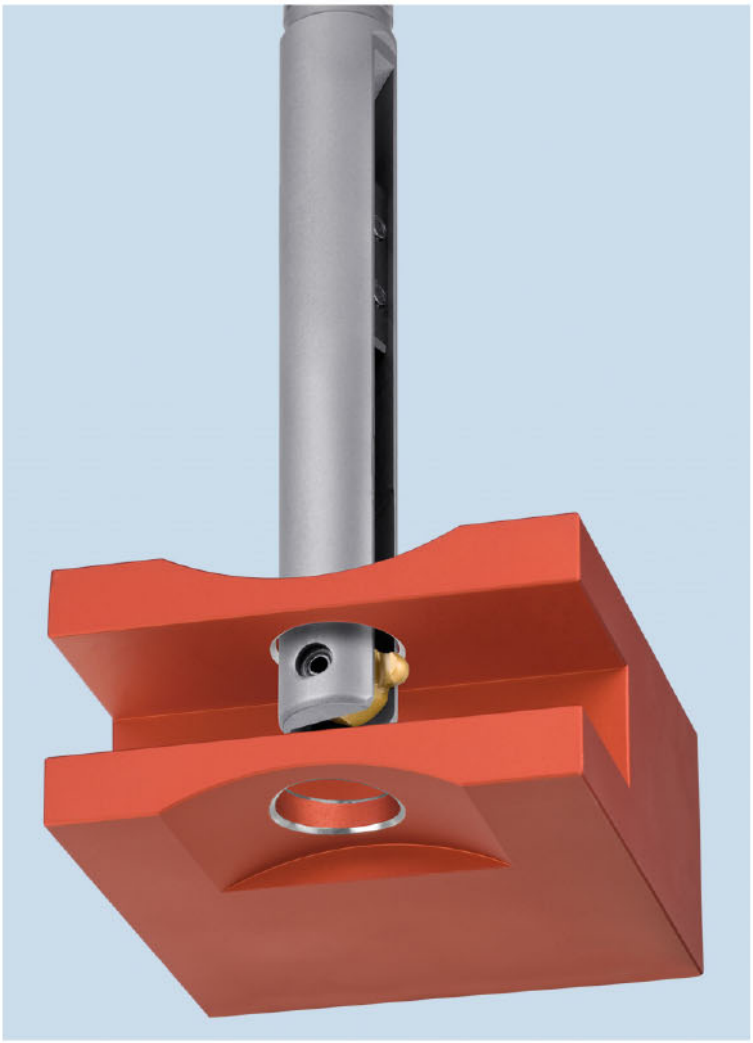
HEULE
PRECISION TOOLS

ONEOPERATION

COFA

Instruction Book

Contour Deburring Tools for all purpose front and back deburring of through holes.



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All Heule tool systems are protected by international patents.

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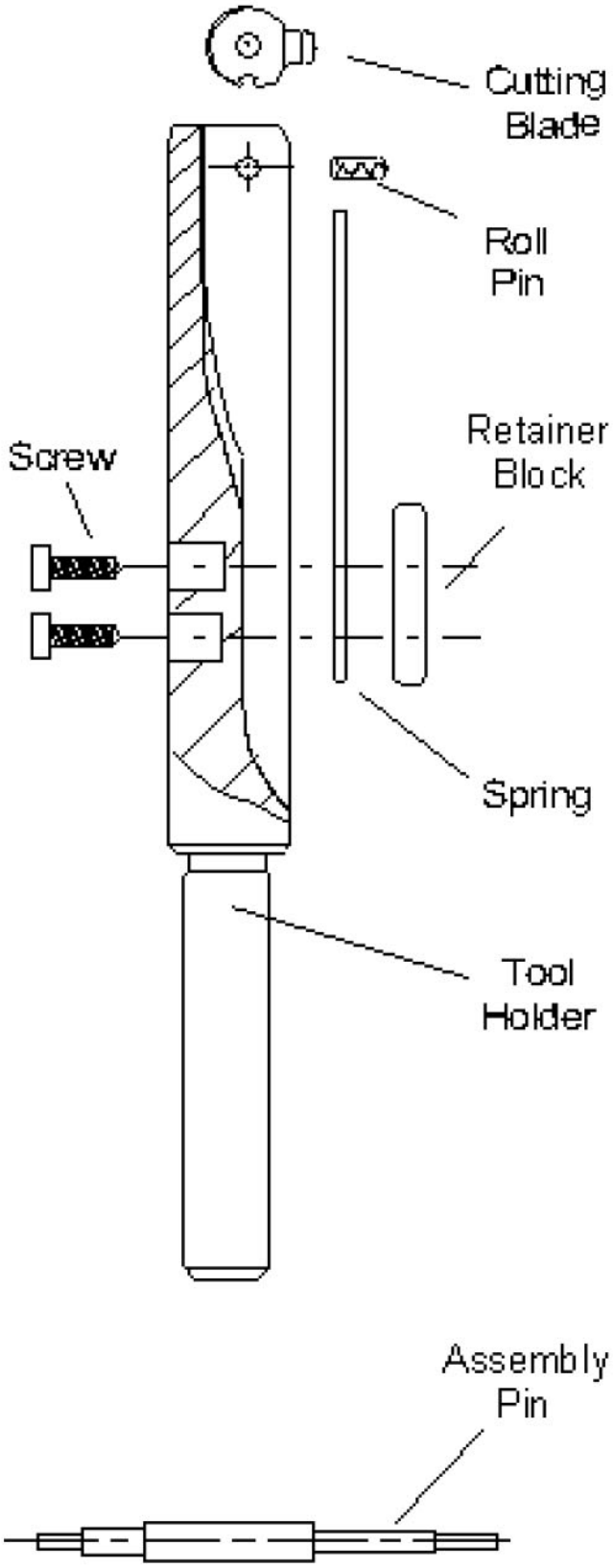
ISO 9001 Certified Management System

SWISS MADE

Tool Description



What does the COFA tool do?

The COFA tool removes burrs from the front and back of a through hole without stopping or reversing the spindle.

How does it work?

Controlled by a spring, the blade follows the contour of the hole's surface and removes all burrs while creating an even tapered corner break. The blade does not cut as it passes through the bore and will not damage its surface.

The edge break begins only at the point where the blade makes contact with the material and then tapers the hole's edge. This allows for faster feed rates since the tool slows itself down as it enters the through hole.

Each series has a different size blade, but all tools within the same series use the same blade (i.e. all series 4 use the same blade, all series 5 use the same blade, etc.). All series are available with either a front and back cutting blade or a back only cutting blade.

Expanded Drawing represents Series 6, 8, and 12 only.

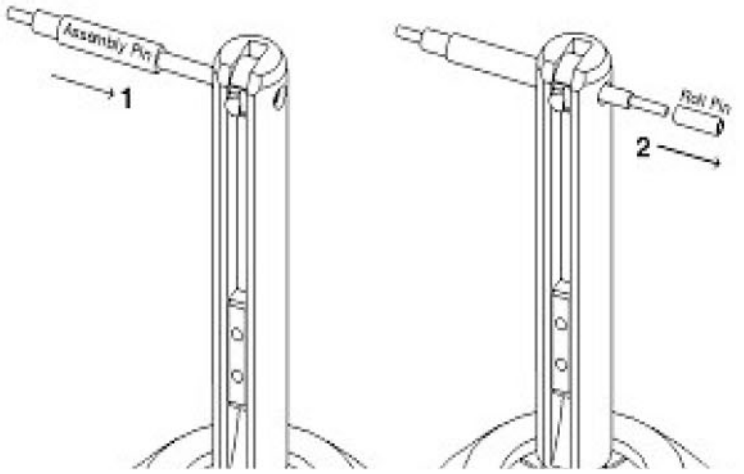
How do I change blades?

For COFA Series 6, 8 and 12 Tools

Step 1
Insert the long end of the assembly pin into the roll pin.

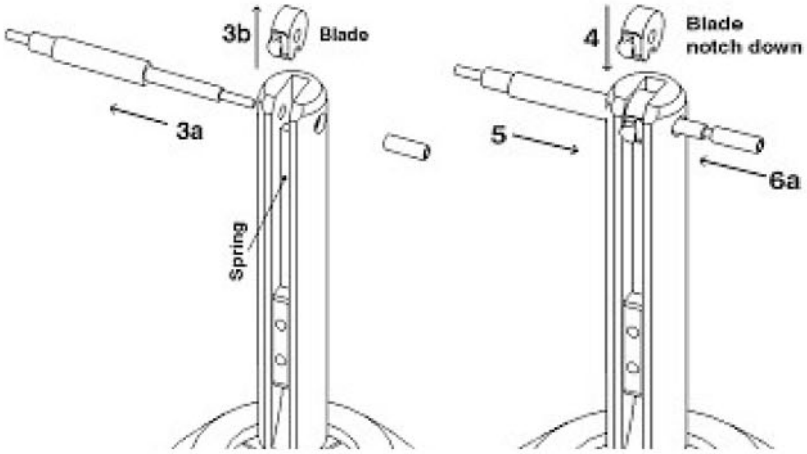
Step 2
Drive the roll pin out of the tool body. Keep the roll pin to reuse it.

Step 3
Remove the assembly pin and then remove the blade.



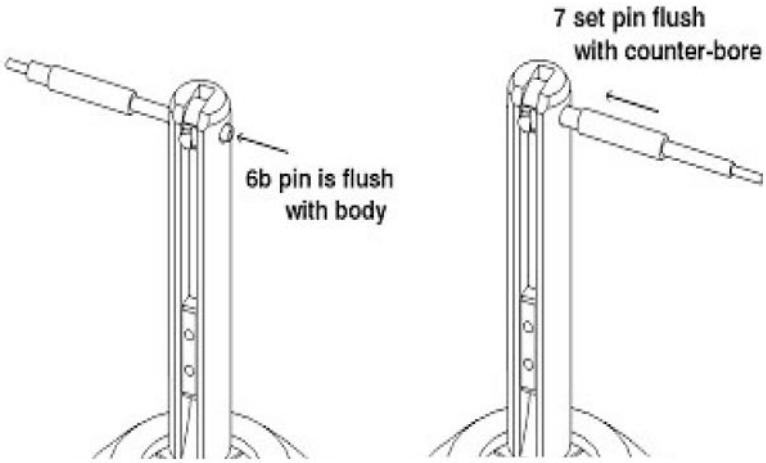
Step 4
Place new blade into the tool with the notch on the end of the spring.

Step 5
Place the long end of the assembly pin through the holes to align the blade in the tool.



Step 6
Place the roll pin on the end of the assembly pin and hammer it into the tool. Use the assembly pin to maintain the proper alignment.

Step 7
Place the short end of the assembly pin into the roll pin and drive the assembly pin so it seats against the counterbore.



How do I change blades? *(continued)*

For COFA Series 4 and 5 Tools

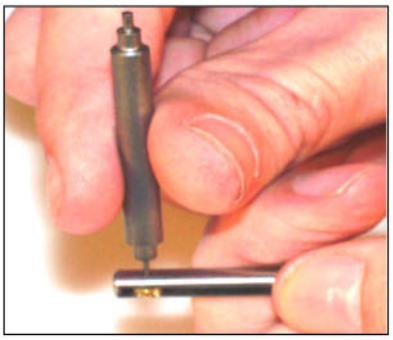
Step 1
Insert the Assembly pin's end into the side hole to remove the split pin.

Step 2
Use a small hammer to press the split pin out of the tool body. The blade will fall out of the tool.

NOTE
HEULE recommends that you use a new split pin with each blade change and dispose of the old pin.

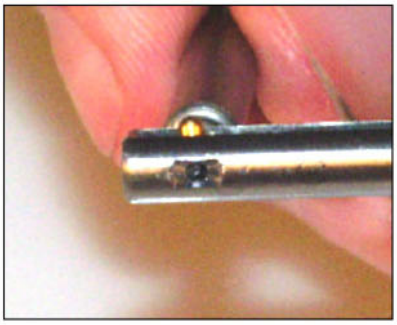
Step 3
Insert the blade in the tool body in the direction of the illustration marked on the tool body.

Step 4
Line up the blade with the split pin hole using the assembly pin given with each tool. Insert the solid end of the split pin in the hole on the opposite side of the assembly pin and manually press into place. Using a small hammer or mallet, carefully press in the split pin on the split end into the hole.

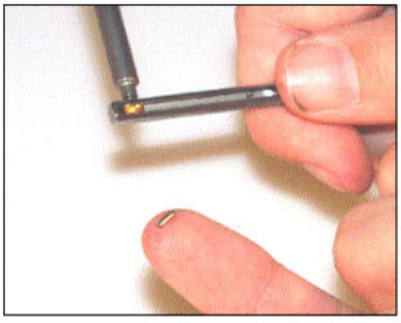


Step 1

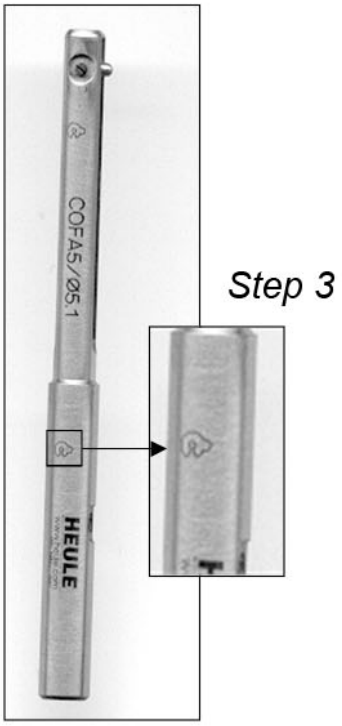
Step 2



Step 3



Step 4



Step 3

Step 4

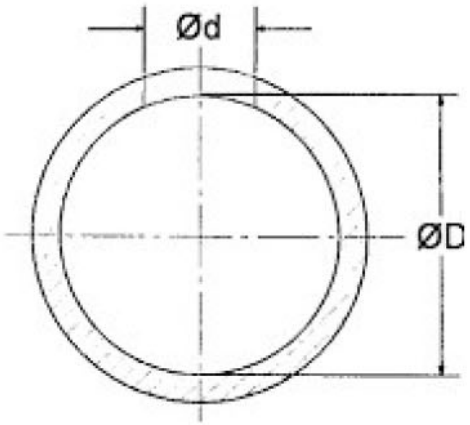
Insert split pin here.

The split pin should not stick out on this side.

How do I program?

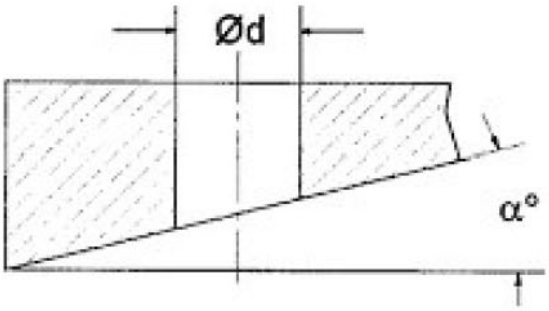
$H = d/D$

$H_{max} = 0.5$



a = slope angle

a = 15°



Technical Information

For the standard COFA Tool, the maximum cross hole to main hole ratio is 1:2 and the maximum surface angle is 15°. Above these values, the cutting insert may not have enough clearance. Special blades may be requested for some applications. With irregular surfaces, the RPM must be lowered but the feed rate is unaffected. The chip load is approzimately15% of the feed rate.

Spring Information

The COFA tool can be modified easily to accommodate several spring strengths. Most applications use the standard ‘S’ spring. For materials requiring more cutting force, a stiffer spring such as ‘S’, ‘Z2’ or ’Z3’ are available. Softer materials such as aluminum and brass use a ‘W’ spring.

How do I program? *(continued)*

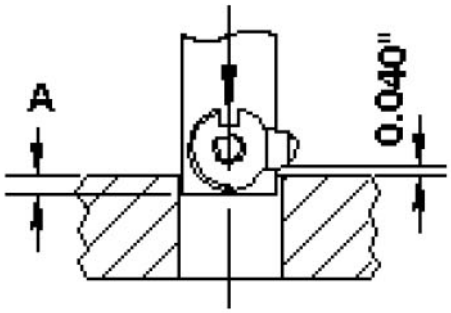
Feed:	0.006”-0.014” IPR. Depend upon the material and machine rigidity, the feed rate can be increased			
Speed:	**Typical Material**	**bhn**	**Flat Surface**	**Uneven Surface**
SFM	Aluminum	30-180	160-400	120-200
	Iron	180	190-260	50-130
	Low carbon steel	100-200	190-340	120-160
	Med carbon steel	125-250	120-240	90-130
	Stainless steel	140-250	60-140	40-90
	Cast steel	200	110-240	90-150
	Titanium		20-80	20-35
	Nickel alloys	220-310	20-80	15-30

	COFA4	**COFA5**	**COFA6**	**COFA8**	**COFA12**
A	2 *.079”*	2.8 *.110”*	1 *.039”*	1.5 *.059”*	3 *.118”*
B	5.5 *.217”*	7 *.276”*	5.5 *.217”*	7 *.276”*	10 *.394”*
B *Irregular*	*6.1* *.240”*	*7.3* *.286”*	*6.5* *.258”*	*8.5* *.324”*	*11.9* *.468”*
C	5.5 *.217”*	6.9 *.272”*	6 *.236”*	8 *.315”*	12 *.472”*
D	5.3 *.209”*	6.4 *.252”*	5 *.197”*	6.5 *.256”*	9 *.354”*
E	1.8 *.071”*	2.2 *.087”*	0.5 *.020”*	0 *0*	2 *.079”*
E *Irregular*	*1.2* *.048”*	*0.9* *.037”*	*-0.5* *-0.18”*	*-1.2* *-.049”*	*0* *0*

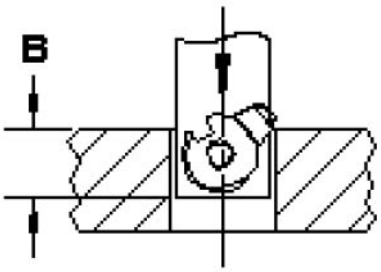
How do I program? *(continued)*

FRONT AND BACK DEBURRING

Step 1
Reference the front of the tool. Rapid Traverse the tool the distance “A” into the bore. This will give the insert 0.040” (1mm) clearance.

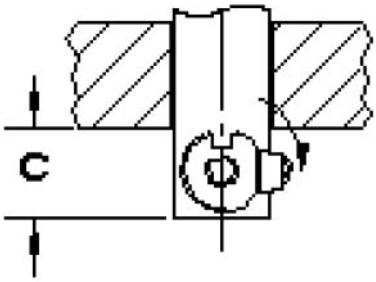


Step 2
In forward working feed, machine the top surface of the bore by moving the tool to distance “B” into the bore.

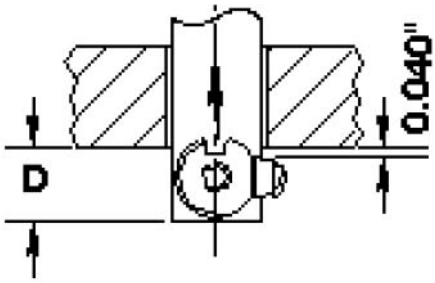


Step 3
The insert has rotated into the tool body and is finished cutting. Rapid traverse through the bore. The bore surface will not be damaged.

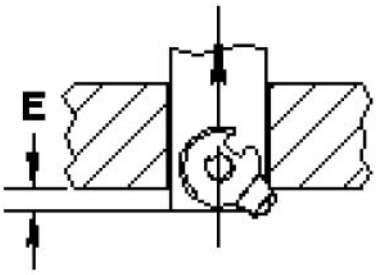
Step 4
In order for the insert to snap out again, rapid traverse until the tool end is beyond the bottom surface by distance “C”.



Step 5
To reduce cycle time, rapid traverse the tool in reverse feed to position “D” from the bottom of the bore or burr.



Step 6
In reverse working feed, machine the bottom surface of the bore by moving the tool to distance “E” from the bottom surface.



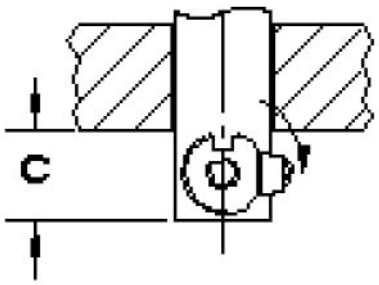
Step 7
Rapid out.

Reference table A-E on page 6.

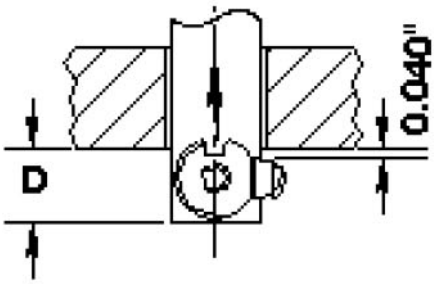
How do I program? *(continued)*

BACK DEBURRING ONLY

For back deburring only, the COFA tool can rapid through the top of the bore without damage to it's surface.

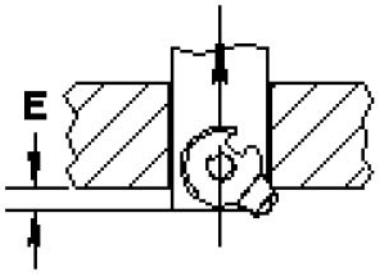


Step 1
Reference the front of the tool. Rapid traverse the tool through the bore and to the distance "C" from the bottom of the part.



Step 2
To reduce cycle time, rapid traverse the tool in reverse feed to position "D" from the bottom of the bore or burr.

Step 3
In reverse working feed, machine the bottom surface of the bore by moving the tool to distance "E" from the bottom surface.



Step 4
Rapid out.

Troubleshooting

Problem	Probable Cause	Solution
Chamfer Ø too large	• Tool is designed to cut to a set chamfer diameter	• Select a smaller sized tool
Chamfer Ø too small	• Chamfer is cutting to the designated maximum from the catalog but this is not large enough • Chamfer is not to designed maximum size	• Use the next size larger tool if possible • The COFA tool is only designed for edge breaks but specials can be requested • Use the next higher strength spring • Use a slower feed rate
Tool Chatters	• Operating conditions are not correct • Not enough cutting force on your material	• Increase feed rates • Decrease speed rates • Use coolant on tool • Use the next higher strength spring
Tool is pushing the burr	• Blade is used or dull • Blade is new but still not working	• Change the insert • Use the next higher strength spring • Check programming position and feed rates • Burrs are too large
Tool creates a secondary burr or poor surface finish	• Spring is too heavy • Chamfer size is too large • Operating conditions are not correct	• Use next lighter strength spring • Use a smaller tool to achieve a smaller edge break • Check recommended feed and speed rates

Troubleshooting *(continued)*

Problem	Probable Cause	Solution
Cutting blades are chipping	• Programming error • Interrupted cut or possible wall interference	• Make sure cutting edge is not in fast feed when cutting • Try smaller tool • Reduce speed rate
Uneven chamfer or missing some burrs	• Speed rate far too high • Ratio between crosshole and tube diameter (d:D) is larger than 0.5 • Not enough cutting force for your material	• Special inserts are possible • Change spring or use the next higher strength spring
Blade is breaking or falling out of tool	• Interrupted cut or possible wall interference • Roll pins are being deformed • Program is incorrect	• Try smaller tool • Check assembly procedures • Assembly pins must be used when changing blades • Change roll pin • Check programming positioning • Do not use bore cycle

Frequently Asked Questions

My chamfer is too big. Can I reduce it by feeding the tool faster?
Not recommended. The COFA tool is designed to cut the same diameter as stated in the catalog if all parameters are correct. Feeding it faster than recommended reduced tool life.

Will a stiffer spring create a larger chamfer?
No. If the COFA tool is already cutting to the stated edge break size for the tool, a larger chamfer is not possible. A larger tool may be used if there is enough hole clearance.

Can I feed to the tool faster by using a stiffer spring?
Yes. Using a stiffer spring will allow for some applications to reduce cycle time, however, expect blade life to diminish.

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www.HeuleTool.com

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