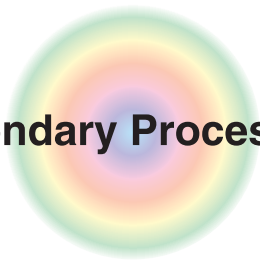


# Secondary Processing



## Machining

For Panlite, machining is possible with metal working tools, such as cutting, drilling, machining, etc. Panlite has excellent stiffness and strength. Also its softening point is high, therefore, the machining surface is not easily softened or chipped, and gives a beautiful finish. During machining, the workpiece may be whitened by the frictional heat or cracked by occurring the great residual stress and physical properties may be deteriorated. Therefore, the machining speed must be adjusted properly and cutting tools must be cooled without fail.

When cutting oil is used, choose the most proper one for Panlite (See P. 23, Table 6). As cutting oil, neutral detergent solution, silicone emulsion type, etc. are usually used. When load is applied after machining or residual stress is great, annealing treatment should be given.

## Mutual bonding of Panlite

Panlite can be bonded with adhesives, solvent, ultrasonic waves, etc.

### Bonding by Adhesives and solvents

As pretreatment, bonding surface should be cleaned by detergent or alcohol and be sandpapered. After that, the pieces should be bonded. Introduced in the table below are

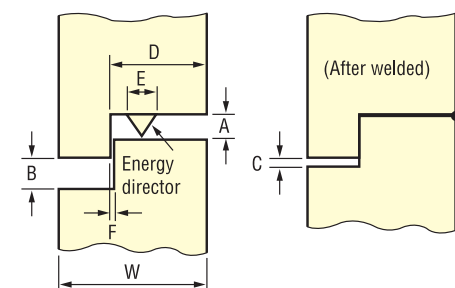
examples of mutual bonding by typical adhesives and solvents. Almost all the adhesives have a low critical stress value, therefore bonding should be made after the molded product is annealed when residual stress is great (Table 7).

Table 10 Adhesives suitable for Panlite

Type	Adhesive	Manufacturer	Tensile shearing strength MPa	Critical stress 23°C×24 hr MPa	Remark
Epoxy type	Cemedine 1500	Cemedine	4.4	61.8 and up	Cure agent: Polyamide, Pot life: 60 min (20°C)
	Bond E Set M	Konishi	3.4	61.8 and up	Cure agent: Modified polyamide, Pot life: 60 min (20°C)
	Bond Quick Set	Konishi	2.0	61.8 and up	Cure agent: Modified polyamide, Pot life: 4 min (20°C)
Urethane type	Bond KU-661/KU-662	Konishi	3.9	21.6	KU-661: Polyester polyol, KU-662: Polyisocyanate
α-cyano acrylate type (Instantaneous adhesives)	Aron Alpha #201	Toagosei Co., Ltd.	10.8	6.9	Viscosity: 2-6 (CPS)
	Three Bond 1770	Three Bond	9.8	6.9	Viscosity: 2-5 (CPS)
	Cemedine 3000	Cemedine	8.3	6.9	Viscosity: 2-5 (CPS)
	Loctite 495	Japan Loctite	10.8	6.9	Viscosity: 40 (CPS)
Solvent type	Bond VP-2000	Konishi	10.3	7.8	Main component: Acrylics, Solvent: MEK
Solvent	Methylene chloride	-	10.8	-	

### Ultrasonic welding of Panlite

Since ultrasonic welding needs only a very short time of less than one second for welding and is very easy to handle, this method is becoming more and more popular. In order to obtain good bonding results, an energy director should be provided at the jointing parts of the workpiece (Fig. 51). After bonding, annealing treatment should be given and residual stress relaxed. Clearance is as small as possible, and should be easily fitted.



$D = W/2 - 2W/3$   
 $E = D/2 - D/3$   
 $A = D/4$   
 $B = D/4 + (0.1 - 0.3 \text{ mm})$   
 $C = 0.1 \text{ mm}$   
 $F = \text{Should be easily fitted, with clearance as small as possible.}$

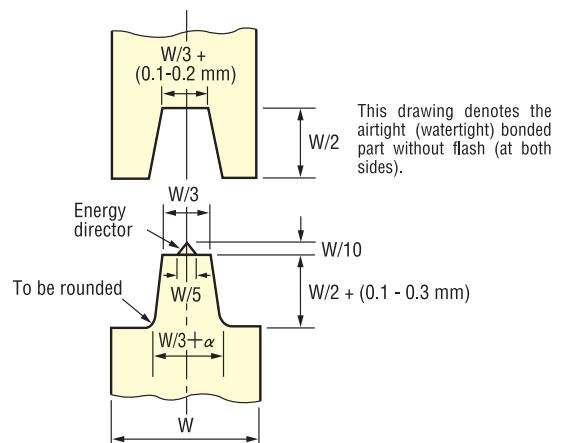


Fig. 51 Joint Parts Design