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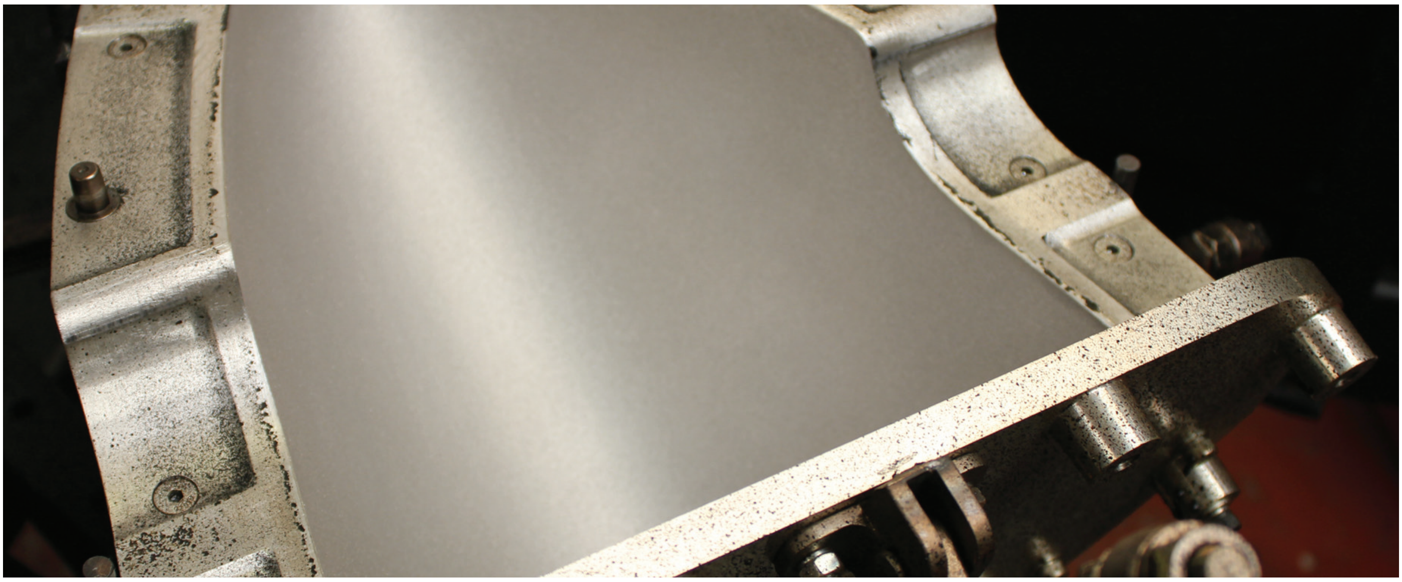
Tools & Moulds



> tecni-form carefully consider the customer's specific application before making a recommendation as to which of the 5 processes of mould making should be applied

Moulds used for rotational moulding

- Rotational moulding tools cost less than one-fifth of their injection or blow moulding equivalents
- Good quality moulds cost less in the long run
- tecni-form offers five different methods of making moulds.

The quality of a rotational moulding is dependent on many factors. The most fundamental, but sometimes overlooked, is the quality of the moulds. To achieve optimum quality and appearance of product the use of good quality moulds is crucial.

Not surprisingly the best quality moulds tend to cost more when new, but prove the lowest cost solution during their life. Cheaper, poorer quality moulds produce more defects in the mouldings made from them, need more costly maintenance and repair, and have a shorter life.

Given the tecni-form commitment to quality mould tools, the next factor to be considered is the method of manufacture of the mould. tecni-form carefully consider the customer's specific application before making a recommendation as to which of the 5 processes of mould making should be applied. The most common methods are cast or CNC machined aluminium; but they also offer electroformed or sheet steel tools for volume production and flame sprayed or composite moulds for your prototype parts. There are more details and guidance on other pages.

The lower cost of rotomoulding tooling compared with other plastic moulding methods is an important advantage, especially for shorter production runs.

Cast Aluminium

“ Cast aluminium is still the most cost-effective method for complex mouldings

Reasons to use

- Still the most cost-effective method for complex mouldings
- Suitable for small- to large-sized mouldings
- Ideal for higher volume applications as multiple cavities can be produced at lower cost
- Can provide a range of surface finishes produced by shot peening, photo-etching, or cast in
- Tools can be modified to accommodate design changes.

Method of manufacture

A model of the product is made (with casting contraction and moulding shrinkage added) onto which epoxy resin is laid-up by hand, to become a reverse pattern. The resulting pattern is then transferred to a foundry where aluminium castings, similar in shape to the pattern, are produced. These castings are subject to machining and other engineering process, to create the finished tool.

There are a number of variations on this theme, such as the direct CNC machining of the patterns, the use of flexible patterns to allow undercuts in the tool, and the use of plaster instead of the usual foundry sand.

Where the quantity of the required rotomouldings suggests that multiple cavities, or moulds are required, the cost of second and subsequent moulds is significantly lower than the original mould.

CNC Machined Aluminium

“ Well-suited to higher volume applications as multiple cavity moulds can have lower cost

Reasons to use

- Cost-effective method for complex mouldings
- Well-suited to small to small- and large-sized mouldings
- High accuracy of cavity dimensions, form and surface definition – resulting mouldings have sharper surface definition
- Shorter lead-time than for cast aluminium
- Well-suited to higher volume applications as multiple cavity moulds can have lower cost
- Can receive a huge range of surface finishes produced by shot peening, photo-etching, or CNC machining
- Tools can be modified to accommodate design changes.

Method of manufacture

Aluminium plate or block is machined by methods similar to those used for injection or blow mould tooling. CAM software is used to create the cavity (with moulding shrinkage added) from the supplied CAD model of the required product. As rotational moulding tools are shells with a wall thickness of about 10 mm, a toolpath is also created for the outside. In some cases the outside is machined before the inside so that stresses relieved during machining do not affect the accuracy of the cavity.

Where the quantity of the required rotomouldings suggests that multiple cavities, or moulds are required, the cost of second and subsequent moulds is lower cost than the original mould.

Sheet Steel

“ A cost effective method for larger mouldings with low complexity of shape

Reasons to use

- Cost effective method for larger mouldings with low complexity of shape
- Short lead-times can be achieved
- Tools can be modified to accommodate design changes
- Selective local insulation of areas of the tool to prevent unwanted build up of moulding material is particularly effective.

Method of manufacture

Tools are fabricated by welding pre-formed sheet steel sections together and hand machining the welds to avoid visible seams on the moulding. The combination of modern sheet steel punching, bending and forming equipment and traditional sheet steel hand working methods does allow surprisingly complex forms to be created. Compound curvature and fine detail are not readily achieved.

Tools are usually fabricated from 1.6 mm to 2.5 mm thick mild or stainless steel. Areas of the mould can be selectively insulated in order to create patches which are cooler during moulding of the products, resulting in thinner wall sections at those points.

Electroformed

“ High accuracy of cavity dimensions, form and surface definition

Reasons to use

- Only method available for creation of tools with extremely complex undercuts
- Cost effective method for complex mouldings
- Well suited to small to small/medium sized mouldings
- High accuracy of cavity dimensions, form and surface definition
- Well suited to higher volume applications as much of the cost of the manufacture of the first tool is not repeated for subsequent tools
- Can receive a huge range of surface finishes usually produced by laminating onto the master model.

Method of manufacture

Secondary wax models are produced from a master model. The wax models are put into an electroplating bath and receive a coating of nickel (0.5 – 1 mm) followed by a coating of copper (3 – 5 mm), after which the wax is melted out to create a nickel / copper shell. Additional metallic components (mounting frame, flange plates, etc.) are then brazed onto the shell to create the mould tool.

This method is used mostly (but not exclusively) for its ability to create extremely complex undercuts combined with very high surface definition. Good examples are automotive dashboards, grab handles and armrests; dolls’ heads and torsos; and vehicle handbrake and gear lever gaiters.

Prototype Moulds

> “ Very short lead-times can be achieved

Flame sprayed

Note: This method is currently only suitable for prototype tooling

Reasons to Use

- Very short lead-times can be achieved
- Well suited to small to small/medium sized mouldings
- High accuracy of cavity dimensions, form and surface definition.

Method of manufacture

A model (with casting contraction and moulding shrinkage added) has zinc flame sprayed on to it. External flanges and other details may be also sprayed on. Unlike tools made for injection moulding and blow moulding there is no need to back up the flame sprayed shell with other materials to give strength and to form the bolster.

Composite

Note: This method is currently only suitable for prototype tooling

Reasons to Use

- Very short lead-times can be achieved
- Well suited to small to small/medium sized mouldings
- Good accuracy of cavity dimensions and form.

Method of manufacture

A model is made (with moulding shrinkage added) onto which the pieces of the tool are laid-up by hand using high temperature grades of epoxy resin with carbon fibre reinforcement.