere and all around us, they play a big part in our everyday lives. Examples of these products could be plastic chairs you find in schools, food containers and packaging, plastic plant pots, safety helmets (hard hats) and parts of cars.

Vacuum forming involves a sheet of material clamped to a heater with an air tight seal, this is then heated to an optimum thermoforming temperature before the heater is moved away and a mould is moved up into the heated sheet so the sheet drapes over the mould. This causes the sheet and the mould to form an air-tight pocket that is connected to a vacuum pump, which then pumps air out from between the two removing air which is preventing atmospheric pressure from pushing the sheet down on to the mould. Then the sheet cools down and the mould can be removed, leaving you with a sheet of material with the form you made using the mould inside. This is now ready for post processing.



COST

Vacuum forming, compared to other manufacturing processes such as injection moulding and rotational moulding, is much cheaper. The tooling costs are low and the parts needed for the process, such as materials, are also relatively cheap. The moulds used might be more or less expensive depending on the material used a steel mould would be more expensive to make but it would last longer, compared to a mould made of a cheaper material such as plywood which would not last as long as a steel mould after repeated use, therefore another mould would have to be made. Vacuum forming also uses lower forming pressures which means the cost of tooling is lowered.

POST PROCESSING

For vacuum forming post processing involves the trimming of excess material around the formed part. Sanding and polishing any rough edges. If holes are required in the finished products then holes must be drilled in areas indicated or made during the vacuum forming process.

DESIGN CONSIDERATIONS

The first consideration would be is vacuum forming the right process to use and will this achieve the best results, factors that may effect this are the size and shape of what it is you want to make. Material choice also need to be taken into account. Is the material suitable for this process, if not then that may effect the design of what your making therefore changes might have to be made. You must consider the work after the forming and the post processing involved in getting your finished product. Is it cost-effective to have a mould made and then vacuum formed.

TIME AND VOLUME

The time it takes to heat up the material and the cooling it down varies from material to material. If the material used needs to dry and cool down after it can take between one and two hours to dry. the type of heater used can also effect the time needed for vacuum forming, for example a ceramic heater can take 10-15 minutes to heat up. Vacuum forming is a batch production method or a one off sort of method to produce a single piece of material formed into a unique form.

MATERIALS AND MOULDS

POLYESTER COPOLYMER PETG

POLYSTYRENE PS

POLYCARBONATE PC

POLYVINYL CHLORIDE PVC

ACRYLIC PMMA

ABS (FLAME RETARDANT, ANTIBACTERIAL AND TEXTURES)

ACRYLIC CAPPED ABS (FOR EXCELLENT UV AND HIGH GLOSS)

POLYETHYLENE AND POLYPROPYLENE (CHEMICAL, RESISTANCE).

POLYCARBONATE (FOR HIGH IMPACT)

HIPS (FOR SANITARY APPLICATIONS)

SPECIALITY MATERIALS MEETING FIRE, SMOKE AND TOXICITY REGULATIONS

CARBON FIBRE

MOULDS ARE TYPICALLY MADE FROM PLYWOOD, HARDWOODS, HARDENED CLAY OR MDF.

HOWEVER IN INDUSTRY MOULDS MAY BE MADE FROM STEEL OR LEAD, SPARE NO EXPENSE.

STEEL MOULDS TEND TO LAST LONGER THAN WOODEN MOULDS.

THIS IS VERY IMPORTANT IF MANY PLASTIC SHAPES ARE GOING TO BE PRODUCED AND THE SHAPE IS REQUIRED TO BE EXACTLY THE SAME ON EACH PRODUCT.

SUPPLIERS

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