

Chamber Reamer Feeds & Speeds Information

Here is a Program and Reamer/ Cutting Fluid Recommendation that has saved companies thousands of dollars.

I start with a Carbide Breech Tool, to make a three tool set up. That will Breech then Rough and Finish the complete chamber end of a production barrel.....between 2 minutes and 38 seconds and 1 minute and 33 seconds, depending on the reamer design and if a reamer's coated before or after finish. (This 3 tool set up Breech, Rough, Finish is the same program we have set up for AR manufactures World Wide)

Note: We have been changing the Roughers over to a Breech Rougher Combination for some companies. If a Combo Rough, Breech Tool is used you will omit Tool #1 in the program. (This new design, I created for Bolt actions manufactures such as; Winchester, Ruger and Remington)

The speed and productivity can only be achieved with a SAMMI, CIP, or Military spec finish reamer utilizing the full SAAMI allowable tolerance that is excepted worldwide, with the proper reamer that's ground .001 to .0015 over minimum with the final circle ground margin of .001 to .002 (burnish wear bar). I have found that up sharp tools can be coated after finish to create a false margin with a multilayer coating.....Up sharp tools tend to wear fast in the throat area and can have chatter problems.. The best coatings, I will explain at the end of the program.

Before we start you should make sure the bushing to bore fit is not greater than -.0005. Also tighten up your holder to .002 more float than your maximum allowable permitted bore run out tolerance. I have converted over many Pistol, Gas Guns, and Rifle manufactures to this simple repeatable CNC program. This simple program is not excluded from water based, but should be used with the petroleum based cutting fluids.

Begin with tool # 1: The precision ground carbide piloted Breech Tool @ 1300 RPM @ .0025 per Rev to proper depth according to Manufacturers Counter Bore or Breech configuration. This tool should be rapid forward to finish touch. NOTE: If you are using a boring bar to create the Breech, it will have to run @ 4-8 seconds to match the time of cut of my specially designed Breech Tools @ 6 seconds.

Index to tool # 2: Rapid Rougher forward to .045 from touch point on the finished Breech. At .045 from touch point start tool @ 800 RPM @ .0035 per Rev. Ream forward to .380 from 0 point setting (from finish shoulder datum point). Note: If your programs are calculated from the bolt face or barrel face forward to finish shoulder datum you should be subtracting .380 from your final length on program. Rapid back .450 stop for chip flush. Rapid forward to .390 then ream forward to .012 to .009 from 0 point setting, to leave stock for the final tool.

Then rapid out and change to tool #3. Remember I make special gauges, to make it easier to set up the rougher. The finish chamber reamer will rapid forward to .045 from touch point of the roughed cavity. At .045 advance to finisher forward at 800 RPM @ .003 per Revolution. To the first retract flush of .680 from 0 point setting rapid back .450 for chip evacuation then rapid forward to .700 from 0 point setting, as you rapid forward to 0 point setting change speed to 1300 RPM @ point .0025 per Rev Ream forward to .190. At forward .190 rapid back .400 for chip evacuation and then rapid forward .200 at 1300 RPM @ .0025. Ream forward to .009 from 0 point setting (final shoulder datum). Rapid back .400 for a final chip

flush. Rapid forward to .012 from final shoulder datum, slow RPM down on forward advance to 450 RPM moving forward from .009 to final finish depth @ 450 RPM and a feed rate .0025 to final destination of min SAAMI or manufacturers chamber length. Reamer must rotate 16 complete revolutions not more than 17 not under 15 complete revolutions @ 0 point setting for the molecular structure to cool down .0001 per side in chamber reduction, utilizing the .001 to .002 margin as a Burnish tool. At that point rapid out at max speed.....Chamber is complete. The chamber should have a finish between 6 and 16 RMS finish, chatter free, ring free.....If it shows scratches and mars, and immediately check the coolant tank for fine swarf from dirty or faulty system.

Note: I recommend a petroleum base high sulfur cutting fluid such as, TRIM OM 300, Castrol ILOCUT 534, Texaco Transultex H, Chevron Lanka Cutting Oil, and Mobile met Alpha Cutting Oil. All of these can be cut with a 20% ATF Transmission Fluid for better finish with 4140 Military Steel. These fluids have a medium viscosity that will work in conjunction with our mirror image Roughers with chip breakers and our specially designed 6 flute finishers, ground before or after coating with a .001 to .002 margin....Some of the new double layered coatings add between .00017 to .0004 per side depending on coating type such as: Alcrona Pro, Balinit Aldura, Balinit B Tcn, Hard Lube, Latuma, Trinton and X.CEED. All these will yield 900 plus chambers with our reamer design and Petroleum based fluid. If these coatings are applied to tools that have circle ground margin it will cause a minute high spot (crown) from the multi vapor layers causing the crown to be higher than the cutting edge that is no longer as sharp because of the small radius added to the direct cutting edge. All re-sharpened and new tools pulled up sharp on a CNC tool and cutter grinder will work if coated after finish grind, with multi-layer coatings. If the older Tin and Tialn single layer coatings are applied to up sharp tools a poor return will occur. Because of the geometry of a knife like edge primary and secondary grind they will rapidly wear in the throat area, yielding only 89 to 125 chambers without the aid of the fourth tool, which is a carbide throating reamer to extend longevity. Our competitor's reamer has this problem. The companies that have us finish the reamer and coat them after....Have let me choose the coating. The very best coating, for a completely finished reamer with a .001 to .0015 margin is the following: Tialn Dark, CVD Tin, Balint X.ceed, Alcrona Pro, Futura Nano, Futura Top, Hard Carbon, Petura.....All of these will work with a single layer. But multi layers will need to be finish ground after coating or pulled up sharp and then coated. The best coating for 4140-V Military Spec. is the Hard Lube for finish chamber reamer and Alnova Coated Rougher, pulled up sharp and coated after finished.

*Remember on machines not yet converted over to oil, you should use Alnova, Lauma, Futura, Futura Top Helica, Hard Lube.....these will work well with Petroleum and Water Based Coolants mix @ 6 points higher than manufacturers recommendation. The ultimate Breech and Roughing Tools would have a .001 margin and coated after finish with Petura, Futura Nano, or Futura Top. For the same results, a reamer that has been Re-sharpened and Pulled "Up Sharp" in the process should be coated after finish with Alcrona Pro, Balinit Alnova or Triton, to reach close to the original life of a new tool. I have found my go to coating for high yield and beautiful finishes are the NEW Balinit single vapor coating Alnova, Futura Nano, Futura Top, Hadlube, Helica, Latuma, Lumena, X.Ceed, and X.Cell, and Tcn. One of the best and most forgiving with high lubricity is Quantum.

*Let me know if this helps, if I can be of further assistance give me a call

THIS IS A BASIC START UP PROGRAM FOR HIGH VOLUME CHAMBER PRODUCTION
PLEASE ADJUST ACCORDINGLY FOR DESIRED HEADSPACE AND ADJUST LENGTHS
FOR TOOLS BEING USED. PLEASE REVIEW WRITTEN INSTRUCTION SHEET.

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O0556

(CHAMBER REAM)

(BEFORE STARTING MAKE SURE THE BUSHING TO BORE SIZE IS)

(NO GREATER THEN -.0005. ALSO TIGHTEN UP YOUR HOLDER TO)

(.002 MORE FLOAT THEN YOUR MAXIMUM ALLOWABLE PERMITTED)

(BORE RUN OUT)

G20

N1

(TOOL - 1: PILOTED BREECH TOOL CARBIDE)

G0 T0101

G18

G97 S1300 M03

G0 X0. Z.045 M8

G99 G1 Z-.55 F.02

G1 Z-1.445 F.0025

G1 Z-1.450 F.001

G0 Z.045

M9

G28 U0. V0. W0. M05

T0100

M01

N2

(TOOL - 2: PILOTED ROUGHING CHAMBER REAMER TOOL CARBIDE)

(REAM CHAMBER .009 TO .012 FROM FINISH HEADSPACE)

G0 T0202

G18

G97 S800 M03

G0 X0. Z.045 M8

G1 Z-1.4 F.02

Z-1.865 F.0035

G0 Z.045

Z-1.850

G1Z-2.265 F.0035

G0 Z.045

M9

G28 U0. V0. W0. M05

T0200

M01

N3

(TOOL - 3: PILOTED FINISH CHAMBER REAMER TOOL CARBIDE)

G0 T0303

G18

G97 S800 M03

G0 X0. Z.045 M8

G1 Z-2.25 F.02

G1 Z-2.270 F.003

G0 Z.045

Z-2.260

S450

G1 Z-2.274 F.0015
G4 P1000
G0 Z.045
M9
G28 U0. V0. W0. M05
T0300
M30
%

Tooth Profile
PTG Chamber Reamer
New or Re-Sharp

Only the Sharp cutting edge is in contact with the work piece.
Margin is trailing for the tool strength, burnish, Finish.

Tooth Profile
Brand X Tool
or Factory Re-Sharp

Only the Sharp cutting edge is in contact with the work piece.
Coating after finish will give the function of a circle ground margin, but wears the Throat fast.

The Flute face is the Work Horse. As the coated flute face plunges in to the cavity it lifts and separates the material (Chip Removal). That is the reason that cutting tools with burnish wear bar "margin" can be circle ground after coat , as it only burnish the Reamed circumference. This gives a Great Finish with Long Life.

1

The Multi Layered Coating causes the margin of the Flute to be taller than the cutting edge. Sharp edge of Flute Face to margin has a small vapor coated radius edge. This leaves a poor Finish and high Friction. Very Poor Chamber Finish and Poor Tool Life. D.D. Grinding margin circumference of Blunt Dug is the only connection.

Our Competitors usually grind tools like this for fast Production on CNC. Its faster and more Profitable to skip the ground margin (Wear Bar). You the Customer pay high Prices for Poor Return.

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DIMENSIONS ARE IN INCHES		NAME	DATE
TOLERANCES:		DRAWN	DATE
FRACTIONAL ±		CHECKED	CC
ANGULAR MATCH ± BEND ±		ENG APPR.	
TWO PLACE DECIMAL ±		MFG APPR.	
THREE PLACE DECIMAL ±		QA	EB
MATERIAL		COMMENTS	
NEXT ASSY	USED ON	FINISH	
APPLICATION		DO NOT SCALE DRAWING	

Pacific Tool and Gauge

SIZE: 1/2" DIA. H/L
SCALE: 1/2" = 1"
SHEET 1 OF 1