

Rotational Moulding

Introduction

Rotational moulding is a process used to make hollow plastic products, like toys, balls and tanks for various fluids. The process involves placing a measured amount of polymer into a mould, closing the mould and then rotating it so that polymer flows all over the inside of the mould.

As the polymer solidifies, it forms a thick film of polymer all over the inside of the mould. When the polymer has solidified, the mould is opened and the hollow plastic product is taken out.

Thermoplastics and thermosetting plastics may be rotational moulded, (rotomoulded).

Rotational moulding thermoplastics

Thermoplastics used for rotational moulding can be in the form of granules, polymer powder, flock or a vinyl Plastisol. Plastisol is a vinyl compound that consists of PVC particles suspended in a liquid plasticiser. It is liquid at room temperature but forms a rubbery PVC material when it is heated to about 177°C.

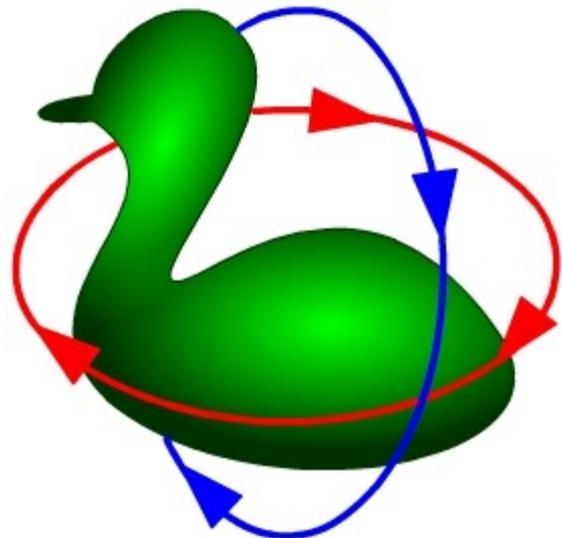
The moulding process

A metal mould is charged with thermoplastic polymer; it is closed and rotated along two axes in an oven. The polymer granules are tumbled inside the mould. Polymer granules begin to stick to the mould cavity as the temperature rises inside the mould. When the temperature inside the mould reaches the melting temperature of the polymer, the polymer melts fully and flows around the inside of the mould, coating it with an even layer of polymer.

When the polymer has had time to melt properly and flow around the mould, the mould is removed from the oven. Rotation of the mould continues as the mould is removed from the oven and as the mould is cooled either by the use of fans or by being sprayed with a fine mist of water. Once the mould is cold, rotation stops and the mould is opened.

The hollow plastic product is removed from the mould.

When Plastisol is used to charge the mould, then the Plastisol is washed around the mould cavity as the mould rotates. Heat from the oven warms the mould and at about 177 °C, the Plastisol cures and forms a rubbery PVC coating on the inside of the mould. The mould is removed from the oven and is cooled, either by fans or a fine mist of water. The mould continues to be rotated until the mould is cold.



Hollow plastic duck produced by rotational moulding

Rotational moulding thermosetting plastics

Rotational moulding of thermosetting plastics involves placing a measured quantity of polymer resin mixed with catalyst and hardener into a mould, closing it and rotating the mould along two axes. The uncured resin is fluid and flows around the mould as it is rotated. As the resin and hardener begin to react, an exothermic reaction occurs and the resin heats up. The resin cures and slowly cools down.

Thermosetting plastics do not need to be heated in an oven during the rotational moulding process. The chemical reaction between the resin and hardener is sufficient to cure the resin.

Once the resin has cured, the mould is opened and the rotomoulded product is removed.