Guideline for processing PLEXIGLAS ®Films

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Technical Films

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PREPARATION

• Surface protection

PLEXIGLAS und EUROPLEX Films are normally masked with protective films (PE-films) on both sides. Due to surface contamination, it is best to leave the protective film in place until the part is ready for use.

• Marking

Marking out should be done on the masking film. The marking should be done with a soft lead pencil, chinagraph pencil or a waterproof marker.

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MACHINING

Circular saws

PLEXIGLAS and EUROPLEX Films in a thickness > 0.5 mm are normally cut to size by circular saws.

- Blade: carbide tipped or HSS
- Number of teeth: diameter of the blade= number of teeth (e.g.:diameter 200 mm=196 teeth)
- Cutting speed: 3000 – 5000 rpm
- Saw blade profude: only slidly above the film, max. 3-5 mm
- Cooling: normally not necessary, but recommended at higher cutting speeds
- Feed rate: ca.0.5-0.8 m/min

It is highly recommended to cut with a hold down bar to avoid fluterring. Fluttering will cause cracking.

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DIE CUTTING

Guillotining and Die-Cutting PLEXIGLAS and EUROPLEX Films

Precisely cut-to-size film sections with close tolerances can be obtained using PLEXIGLAS and EUROPLEX films by a variety of die-cutting and guillotining methods.

1. Guillotining PLEXIGLAS and EUROPLEX Films by Means of High-Speed Cutting Units

In order to obtain perfect cut edges, it is essential to work with sharp, unnotched cutting tools. The tool wedge angle determines the quality of the cut and should be between 22 and 24 ° (see figure 1). During processing, the material to be cut should have at least room temperature. Heated films, on the other hand, should be insulated against the table, which is usually cold, by means of a sheet of cardboard.

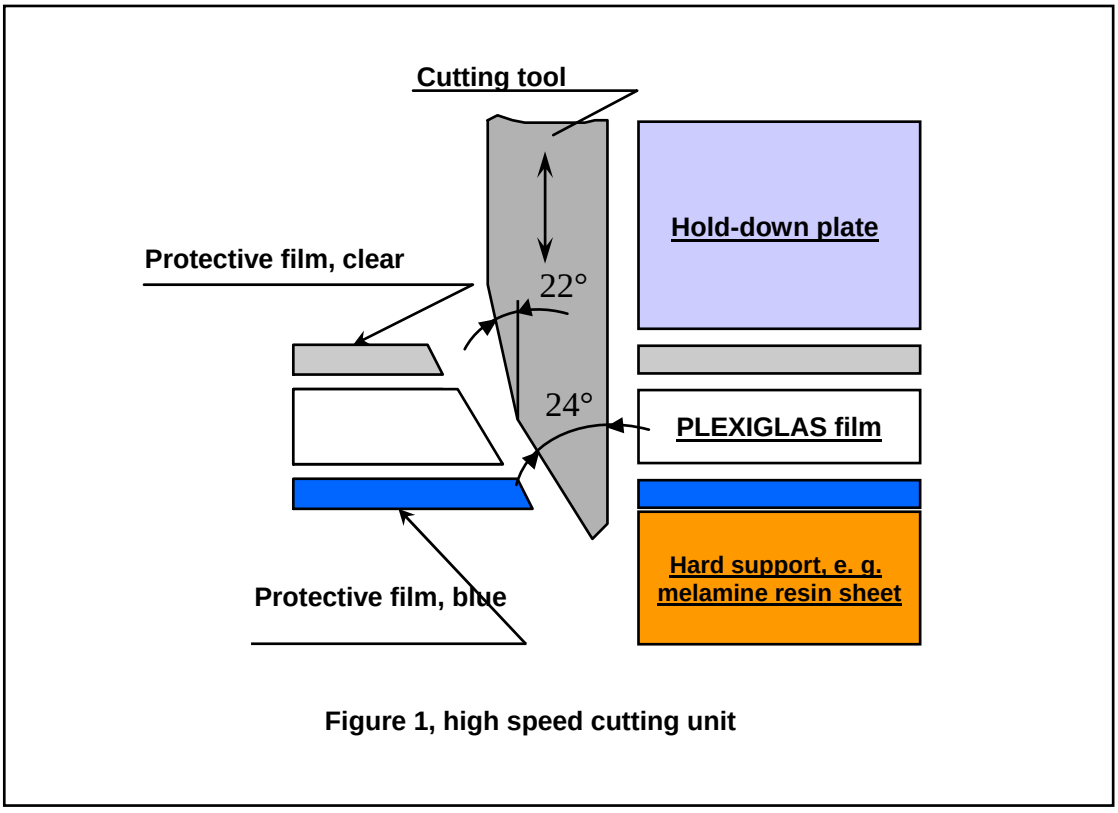

Figure 1, high speed cutting unit

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2. Die-Cutting PLEXIGLAS and EUROPLEX Films

PLEXIGLAS and EUROPLEX films can be die-cut cold with close tolerances. Both steel rule dies and complete cutting tools are used for this purpose.

Steel Rule Die

Steel rule dies provide dimensional accuracy of +/- 0.1 mm. However, it must be borne in mind that the dimensional accuracy is influenced by elastic forming of the film. The most common cutting lines are shown in Figure 2. Of these, the conical shape with double bevel on both sides is the most suitable for die-cutting PLEXIGLAS and EUROPLEX film.

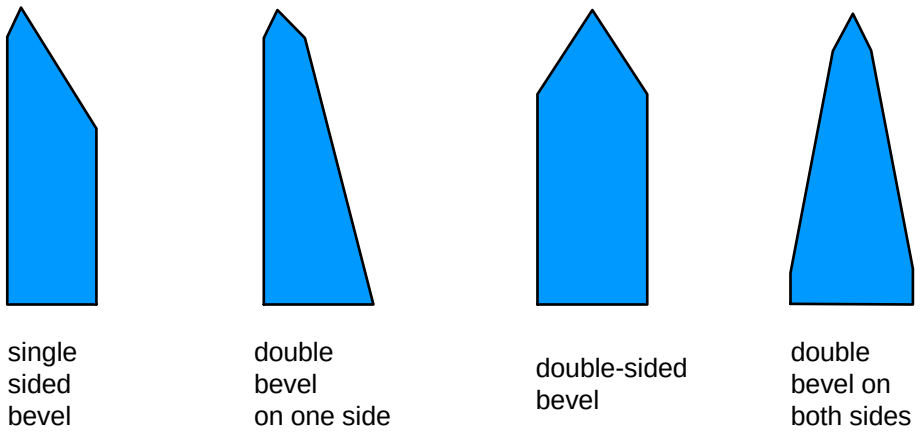

Figure 2: common cutting lines of steel rule dies

The steel rule die is often mounted on a block of wood. The tip of the cutting tool must be hardened and ground to a point. Point angles between 20 and 45° have proven suitable (see Figure 3). It has proved useful to place a sheet of die-cutting paper or cardboard under the film. During die-cutting, the tip of the cutting tool is pressed through the film without penetrating too deep into the base. With PLEXIGLAS film, it may be favorable to stop the cutting stroke shortly before complete penetration of the film. The foam rubber which lines the tool acts as ejector and clamping device and stabilizes the cutting lines. In the case of very long tools with a large surface area, only strips of foam rubber should be arranged along the cutting line. Otherwize, the pressure required to compress the rubber is too high.

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DIE CUTTING

PLEXIGLAS is not a suitable base for die-cutting because the chipping likely to occur along the edge of the cut material may give rise to crazing. For die-cutting EUROPLEX PC film, it has proved useful to insert a sheet of hard rubber underneath.

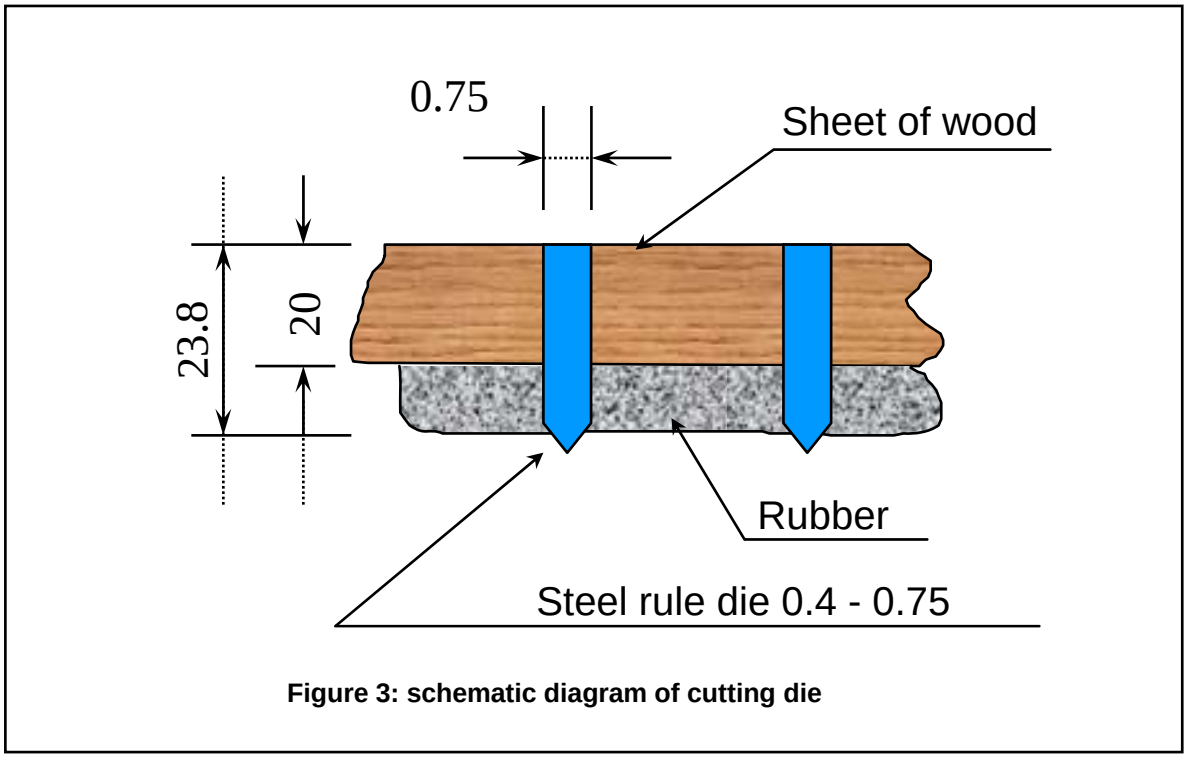

Figure 3: schematic diagram of cutting die

Column-guided tools with male and female die

For very high numbers of items and very precise cuts, it is advisable to use pillar-guided cutting dies. These tools offer a precision of +/- 0.02 mm. An important precondition for precise cuts is good, precise guidance by the pillars. Hydraulic presses show advantages over eccentric presses in this respect. The die clearance of 0.01 – 0.03 mm depends on the film thickness or size of the molding. For moldings of less than 80 mm, the die clearance should be adjusted to the lower measurement.

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Laser Cutting

• Laser cutting of PLEXIGLAS® and EUROPLEX® PC films

Laser cutting of PLEXIGLAS® and EUROPLEX® PC films is a good possibility to trim sheets into cut to size pieces. With PLEXIGLAS® films, the cutting edge can be achieved highly polished.

For the cutting of PLEXIGLAS® and EUROPLEX® PC films carbon dioxide lasers are used.

• Recommended parameters for laser cutting PLEXIGLAS® films (0,125 - 1,0 mm):

CO_2 Laser

Power: 50 Watt

Cutting speed: 60 - 70 mm/s (film thickness: 0,125 - 0,5 mm)

120 - 150 mm/s (film thickness: 0,5 - 1,0 mm)

Flow gas: air or nitrogen

• Recommended parameters for laser cutting EUROPLEX® PC films (0,125 - 1,0 mm):

CO_2 Laser

Power: 50 Watt

Cutting speed: 30-40 mm/s (film thickness: 0,125 - 1,0 mm)

Flow gas: air or nitrogen

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Printing

PLEXIGLAS and EUROPLEX Films could be printed in all printing processes. They are ideal for second surface printing. Most inks adhere very well to PLEXIGLAS and EUROPLEX Films without any pretreatment.

Printing recommendations:

a. Use state eliminations or a cleaning unit before printing

b. Keep printing machine and printing area free of dust

c. Use links which are approved for PLEXIGLAS and EUROPLEX Films. Inks with very agressive organic solvents may contribute to film failure.

d. Drive off solvents as soon as possible. PLEXIGLAS and EUROPLEX Films could be dried at following temperatures.

   PLEXIGLAS Film: 70-80°C

   EUROPLEX Film: 110-120°C

e. Make sure UV inks are formulated to cure completly on your equipment.

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Thermoforming

PLEXIGLAS and EUROPLEX Films behave very well in all thermoforming processes.

The following processing hints should be followed for a succesful forming:

Mold design:

- Tooling materials: steel or aluminium.
  Materials like hardwood, silicone and phenolic are for prototypes or for limited number of parts only
- Shrinkage for mold design: 0.5 - 1%
- Vacuum holes: < 0.5 mm
- Draft: 2-3 °

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Thermoforming

Drying:

We recommend to pre-dry the film. The protective film should be removed before.

Drying Time:

	Thickness	Time	Temperature
PLEXIGLAS Film	0.5 0.75 1.0 1.5	20 30 60 90	80
EUROPLEX Film PC	0.5 0.75 1.0 1.5	20 30 60 90	120

Forming temperatures

PLEXIGLAS Film must be heated up to 160 - 170°C
EUROPLEX Film PC must be heated up to 200 - 210°C

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