

Fabrication and finishing processes

Machining

Semi-finished parts made from Ultraform® can be machined with all conventional machine tools. As a general rule of thumb cutting speeds should be high and feed rate low.

Joining methods

Parts made from Ultraform® can be joined at low cost by a variety of methods. The mechanical properties of Ultraform®, especially its toughness, allow the use of self-tapping screws. Ultraform® parts can be connected without difficulty to one another or to parts made from other materials by means of rivets and bolts.

Snap-in and press-fit connections can also withstand high stresses. Ultraform®'s outstanding elasticity and strength, even at high temperatures, are particularly suitable for this form of construction.

Ultraform® parts can be welded by heating-element (thermal contact and radiation) methods, and by ultrasonic, vibration and spin welding methods. Only high-frequency welding is not feasible for Ultraform® on account of the low dielectric dissipation factor.

The laser irradiation welding method is suitable for combinations of parts molded from Ultraform® which is transparent to IR radiation (e.g. natural-colored) and parts molded from Ultraform® absorbing IR radiation (e.g. black). In this way very clean welded joints can be produced without flash.

Ultrasonic welding is preferred in cases where short welding times and ready integration into fully automated production flows are required. The strongest welded joints are achieved with the heating-element method.

Apart from the welding method and the welding parameters, the geometry of the mating surfaces is of great importance for the quality of the welded joints. It is therefore advantageous to choose the best method at the design stage and then to design the mating surfaces accordingly.

Adhesive bonding

In order to activate the non-polar material, it is necessary to pre-treat the surfaces, e.g. by etching, priming or corona discharge.

Adhesive bonding is possible only with pressure-sensitive adhesives. The joint obtained is impervious to gas, air and moisture, but has only low mechanical strength.

Since the pre-treatment, primer and adhesive form a single system, adhesives suppliers or the BASF Application Engineering experts should be contacted to provide help in solving bonding problems.

Printing, embossing, varnishing and metallization

Ultraform®'s hard, smooth surface and high resistance to chemicals have an adverse effect on the bonding strength of coatings. The usual methods of pre-treating plastics do not afford satisfactory results.

The use of certain printing inks in conjunction with a subsequent, brief flame treatment or with high-temperature ageing translates into high adhesive strength without the need for any special pre-treatment. Please consult the BASF Applications Engineering experts for the clarification of any specific questions.

Embossing films are available for hot stamping which exhibit adequate adhesion even without pre-treatment of the surfaces.

Electroplating

Surface pre-treatment is necessary for the production of electroplated moldings. Parts made from Ultraform® can be electroplated by the method commonly used for ABS. The first stage in the process, however, etching with chromosulfuric acid, is replaced by acid treatment in dilute sulfuric or nitric acid.

It is imperative that the use of baths containing hydrochloric acid be avoided.

To remove any superficial acid residues the parts are then immersed in a weakly alkaline bath and rinsed thoroughly. The rest of the process is as for ABS.

Using this method relatively firm anchorage of the metal layer to the molding is achieved, as has been confirmed by cyclical temperature tests in the automotive and sanitary ware industry.

Laser marking

Table 5 provides an overview of the suitability of undyed and black Ultraform® to be marked by various lasers. Nd:YAG lasers having a wavelength of 1064 nm are often employed for printing. In general, black Ultraform® grades – color code “black 11020” in particular – enable high-contrast lettering and images with Nd:YAG lasers.

Laser	Wavelength	Uncolored Ultraform®	Ultraform® black 120
UV	308 nm	–	light marking
UV	355 nm	–	light marking
Nd:YAG “green”	512 nm	–	light marking
Nd:YAG	1064 nm	–	light marking
CO ₂	10.6 μm	engraving	engraving

Table 5: Laser marking performance of Ultraform®



Gear wheels