

Materials for Rotational Moulding

Overview:

Rotational moulding, also known as rotomoulding, is a plastics moulding technology which is ideal for making hollow articles. It is a casting technic but unlike most other plastics processes there is no pressure involved. Moulds for the process are relatively inexpensive as they do not have to withstand pressure and therefore relatively short production runs can be made very economically.

Rotomoulding is used to make a very diverse range of products. The process offers the product designer exceptional freedom as just about any shape can be produced. There is almost no limit to the size of mouldings and there are literally thousands of applications.

Overview

Rotational Moulding (or Molding using the American spelling) is a unique process that is very versatile and is virtually unlimited in the shapes and products that can be produced.

Designers and moulders are pushing the limits and demanding a wider variety of materials to meet more challenging application's.

As the process requires the material to be subject to much longer heat cycles compared to other processes such as injection and blow moulding, materials for Rotational moulding require an enhanced heat stabilisation additive package to prevent oxidation and break down of the material properties. In addition all Rotational moulding grades supplied should contain a UV stabilisation additive package making them ideal for outdoor as well as indoor applications. Therefore materials available on the general market for other processes should not be used for Rotational moulding.

For these reasons and due to the lower volumes used worldwide for the Rotational moulding process, the materials that are available are limited from the thermoplastic suppliers.

Polyolefin are the largest group of thermoplastics and are often referred to as commodity resins.

These mainly consist of polyethylene and polypropylene grades.

The term polyolefin means “oil like” and refers to the oily or waxy feel that these materials have.

They are very popular, because of the low cost and wide range of applications.

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1 Common Materials in Rotational Moulding

1.1. Polyethylene (PE)

The most common material used in Rotational Moulding is Polyethylene (PE) which can also be divided into different categories

1.11 Linear Low-density polyethylene (LLDPE)

Linear Low-density polyethylene (LLDPE): is the most common of the Roto polyethylene group and covers a wide range of grades from low to medium stiffness for numerous applications. Most grades used for Rotational moulding come under this category.



1.12 High Density Polyethylene (HDPE)

High Density Polyethylene (HDPE): is used for application requiring higher rigidity, surface hardness, toughness, increased chemical resistance and ideal for large tanks or performance orientated products.



1.13 Cross Linked Polyethylene (XLPE)

Cross Linked Polyethylene (XLPE): Is a plastic material that strengthens considerably during the moulding process by crosslinking the plastic molecules. Some benefits of using XLPE for your products are enhanced impact resistance, ductile strength, improved Environmental Stress Crack Resistance (ESCR), higher abrasion and sustainability in cold temperatures.



1.14 Manufacturing of Polyethylene (PE)

During the manufacture of Polyethylene (PE) a variety of catalyst and co-monomers can be used which also have an effect on the properties of the PE.

Butene: Is the most common providing low cost, good mechanical properties and the most widely used.

Hexene: More grades have been available in the recent past providing a higher quality material with superior mechanical properties and ideal for products requiring improved mechanical properties than Butene grades.

Octene: Less grades are produced with this co-monomer in recent times due to the commercial cost and are being superseded by Hexene grades.

2 Other Materials in Rotational Moulding

2.1 Polypropylene (PP)

Polypropylene (PP): This material offers greater rigidity than polyethylene and has a higher heat distortion temperature. It possesses excellent chemical and environmental stress crack resistance, however exhibits low impact strength at cold temperatures.



2.2 Nylon (PA)

Nylon (PA): These materials offer full engineering material performance for rotational moulding applications. In the case of nylon 11 and 12 they are processed in the presence of air, without degradation of the polymer, in the case of nylon 6 an inert atmosphere has to be used (normally nitrogen) which makes processing more complex, although the lower material cost of this grade compensates for the difficulty in processing.



2.3 Polycarbonate (PC)

Polycarbonate (PC): A very clear transparent material with high stiffness, in built flame retardancy, however a lower impact resistance that also requires high technical processing.



2.4 Plastomer

Plastomer: Flexible materials that have soft touch and rubber-like qualities, are easy to process, excellent impact which can vary in the stiffness depending on grades. Ideal for road bollards, fenders and products requiring excellent impact strength.



2.5 Thermoplastic elastomer (TPE)

Thermoplastic elastomer (TPE): A range of flexible grades having unique attributes, easy to process, soft touch, with high and low temperature resistance properties. Ideal for under bonnet vehicle applications such as air ducting.



2.6 Plasticised polyvinyl chloride (PVC)

Plasticised polyvinyl chloride (PVC): available in a liquid form, (plastisol). PVC has excellent weathering and ageing characteristics and is highly resistant to certain chemicals. Flexibility, impact and temperature performances differ according to grade. Because of their elastomeric qualities, the softer grades of PVC are commonly employed where rubber-like qualities are required.



2.7 Polyvinylidene fluoride (PVDF)

Polyvinylidene fluoride (PVDF): On top of the list regarding high chemical resistance, outstanding environmental stress crack resistance, inherently flame retardant, excellent impact and heat resistance. Used when other materials cannot perform for the application due to the mechanical properties.



2.8 Roto lining

Roto lining: Is a material that has been chemically modified to allow the resin to adhere to metals or other resins. This plastic forms a chemical bond to polar materials and can be used to line metal vessels for corrosion and chemical resistance.



2.9 Foams (PE based)

Foams (PE based): Foams are used in providing properties such as thermal and sound insulation as well as to provide higher stiffness at lower weight. They can be used as a one-shot process in granules (PE powder and Foam granules) or as two and three shot laminates as well. (PE/Foam/PE).



3 Additives

There are a variety of additives available to enhance the PE materials for certain applications. The most common additives used are, flame retardants, anti-microbial, and anti-static.

Regards

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