

Group 1: Unital[®] Acetal Products

GENERAL NOTES FOR MACHINING UNITAL ACETAL STOCK SHAPE PRODUCTS:

1. Compressed air or water soluble liquid coolants are recommended when drilling, reaming, tapping, threading, or cutting very thick materials.
2. Although Unital Acetal is one of the most forgiving thermoplastics materials to machine, achieving very high quality surfaces may require experimentation with tools, feeds and speeds.
3. Unital Acetal is made by polymerizing formaldehyde. The smell of formaldehyde during machining indicates excessive heat generation. Review feeds, speeds, and the sharpness of cutters to minimize the heat being generated.

BAND SAWING

Material Thickness	Pitch (teeth/in.)	Speed (sfpm)
<1"	4 - 6	300 - 400
1" - 3"	3 - 4	300 - 400
3" - 4"	2 - 3	300 - 400

CIRCULAR SAWING

Material Thickness	Pitch (teeth/in.)	Speed (sfpm)
<1"	2	9000
1" - 3"	1	9000
3" - 4"	1	9000

NOTES:

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|----------------------|-----------|---------------|
| 1. Tooth Geometries: | Band Saws | Circular Saws |
| Rake Angle: | 0° - 8° | 0° - 10° |
| Clearance Angle: | 30° - 40° | 10° - 15° |
2. To prevent binding, saws should have a slight set (3° - 10°). Coarse teeth with wide gullets are recommended.
 3. Larger diameter circular blades and thicker band saw blades promote cooling and reduce heat buildup.
 4. Thinner stock requires more teeth per inch.

TURNING/THREADING

Operation	Tool Material	Depth of Cut	Speed (sfpm)	Feed (in./rev.)
Rough Cutting	Carbide	0.150"	450 - 600	0.010 - 0.020
General Turning	Carbide	0.100"	600	0.010
Finish Cut	HSS/Carbide	0.025"	600 - 800	0.003 - 0.007
Cut Off	HSS/Carbide		800	0.003 - 0.004
Threading	Carbide		500	0.005 - 0.010

NOTES:

1. Tooth form recommendations:

Top Rake Angle:	0° - 5°
Clearance Angle:	15° - 20°
Side Incidence Angle:	15° - 20°
Tip Radius:	0.020" min.
2. Carbide inserts are adequate for most turning operations. For operations requiring high quality surface finishes, High Speed Steel tools are recommended because of the sharper cutting edge that can be held on the tool.
3. When threading, use a single point and finish with several 0.001" passes. The use of a coolant during threading is recommended.



MILLING

Operation	Tool Material	Depth of Cut	Speed (sfpm)	Feed (in./rev.)
Face Milling - Rough	HSS/Carbide	0.150"	1400 - 2000	0.020
Face Milling - Finish	HSS/Carbide	0.050"	2500 - 3000	0.005
End Milling - Rough	HSS/Carbide	0.250"	250 - 450	0.002 - 0.010
End Milling - Finish	HSS/Carbide	0.050"	350 - 550	0.001 - 0.005

NOTES:

1. Tooth form recommendations:

Rake Angle: 0°-10°

Clearance Angle: 5°-15°

2. Single or dual fluted cutters are desirable because they produce less heat and vibration than multi-fluted helical cutters.

DRILLING/REAMING

Operation	Tool Material	Depth of Cut	Speed (sfpm)	Feed (in./rev.)
Drilling	<1" dia.	HSS/Carbide	200 - 500	0.004 - 0.015
Drilling	≥1" dia.	HSS/Carbide	150 - 300	0.010 - 0.050
Reaming		HSS/Carbide	350 - 450	0.005 - 0.015

NOTES:

1. During drilling and reaming, assure that chips do not build up in the hole. Failure to adequately clear chips will cause melting, cracking, and oversize holes.

Peck drilling is recommended.

2. For small holes (<1" dia.) high speed steel twist drills are sufficient.

3. For larger holes (≥1" dia.), use a low helix bit with a point angle of 90°-118° with a relief lip clearance of 10°-15° and 3°-5° rake angle.

To minimize cracking, a 1/2" pilot hole should be drilled prior to finish drilling to the required size.

4. During reaming, use a 0.005 - 0.010" depth of cut. To avoid undersized holes, the final cut with a fixed reamer should be at least 0.005".

Helical flute reamers are recommended if there is an interruption in the I.D. of the hole.

5. Coolants (air or liquid) are recommended during drilling and reaming.



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