
The processing of Ultraform®

Ultraform® can be processed by all methods suitable for thermoplastics. The most important methods are injection molding and extrusion. Injection molding allows even the most complicated moldings to be mass-produced very economically. The extrusion process is used to manufacture rods, pipes, profile sections and sheet, most of which are further machined by cutting tools to form finished parts.

General notes

Preliminary treatment

The granules or pellets in their original packaging can generally be processed without any special preliminary treatment. However, granules or pellets which have become moist due to prolonged or incorrect storage must be dried in suitable dryers, e.g. dehumidifying dryers, for approx. 3 hours at about 100°C to 110°C.

Start-up and shutdown

The processing machine containing Ultraform® is started up in the usual manner for thermoplastics. The barrel and nozzle heaters are set to achieve melt temperatures of 180°C to 220°C. After this the optimum processing conditions must be determined in trials. See also "Safety notes".

When there are relatively long work stoppages or on shutdown the machine should if possible be run until it is empty and the barrel temperature lowered.

When the processing machine is re-started, care should be taken to ensure that the die is first heated up to about 200°C. This measure prevents blockage of the barrel by a cold plug of material.

Self-coloring

Ultraform® can be colored during processing. The following should be observed in this context:

- Only colorants and auxiliaries that do not affect the thermal stability of Ultraform® and that are themselves stable under the prevailing processing conditions can be utilized to color Ultraform®.
- In actual practice, coloring systems on the basis of powdered pigments, liquid colors and masterbatches (polyolefin or preferably POM substrate material) are successfully employed. Uniformity of the color distribution can usually be achieved by means of elevated back pressure and a low screw speed.
- The presence of pigments (type and amount) as well as the presence of a masterbatch support material alter the mechanical and tribological properties as well as shrinkage and warpage behavior of Ultraform® by comparison with the uncolored material. Tests on finished parts will provide information as to whether the demands made of the parts are being met.
- In most cases, good results can already be obtained with conventionally configured processing installations to which a colorant metering unit has simply been added. If very high demands are being made, it is recommended that special mixing elements be employed.
- If self-colored parts are used in contact with food, the special provisions of food legislation must be observed (see "Safety notes").

Additional information can be found in the brochure "Self-coloring of Ultraform®".

Re-processing

Ground-up waste material consisting of sprues, rejects and the like can be recovered by mixing it back in. However, they must not be dirty or damaged during the preceding processing. Factors that can influence the material decomposition are:

- severe shearing
(high screw speeds, gates that are too small, etc.)
- temperature too high or residence time too long
- incompatible pigments used in self-coloring
- foreign matter or other impurities
- moisture.

The grinding procedure can also damage the plastic. Mills running at a low speed have proven their worth for the grinding operation; any adhering dust should be removed. Prior to the re-processing, it is recommended to dry any ground-up material that has been stored for a prolonged period of time. In actual practice, 10 to 15 percent, occasionally even up to 30 percent of ground-up material, is admixed.

In the case of fiberglass-reinforced products, the glass fibers can be shortened during the processing and also during the grinding. If large quantities of such a type of ground-up material are admixed to the new material, then the shrinkage, the warpage and especially the mechanical properties can be affected.

The addition of ground material to the original granules can adversely affect the normal feed behavior. For that reason it should only be added to a production run if it is certain that it will not disturb the processing conditions or impair the properties (e. g. impact strength) of the finished parts.

Compatibility with other thermoplastics

The Ultraform® grades can be mixed with one another and with other polyoxymethylenes. Due to the limited homogenizing action of the processing machine, excessively large differences in viscosity must be avoided. Ultraform® is immiscible with most other thermoplastics. Even small amounts of such extraneous materials become evident in the form of a laminate structure, particularly in the vicinity of the sprue. The result is the well known flaky pastry effect.

Contamination of Ultraform® by thermoplastics exercising a destructive effect on POM, e. g. PVC, must be avoided without fail. Mixtures with thermoplastics containing halogen-based flame retardants must also be excluded. Even small amounts can bring about uncontrolled and rapid decomposition of Ultraform® during processing.

When ground material is added, it is therefore important to take special care that the material is clean, free of dust and homogeneous.

When changing over to other thermoplastics or from other thermoplastics to Ultraform®, it is advisable to purge the barrel with a granular PE or PP material or suitable cleaning compounds.

In general, once the required temperatures have been set, production can be resumed, the first few moldings being rejected. When changing over from PVC to Ultraform® and vice versa it is essential to purge the processing machine thoroughly and then clean it mechanically.



Toy dragon