



PRECISION TOOLS

**ONEOPERATION**

# MICRO-COFA

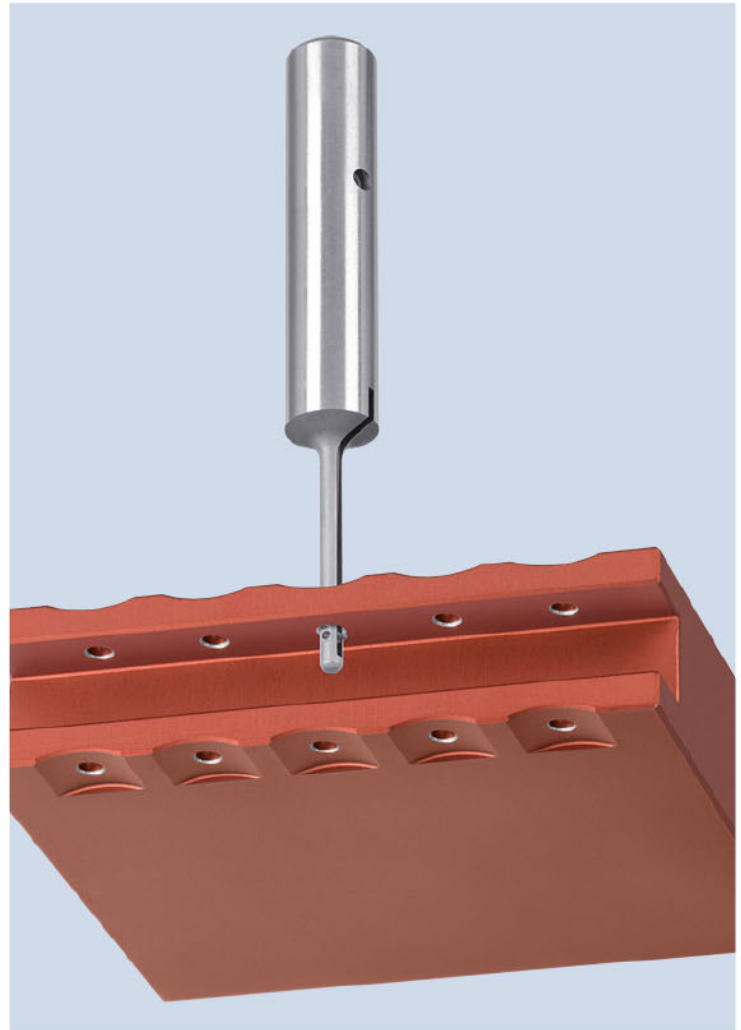
## Instruction Book

Front and back deburring of small through holes

### Table of Contents

|                  |           |
|------------------|-----------|
| Tool Description | pg.2      |
| Install Blades   | pg. 3-4   |
| Remove Blades    | pg. 5     |
| Install Springs  | pg. 5     |
| Programming      | pg. 6-9   |
| Troubleshooting  | pg. 10-11 |

*All Heule tool systems are protected by international patents.*



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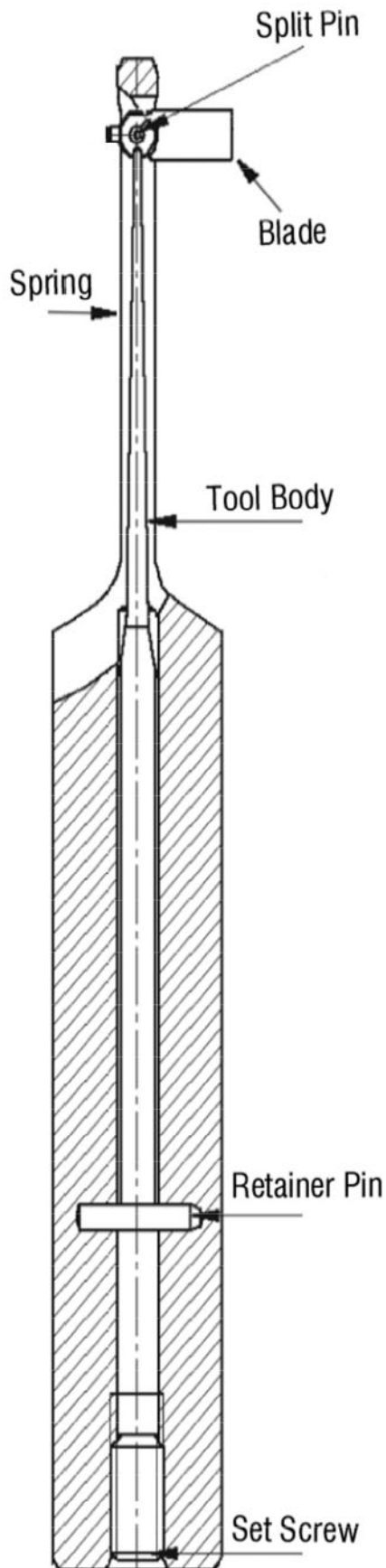
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COFA-IB 2012

# Tool Description



## What does the MICRO COFA tool do?

The MICRO 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 2 use the same blade, all series 3 use the same blade). All series are available with either a front and back cutting blade or a back only cutting blade.

# How do I install blades?

## For COFA Series 2 and 3 Tools

### Step 1

The COFA C2 and C3 blades can be installed and removed by clamping the tool in the COFA assembly fixture

### Step 2

Position the blade pin hole over the fixture pin hole by adjusting the set screw at the end of the assembly fixture

### Step 3

Lay the tool firmly into the assembly fixture, positioning the tool with the longer spring slot facing the clamping screw. Tighten the clamping screw.

### Step 4

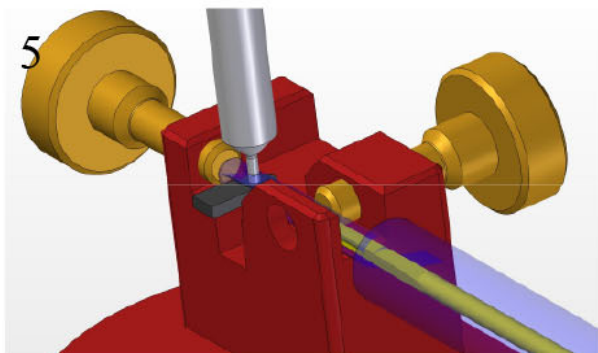
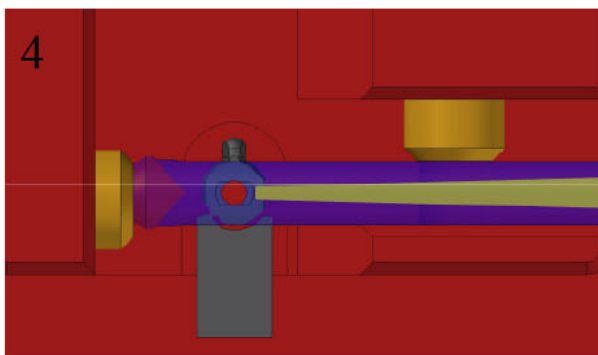
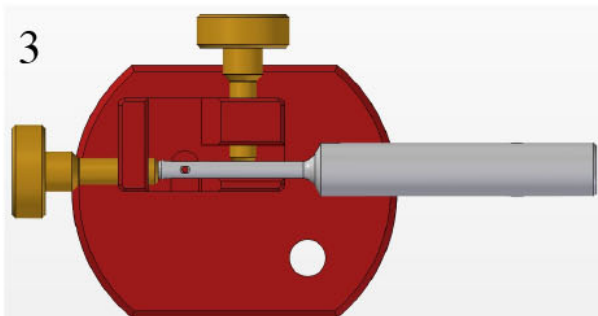
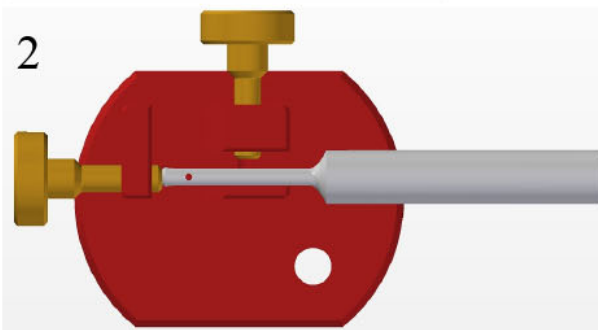
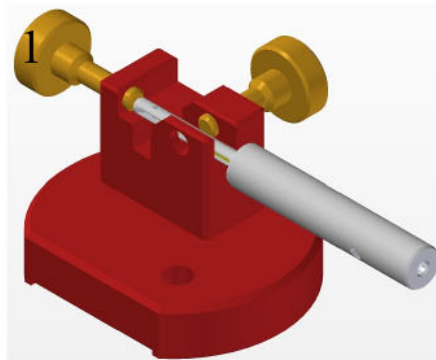
Install the blade into the blade window, nose first, so the nose of the blade is on the same side as the large spring slot opening. Make sure the bottom slot on the blade is engaged with the end of the spring.

### IMPORTANT:

The blade hold and pin hole should be aligned.

### Step 5

Use the assembly pin to make sure the blade hole and the pin hole are aligned. Press the assembly pin all the way through to the large diameter.

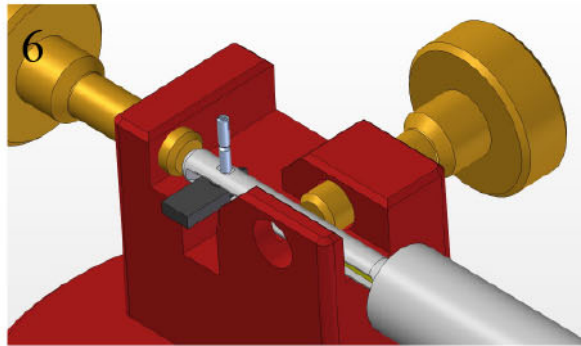


## How do I install blades? *(continued)*

### For COFA Series 2 and 3 Tools

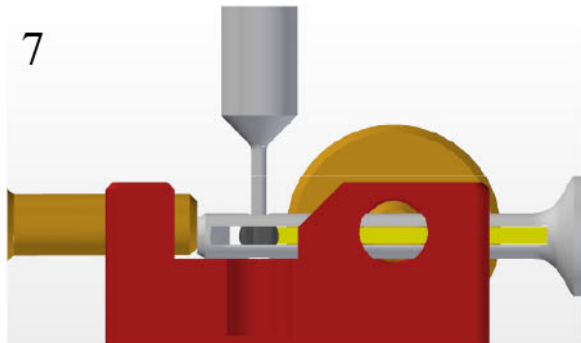
#### Step 6

Remove the assembly pin and install the longer (and smaller diameter) of the split pin into the pin hole and blade hole.



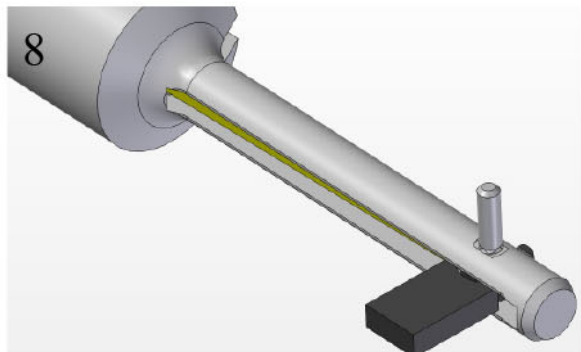
#### Step 7

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



#### Step 8

Remove the tool from the fixture. Using your fingers break off the blade tab and longer end of the split pin.

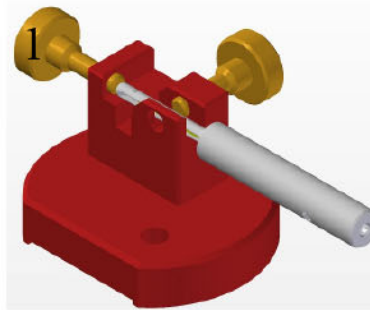


# How do I remove blades?

## For COFA Series 2 and 3 Tools

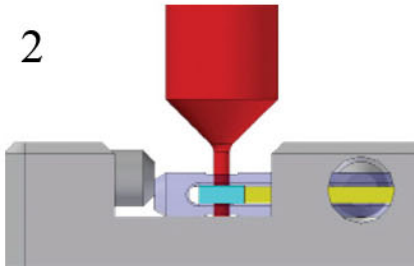
### Step 1

Lay the tool firmly into the assembly fixture, positioning the tool with the longer spring slot facing on the opposite side of the clamping screw. Tighten the clamping screw.



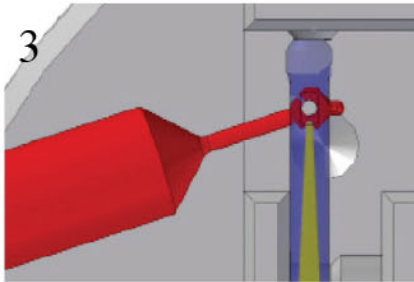
### Step 2

Using the small end of the assembly pin, drive the split pin out.



### Step 3

With the help of the small end of the assembly pin, push the blade out.

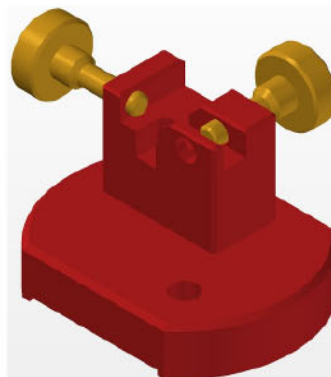


# How do I install the spring?

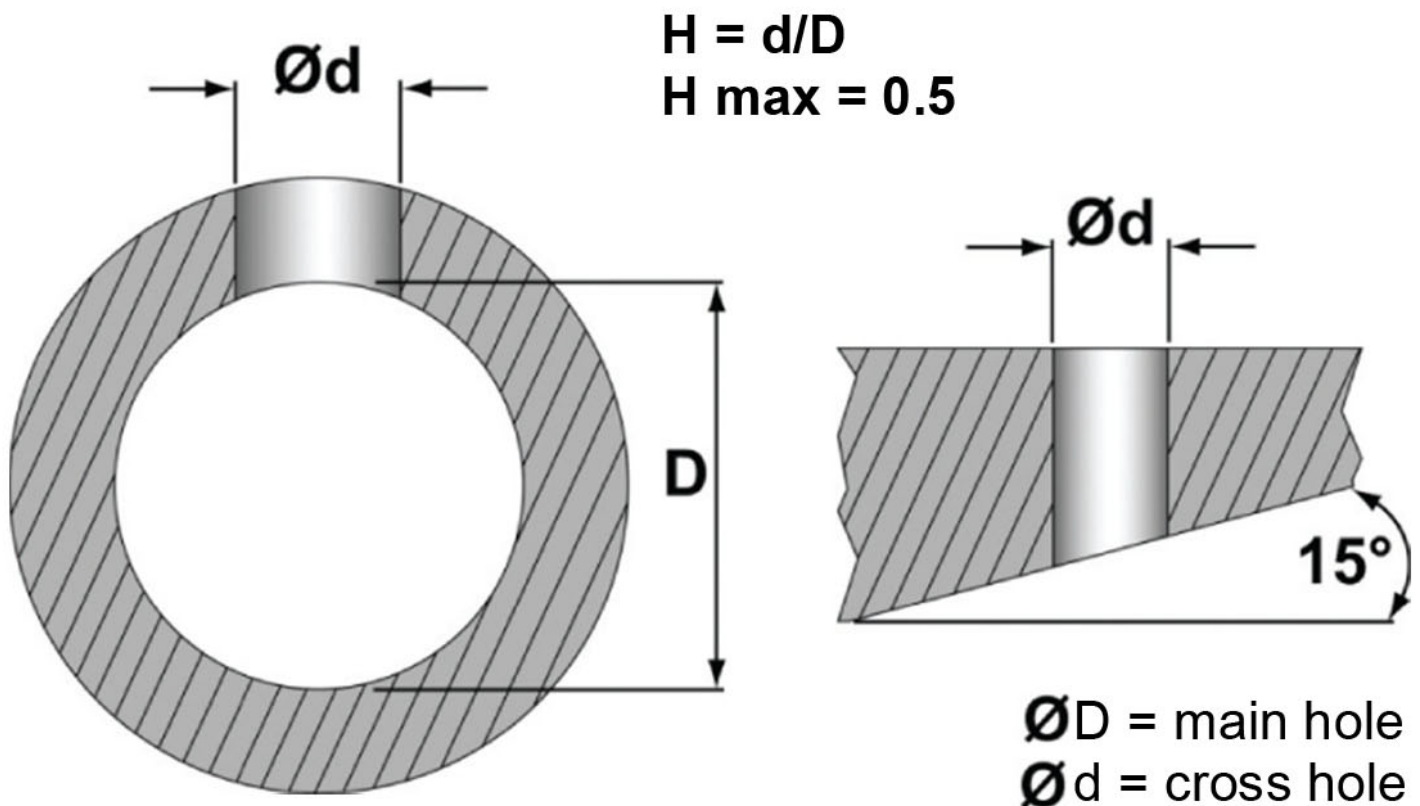
## For COFA Series 2 and 3 Tools

Install the spring into the hole on the bottom of the tool. Make sure to orient the spring flat. Use the set screw to hold the spring in the tool

*Hint: Use the assembly pin to help remove and assemble the spring*



## How do I program?



### Technical Information

For the standard MICRO COFA tool, the maximum main hole to cross hole ratio is 2:1 (for holes under 2.5mm, a minimum main hole of 4.5mm is required) and a maximum surface angle is 15°. Above these values, the cutting insert may not have enough clearance. With irregular surfaces, the RPM must be lowered but the feed rate is unaffected. Deburr more extreme contours by using the new 30° blade with extra clearance relief.

### Spring Information

The spring gives cutting force to the carbide blade and the MICRO COFA tool easily accommodates several spring sizes. For easier cutting materials such as aluminum, a softer "W" spring is recommended. For harder materials or alloys, a stiffer spring is recommended: "Z".

# How do I program? *(continued)*

| Material                                      |         |                 | FEED<br>(IPR) | SPEED (SFM)<br>Carbide-TiN |                   |
|---|---------|-----------------|---------------|----------------------------|-------------------|
|   | BHN     | Spring<br>Index |               | Flat to 6°                 | Uneven<br>Surface |
| Low carbon steel<br>1010, 1020, 1513          | 100-200 | H-Z             | 0.003-0.007   | 60-127                     | 45-75             |
| Med carbon steel<br>1030, 1040, 1050,<br>1524 | 100-200 | H-S             | 0.003-0.007   | 67-105                     | 37-60             |
| Free Machining Alloy<br>4140, 4150, 4130      | 125-250 | H-S             | 0.003-0.007   | 67-90                      | 33-53             |
|   | 125-340 | S-Z             | 0.002-0.006   | 45-75                      | 22-53             |
| High Alloy Steel<br>4340                      | 250-350 | S-Z             | 0.002-0.006   | 45-68                      | 22-53             |
| Stainless Steel<br>301, 316, 17-4PH etc.      | 140-250 | S-Z             | 0.002-0.006   | 33-90                      | 15-38             |
| Steel Castings                                | 90-225  | H-S             | 0.003-0.007   | 49-90                      | 33-60             |
|   | 150-250 | S               | 0.002-0.006   | 22-60                      | 11-38             |
| Gray Cast Iron                                | 150-250 | H               | 0.004-0.008   | 48-90                      | 22-53             |
|   | 200-330 | H-S             | 0.003-0.007   | 22-60                      | 18-38             |
| Nodular Cast Iron                             | 125-260 | H               | 0.004-0.008   | 48-105                     | 26-53             |
|   | 200-300 | H-S             | 0.003-0.007   | 38-83                      | 18-38             |
| Aluminum Alloys                               | 30-180  | W               | 0.004-0.010   | 75-225                     | 30-90             |
| Nickel Base Alloys                            | 140-220 | Z               | 0.002-0.006   | 11-30                      | 7-23              |
|   | 220-310 |                 | 0.002-0.005   | 7-23                       | 7-15              |
| Titanium Alloys                               |         | Z               | 0.002-0.006   | 11-30                      | 7-23              |

|       | A            | B            | B<br>Irregular | C            | D            | E            | E<br>Irregular |
|-------|--------------|--------------|----------------|--------------|--------------|--------------|----------------|
| COFA2 | 1.7<br>.067" | 4.5<br>.177" | 4.9<br>.194"   | 4.5<br>.177" | 4.3<br>.169" | 1.5<br>.059" | 1.0<br>.040"   |
| COFA3 | 2.5<br>.098" | 6.0<br>.236" | 6.6<br>.260"   | 6.0<br>.236" | 5.5<br>.217" | 2.0<br>.078" | 1.4<br>.055"   |

# 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 hole. This will give 0.040" (1) clearance from the cutter.

### Step 2

In forward working feed, machine the top surface of the hole by moving the tool to distance "B". (*Ref. the front of the tool*)

### Step 3

Following, rapid traverse through the hole. The hole cannot be damaged.

### Step 4

In order to make the blade snap out again, the tool has to be positioned beyond the rear bore edge by the distance "C". (*Ref. the front of the tool*)

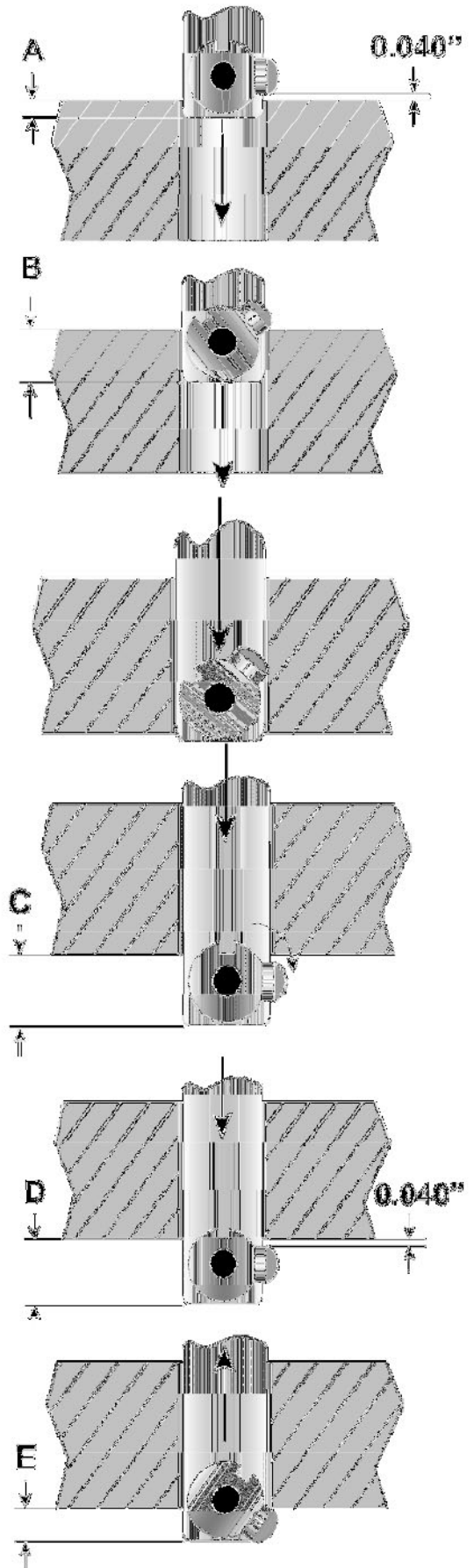
### Step 5

Travel the tool in back rapid feed below the rear material surface of the hole or deburr to reduce cycle time. Move to distance "D". (*Ref. the front of the tool*)

### Step 6

In back working feed, move to distance "E" to machine the rear surface. (*Ref. the front of the tool*)

Rapid out.



Reference table A-E on page 5.



# How do I program? *(continued)*

## BACK DEBURRING ONLY

For back deburring only, the MICRO COFA tool can rapid traverse through the top hole without damage to your hole surface.

### Step 1

Referencing the front of the tool. Rapid traverse the tool the distance "A" into the hole. This will give .040" (1) clearance from the cutter.

### Step 2

In order to make the blade snap out again, the tool has to be positioned beyond the rear bore edge by the distance "C".

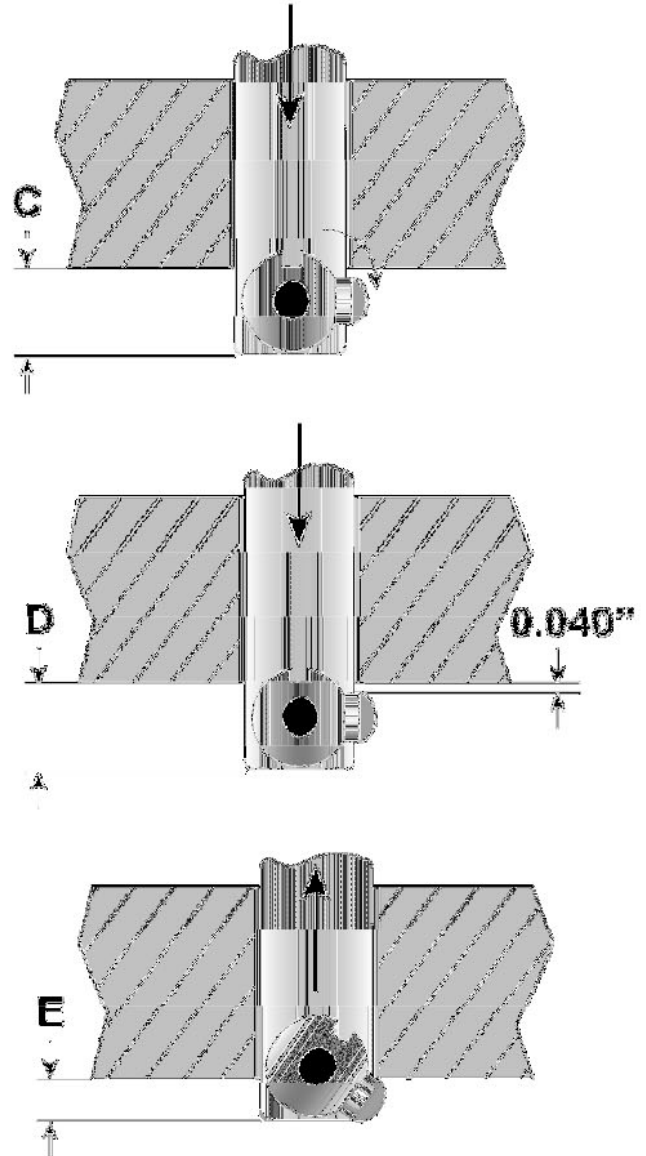
### Step 3

Travel the tool in back rapid feed below the rear material surface of the hole or deburr to reduce cycle time. Move to distance "D". (*Ref. the front of the tool*)

### Step 4

In back working feed, move to distance "E" to machine the rear surface. (*Ref. the front of the tool*)

Rapid Out



# Troubleshooting

| Problem  | Probable Cause  | Solution   |
|--|---|--|
| Chamfer Ø too large                                  | <ul style="list-style-type: none"> <li>• Tool is designed to cut to a set chamfer diameter</li> </ul>   | <ul style="list-style-type: none"> <li>• Select a smaller sized tool</li> </ul>  |
| Chamfer Ø too small                                  | <ul style="list-style-type: none"> <li>• Chamfer is cutting to the designated maximum from the catalog but this is not large enough</li> <li>• Chamfer is not to designed maximum size</li> </ul> | <ul style="list-style-type: none"> <li>• Use the next size larger tool if possible</li> <li>• The MICRO COFA tool is only designed for edge breaks but specials can be requested</li> <li>• Use the next higher strength spring</li> <li>• Use a slower feed rate</li> </ul> |
| Tool Chatters  | <ul style="list-style-type: none"> <li>• Operating conditions are not correct</li> <li>• Not enough cutting force on your material</li> </ul>   | <ul style="list-style-type: none"> <li>• Increase feed rates</li> <li>• Decrease speed rates</li> <li>• Use coolant on tool</li> <li>• Use the next higher strength spring</li> </ul>  |
| Tool is pushing the burr                             | <ul style="list-style-type: none"> <li>• Blade is used or dull</li> <li>• Blade is new but still not working</li> </ul>   | <ul style="list-style-type: none"> <li>• Change the insert</li> <li>• Use the next higher strength spring</li> <li>• Check programming position and feed rates</li> <li>• Burrs are too large</li> </ul>   |
| Tool creates a secondary burr or poor surface finish | <ul style="list-style-type: none"> <li>• Spring is too heavy</li> <li>• Chamfer size is too large</li> <li>• Operating conditions are not correct</li> </ul>                                      | <ul style="list-style-type: none"> <li>• Use next lighter strength spring</li> <li>• Use a smaller tool to achieve a smaller edge break</li> <li>• Check recommended feed and speed rates</li> </ul>   |



**WARNING: Grinding may produce hazardous dust. To avoid adverse effects, use adequate ventilation and read MSDS. Cutting tools may break during use. To avoid injury, use proper safety precautions and protective equipment.**

## Troubleshooting *(continued)*

| Problem                                  | Probable Cause  | Solution  |
|--|---|---|
| Cutting blades are chipping              | <ul style="list-style-type: none"> <li>• Programming error</li> <li>• Interrupted cut or possible wall interference</li> </ul>  | <ul style="list-style-type: none"> <li>• Make sure cutting edge is not in fast feed when cutting</li> <li>• Try smaller tool</li> <li>• Reduce speed rate</li> </ul>  |
| Uneven chamfer or missing some burrs     | <ul style="list-style-type: none"> <li>• Speed rate far too high</li> <li>• Ratio between crosshole and tube diameter (d:D) is larger than 0.5</li> <li>• Not enough cutting force for your material</li> </ul> | <ul style="list-style-type: none"> <li>• Special inserts are possible</li> <li>• Change spring or use the next higher strength spring</li> </ul>  |
| Blade is breaking or falling out of tool | <ul style="list-style-type: none"> <li>• Interrupted cut or possible wall interference</li> <li>• Roll pins are being deformed</li> <li>• Program is incorrect</li> </ul>                                       | <ul style="list-style-type: none"> <li>• Try smaller tool</li> <li>• Check assembly procedures</li> <li>• Assembly pins must be used when changing blades</li> <li>• Change roll pin</li> <li>• Check programming positioning</li> <li>• Do not use bore cycle</li> </ul> |

### Frequently Asked Questions

#### **My chamfer is too big. Can I reduce it by feeding the tool faster?**

*Not recommended. The MICRO 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 MICRO 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.*

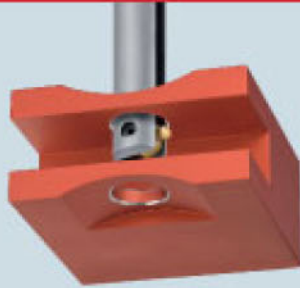
# Over 50 Years of Manufacturing Cutting Tools

HEULE manufactures cutting tools of the highest quality and precision consistent with Swiss craftsmanship for use in the machine tools of some of the world's largest manufacturers; and the smallest machine shops.



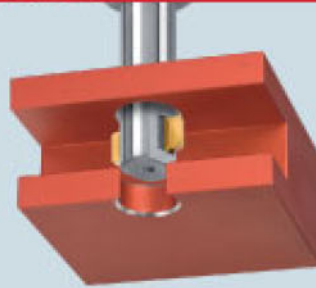
## DEBURRING

COFA  
SNAP



## CHAMFERING

SNAP  
GH-S  
DEFA



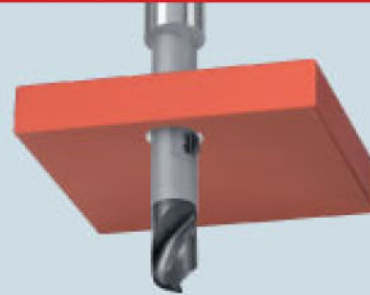
## COUNTERSINKING

BSF  
SOLO  
GH-Z/E  
GH-K



## DRILLING

VEX-P  
VEX-S



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