

## Section #1 Acetal, Nylon #5 Polyolefins

and cracks around the drilled hole can be encountered with plastics if proper procedures are not followed.

A slow spiral drill (low helix angle, 14°-17°) with polished flutes should be used for plastic drilling. This type drill has a large flute area which permits a free flow of chips, minimizing overheating and gumming. However, high speed twist drills with standard spiral flutes (30° helix) can be used.

Chip ejection is an important factor in drilling. Chips must be removed from the flutes of the drill as rapidly as possible, to prevent the generation of frictional heat from tapped chips rubbing the wall of the hole.

### Drill Design

For heavy-walled or large diameter work pieces, because these pieces resist distortion, (Fig. 1) drill style preferred for holes up to 1/2" inclusive is a slow spiral (low helix) ground to a point angle of 90°-110° with a lip clearance of 9°-15°. As an

Drill Sizes	RPM
No. 60 thru 33	5,000
32 thru 17	3,000
16 thru 1	2,500
1/16"	5,000
1/8"	3,000
3/16"	2,500
1/4"	1,700
5/16"	1,700
3/8"	1,300
7/16"	1,000
1/2"	1,000
A thru D	2,500
E thru M	1,700
N thru Z	1,300

alternate (and for all sizes over 1/2") use a general purpose drill ground to a point angle of 118° with a lip clearance of 10° to 15°.

Blunt angles (115°-130°) are better for thin-walled pieces, because this design prevents expansion of the O.D. of the piece.

For general purpose drills 1/2" and larger, the lip rake should be ground off and the web thinned as shown in Fig. 2. The drill should be ground so that

one cutting edge is from .005" to .010" longer than the other to minimize drill margin rubbing the walls of the hole.

Do not use old drills or drills that have been used on metal, since the land may be worn, and cause binding as the drill is advanced.

Coolants should be used. The drill should be backed off frequently, and chips removed from flutes with a brush dipped in coolant.

When drilling thru-holes, drill feed should be reduced at the bottom of the cut to prevent the drill from pulling through at the exit side, causing chipping or breaking out. When drilling deep holes, retract the drill frequently (peck drilling) to eliminate chip congestion in the flutes.

The chart gives recommended drill speeds for operators unfamiliar with thermoplastics. With increased experience, however, these speeds can be considerably increased.

	Inches per rev.	Rake Angle*	Helix Angle*	Point Angle*	Lip Relief Angle*
Nylon: 101 GS	.004" to .015"	Positive 0-5°	14°-17°	90°-110° (under 1/2") 118° (over 1/2")	9°-15° (under 1/2") 10°-16° (over 1/2")
Acetal	.004" to .015"	Positive 0-10°	20°-30°	118°	10°-25°
Poly-carbonate	.004" to .010"	Negative 0-5°	20°-30°	118°	15°

