ALLOY
C27450

Machining Reference Guide

General Recommendations

- Alloy C27450 is a brass alloy that is noticeably different from the conventional alloy C36000 free cutting brass
- The absence of lead in the alloy C27450 will result in differences in machining
- Machining characteristics will be similar to that of 12L14 steel
- Chips will be different in appearance than Alloy C36000 chips
- Chip breakers should be used on form tools and drill bits
- Feed rates and speeds will have to be adjusted
- Oil based lubricants are preferred, however, 8% ~ 12% water soluble lubricants can also be used
- Flow through coolant tooling should be used
- Suggest carbide tooling and titanium nitride coatings

[1] Sources / References:

Copper Rod Alloys for Machined Products — CDA
"Basic Machining Reference Handbook" – Slattery, Meyers 2001

To aid in the transition and integration of Alloy C27450 into today's production processes, Mueller Brass Company has developed this **Machining Reference Guide.** This guide compiles and summarizes information that applies to the various manufacturing processes and procedures Alloy C27450 may undertake during the formation of a part. The information provided is a compilation and summary of machining standards and data acquired from industry resource [1] and successful customer trials.

The purpose of this guide is to provide valuable suggestions and ideas that will aid in minimizing the learning curve associated with this and/or any alloy other than Alloy C36000.

MUELLER BRASS CO.

Machining Reference Guide

Turning Data: Single Point, Form Tools, Hollow and Box Mills

			For Single Point Only					
Material	**Tool Material**	**Relef Angle (side) (degrees)**	**Relef Angle (Front) (degrees)**	**Rake Angle (back) (degrees)**	**Rake Angle (side) (degrees)**	**Surface Speed (sfm)**	**Roughing Feed (in/rev)**	**Fininshing Feed (in/rev)**
Free Cutting	HSS: [2] Carbide:	0 - 5 4 - 6	6 4 - 6	0 - 5 0	0 - 3 2 - 6	300 - 1000 500 - 1600	.008 - .015 .008 - .015	.003 - .108 .003 - .108
Alloy 2745	HSS Carbide:	10 - 20 7 - 10	10 - 15 7 - 10	10 - 20 4 - 8	20 - 30 15 - 25	75 - 300 300 - 750	.008 - .015 .008 - .015	.003 - .008 .003 - .008

[2] High Speed Steel

Notes:

- Chip breakers required to break up stringy chips
- Generous positive rake angles are required so that chips are 'eased off the tool face
- May have to change rake angle to increase clearance angle for chip removal
- Finely polished or burnished cutting surfaces will reduce friction and heat build-up
- The use of titanium nitride coatings will aid in reducing sticking
- A suggestion would be to use high speed steel first for tooling to determine the correct geometry. Once determined, then redesign using carbide tooling
- Material will typically machine 0.003" ~ 0.020" oversized (an OD turning - NOTE: ID will cut undersize) when compared to alloy C36000 (material will tend to push back during machining or drilling)

Milling Data: Single Point, Form Tools, Hollow and Box Mills

Material	**Rake Angle (degrees)**	**Clearance Angle (degrees)**	**Land (inches)**	**Surface Speed (sfm)**
Free Cutting	0 - 10	10 - 15	0.015 - 0.030	300 - 500
Alloy 2745	0 - 15	5 - 15	0.015 - 0.030	200 - 400

Notes:

- Tooth spacing should be no more than 4 – 8 teeth per inch
- Combined cutters can be used, but teeth should be interlocked
- Cutting edges should be polished and/or coated to reduce loading
- Feed rate: 0.006 to .012 chip load (1 pt)

Machining Reference Guide

Drilling Data

Material	Clearance Angle (degrees)	Drill Point Angle (degrees)	Cutting Edge	Surface Speed (sfm)
Free Cutting	12 - 15	118	0° Rake	300 - 1,000
Alloy 2745	12 - 20	100 - 110	Full Rake	50 - 125 w/HSS drills 150 - 300 w/carbide

Notes:

- Special drilling configurations recommended for high production
- No to low helical tooling recommended so chips can be cleared
- Chip breakers (notches) on cutting edges for breaking up chips
- For simultaneous operations, use of roller guide supports recommended
- Flow through tooling recommended

Boring Data (with Carbide Tooling)

Material	Back Rake Angle (degrees)	Side Rake Angle (degrees)	Speed (sfm)
Free Cutting	0	5	250 - 500
Alloy 2745	5 - 10	15 - 20	150 - 300

Notes:

- Tooling geometry is critical in order to achieve required smooth finish surface and to direct chip flow away from cut surface

Reaming Data (with High Speed Steel)

Hole Diameter	Copper (inches/rev)	Brass/Bronze (inches/rev)	Depth of Cut (inches)
<1/8" 1/8" - 3/8" >3/8"	0.006 0.006 - 0.010 0.009 - 0.024	0.010 0.010 - 0.016 0.016 - 0.036	0.003 - 0.004 0.004 - 0.007 0.007 - 0.015

Notes:

- Fluted reamers w/ 8° to 10° clearance recommended
- Cutting tools to be lapped to fine surface finish
- Suggested speed: 40 to 90 sfm
- Rake Angle (hook) of 5 degrees

MUELLER BRASS CO. www.muellerbrass.com

MLT-339
MAY 2019

Machining Reference Guide

Threading and Tapping Data

Material	Tap Rake Angle (degrees)	Die Chamfer (1) (degrees)	Lineal Speed (2) (sfm)
Free Cutting	2 - 4	10 - 30	100 - 200
Alloy 2745	8 - 10	10 - 15	40 - 50

(1) two or three threads

(2) for threading and tapping w/std high speed steel tools

Tap and Die Chaser Geometries

	Tap		Die	
Material	Rake Angle (degrees)	Throat Angle (degrees)	Rake Angle (degrees)	Throat Angle (degrees)
Free Cutting	-5 to +5	15	-10 to 0	15
Alloy 2745	+5 to +15	30	12 - 30	30

Circular Chaser Geometries

Material	Rake Angle (degrees)	Face Angle (degrees)	Throat Angle (degrees)	Claearance (degrees)
Free Cutting	-5 to +5	0	25	12
Alloy 2745	15 - 35	2 - 3	25	12

Notes:

- More power in equipment may be required as material is harder than alloy C36000
- For Buffoli, Kingsbury, Hydromat, City, etc.. machines, increased horse power may be required to run 2 bars simultaneously
- For newer Trunion machines, size of tapping motor may have to be increased
- For threads greater than 12 TPI, issues with slivered threads may emerge (no different than 360 alloy)
- Increased hook angles and radial relief may be required or large ACME and NPT threads

Port Huron Mill
2199 Lapeer Avenue • Port Huron, MI 48060
(P) 800.553.3336 • (P) 810.987.7770
(F) 810.987.9108

Belding Mill
302 Ashfield Street • Belding, MI 48809
(P) 800.553.3336 • (P) 616.794.1200
(F) 616.794.1214

www.muellerbrass.com

MLT-339
MAY 2019

MUELLER BRASS CO.