

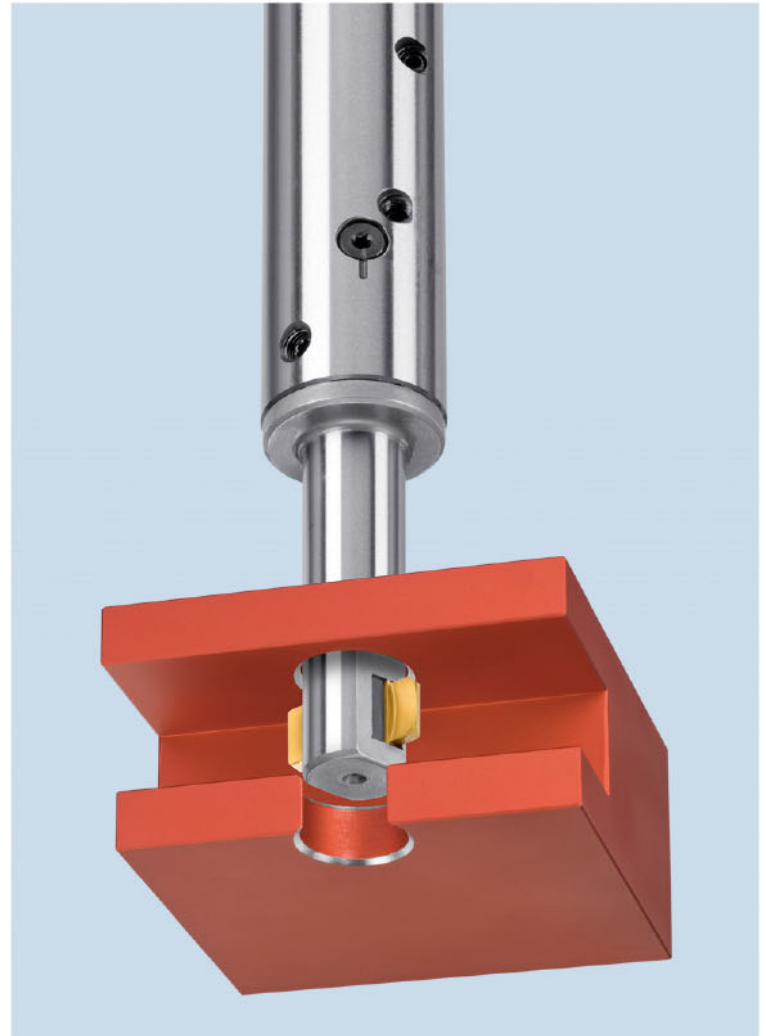
## DEFA

### Instruction Book

Controlled chamfer tools for precision front and back chamfering of through holes.

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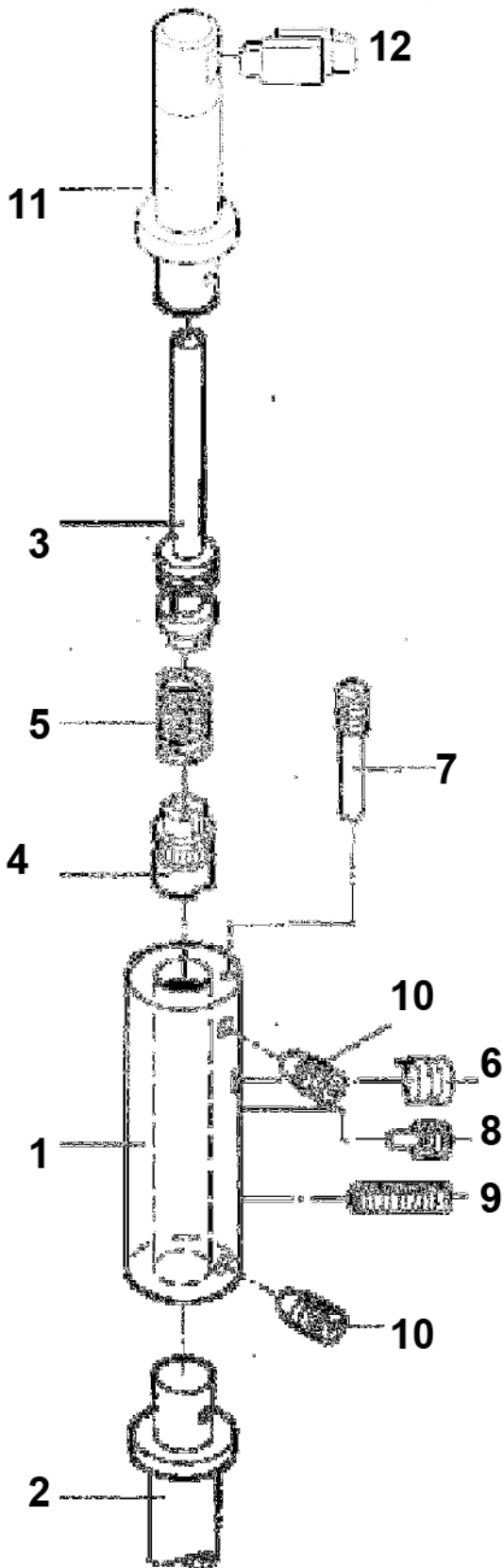
# Tool Description

## What does the DEFA tool do?

The DEFA chamfering tool was designed to offer controlled chamfers over a range of adjustment. DEFA chamfers through holes from front to back without reversing the spindle or indexing the work piece. The DEFA tool offers the user a high quality chamfering tool with TiN coated solid carbide inserts.

## DEFA Tool Spare Parts

1. Tool Body
2. Shank
3. Blade Control
4. Gear Wheel
5. Torsion Spring
6. Eccentric Screw
7. Positioning Screw
8. Set Screw
9. Tension Spring
10. Clamping Screw
11. Blade Housing
12. Blades



# How do I change blades?

## Step 1

Remove the Clamping Screw with with a #8 Torx Wrench.

## Step 2

Pull the Housing from the Tool Body and remove the Blades from the Housing.

## Step 3

Place new blades in the blade window of the housing with numbers out and slots down. Blades should be flush with the housing.

## Step 4

Push the Housing down onto the Tool Body and make sure the screw hole is about a 1/4 turn to the right of the mark on the Tool Body.

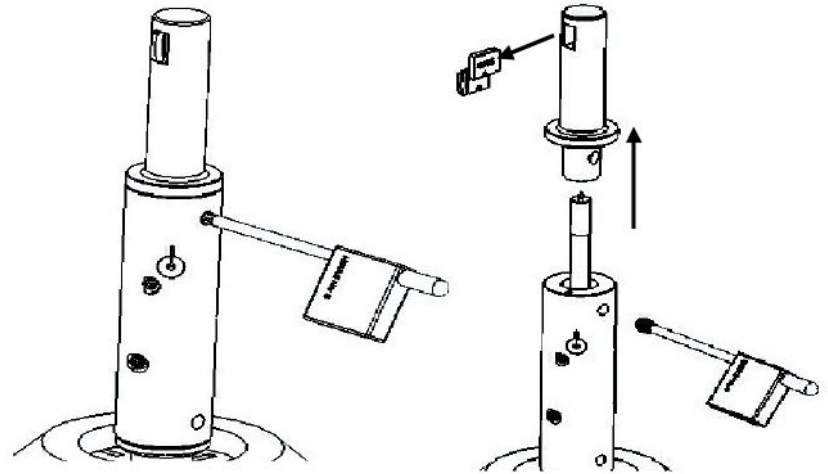
## Step 5

Rotate the Housing 45° to align the screw holes and engage the blades (you will hear a clicking sound and blades will extend and retract once engaged).

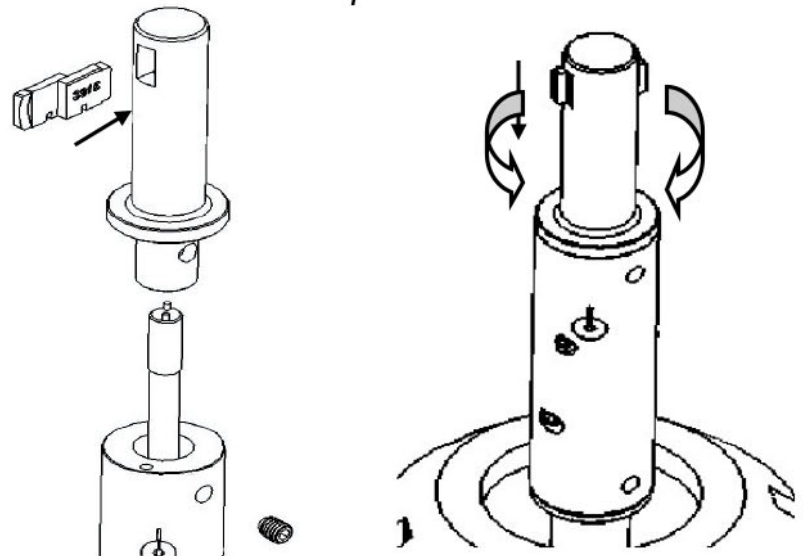
## Step 6

Insert the Clamping Screw and Tighten down.

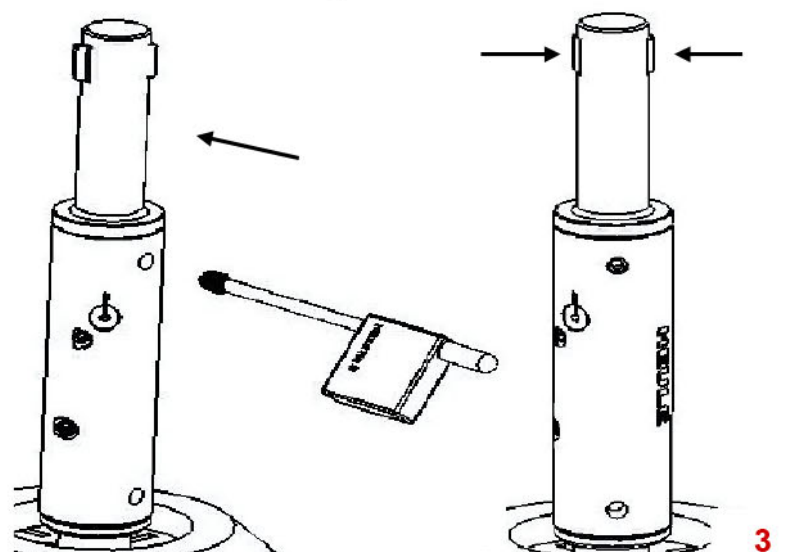
Steps 1 & 2



Steps 3 & 4



Steps 5 & 6



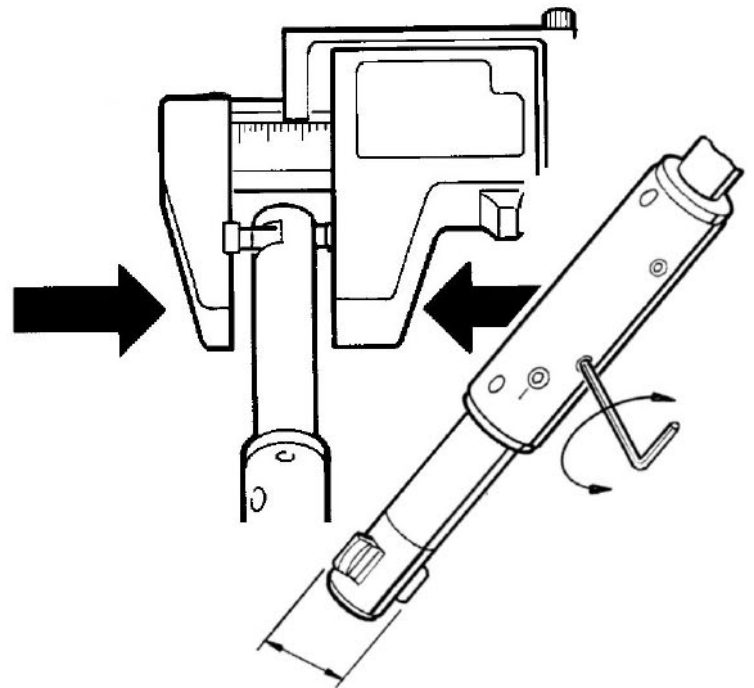
# How do I set the D2 and Blade Force?

## Blade Diameter

1. Turn the Set Screw with an Allen Key to obtain your desired blade diameter (D2).

**NOTE:** Turn counter clockwise to increase the diameter and turn clockwise to decrease the diameter.

2. Measure the blades to make sure you have the correct diameter (See page 5).

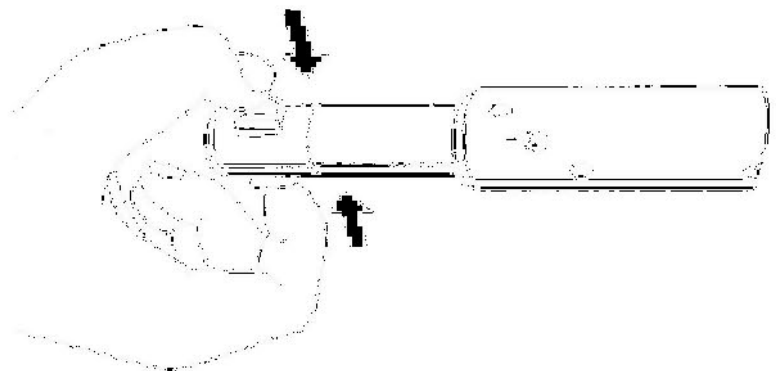
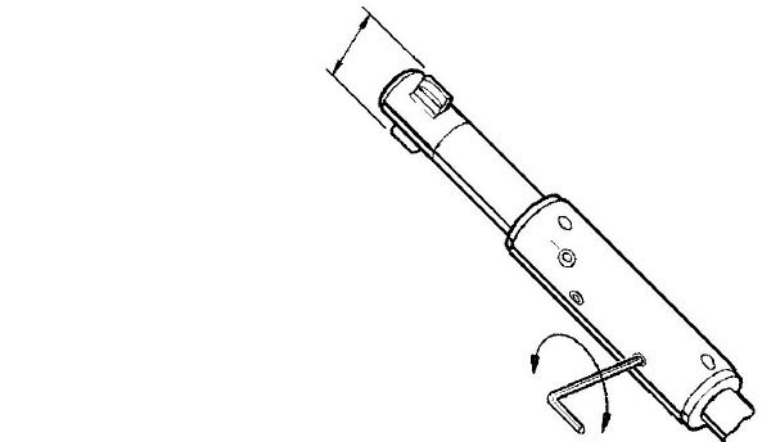


## Blade Force

1. Turn the tension screw with an Allen Key to obtain the desired blade force.

**NOTE:** Turn counter clockwise to decrease the blade force and turn clockwise to increase the blade force.

2. Use your fingers to check the blade force, it should be tight enough that the blades pop out after being pushed in, but loose enough that they can be pushed together.

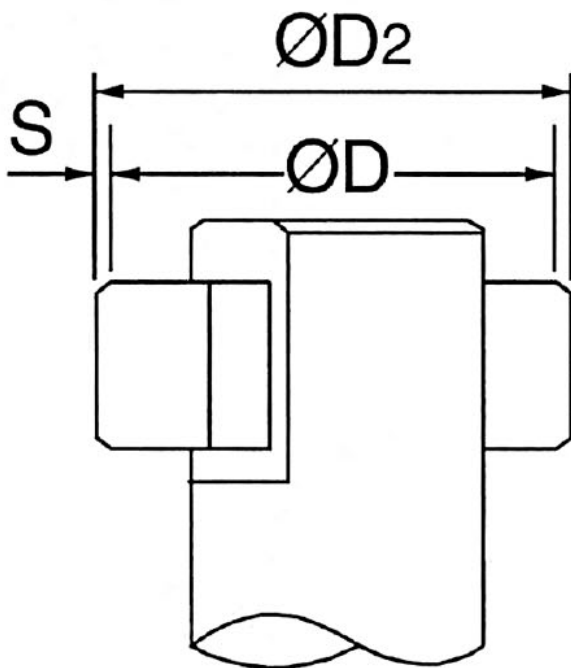


# Calculating $\text{ØD2}$

$\text{ØD2}$  is the measurement across the outer sliding edge of the cutting blades when they are installed in the tool holder.  $\text{ØD2}$  is based on the desired chamfer diameter,  $\text{ØD}$ , and the projected length of the non-cutting edge, 's'.

$$\text{ØD2} = \text{ØD} + 2(S)$$

$$\text{ØD2} = \text{Chamfer Dia. } (\text{ØD}) + [2 \times \text{'s'}]$$



## Values for 's'

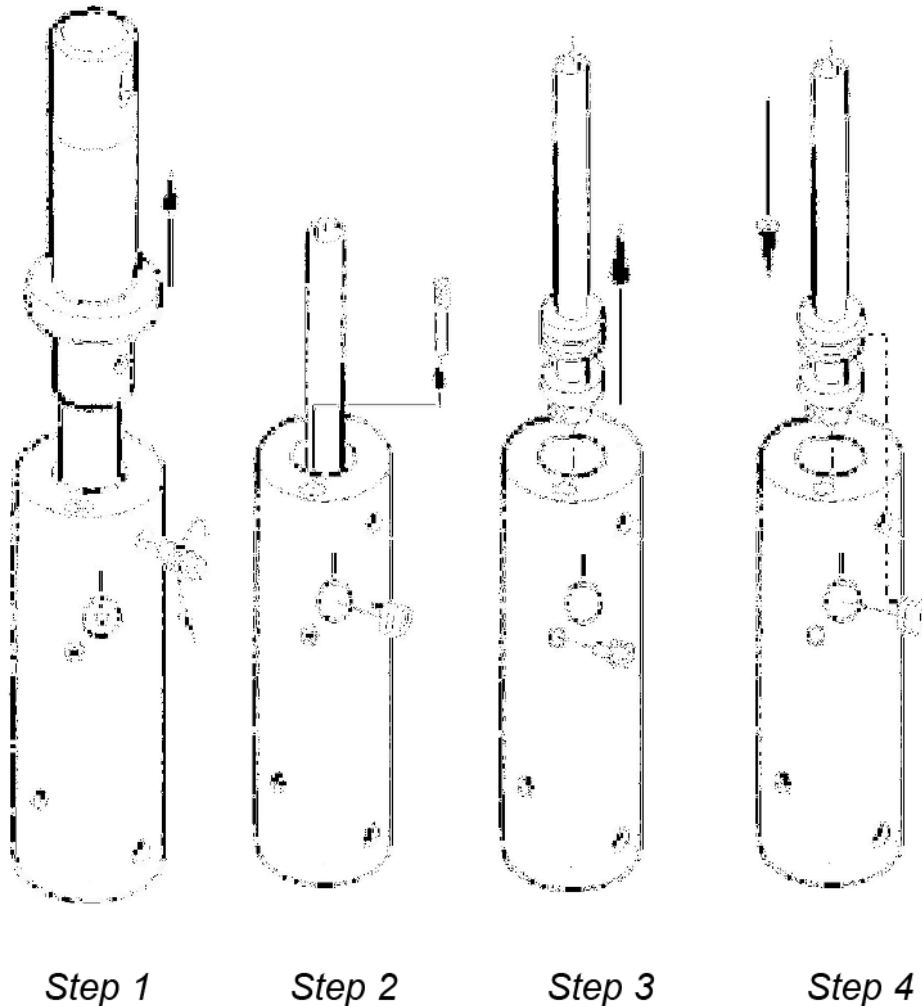
Series	Old Series	's'
02 thru 09	4 thru 8	0.3mm .012"
10 thru 13	8 thru 13	0.4mm .016"
14 thru 17	12 thru 19	0.5mm .020"
18 thru 32	17 thru 42	1.0mm .040"

## Adjusting $\text{ØD2}$

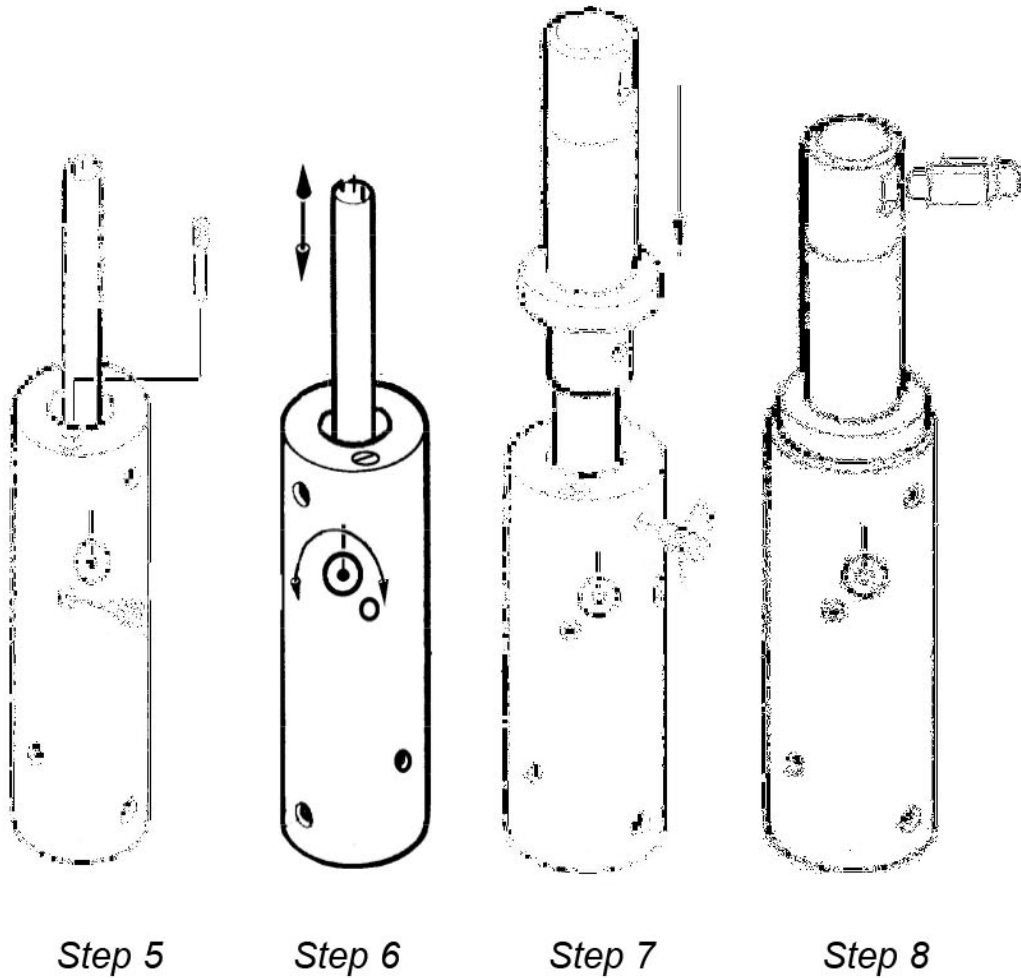
- Remove the red sealant from the chamfer adjusting set screw
- To increase the  $\text{ØD2}$  dimension, turn the set screw counter-clockwise
- To decrease the  $\text{ØD2}$  dimension, turn the set screw clockwise
- Reapply screw sealant to the set screw to prevent unintentional changes

**Hint:** When setting the  $\text{ØD2}$ , increase the blade tension to ensure maximum extension of the blades against the calipers.

## How do I replace the blade control?



1. Remove blades from the tool. Use a #8 Torx wrench to remove the clamping screw and pull off the housing.
2. Remove the positioning pin from the tool body and use an Allen wrench to remove the eccentric cam.
3. Remove the adjusting screw and pull the blade control out of the tool body.
4. Insert the new blade control. Set the eccentric cam in the tool body to ensure that the cam pin sits between the two discs of the blade control.



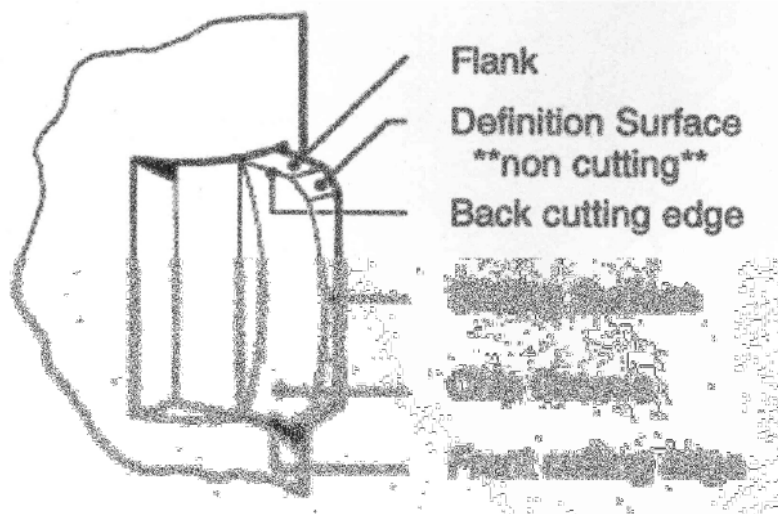
5. Reinstall the positioning pin and the chamfer adjusting set screw until the heads are just below the surface of the tool body.
6. Turn the eccentric cam with a 1.5mm Allen wrench and check that the blade control goes up and down.
7. Align the screw holes and reinstall the blade housing and tighten the screw with a #8 Torx wrench.
8. Install new blades, set the blade  $\text{ØD2}$ , and set the blade force (See sections 2 and 3).

# Troubleshooting Information

Problem	Probable Cause	Solution
Chamfer is too small	<ul style="list-style-type: none"> <li>• <math>\text{ØD2}</math> is set too small</li> </ul>	<ul style="list-style-type: none"> <li>• Turn Chamfer Adjusting set screw counter clockwise.</li> <li>• <i>See section 3 on how to set the <math>\text{ØD2}</math>.</i></li> </ul>
Chamfer is too large	<ul style="list-style-type: none"> <li>• <math>\text{ØD2}</math> is set too large</li> </ul>	<ul style="list-style-type: none"> <li>• Turn Chamfer Adjusting set screw clockwise. <i>See section 3 on how to set the <math>\text{ØD2}</math>.</i></li> </ul>
Inconsistent Chamfer	<ul style="list-style-type: none"> <li>• Blade force is too small</li> <li>• Blades are worn out</li> <li>• Tool is not centered in hole</li> </ul>	<ul style="list-style-type: none"> <li>• When machining harder materials such as nickel based alloys, more blade tension may be required. Turn tension screw clockwise.</li> <li>• Replace the blade set. <i>See section 2.</i></li> <li>• Center tool to hole.</li> </ul>
Poor Chamfer surface quality	<ul style="list-style-type: none"> <li>• Feed rate is too high</li> <li>• Blades are worn out</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce the feed rate.</li> <li>• Replace the blade set. <i>See section 2.</i></li> </ul>
Secondary burr is formed	<ul style="list-style-type: none"> <li>• Feed rate is too high</li> <li>• Blade tension is too high</li> <li>• Tool is not centered in hole</li> <li>• Blades are worn out</li> <li>• Cutting speed is too slow</li> <li>• Too much runout</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce the feed rate.</li> <li>• Turn the tension screw counter clockwise.</li> <li>• Center tool to hole.</li> <li>• Replace the blade set. <i>See section 2.</i></li> <li>• Increase the cutting speed.</li> <li>• Check holders or use bushings.</li> </ul>
Tool does not cut at all	<ul style="list-style-type: none"> <li>• <math>\text{ØD2}</math> is too small</li> </ul>	<ul style="list-style-type: none"> <li>• Check the tool setting and set to correct <math>\text{ØD2}</math>.</li> </ul>
Blades do not fit into tool or are tight and do not slide easily	<ul style="list-style-type: none"> <li>• Incorrect blade size</li> <li>• Burr or debris in window or on blades</li> </ul>	<ul style="list-style-type: none"> <li>• Check Part numbers or blade dimensions from catalog.</li> <li>• Ensure window and blades are clean and free of dirt or burrs.</li> </ul>



# How do I use this tool?



## Flank

The cutting clearance angle, optimized for a variety of materials.

## Definition Surface

Has no cutting Geometry and is designed to guide the cutting edge at the desired angle.

## Back Cutting Edge

Cuts the chamfer on the exit side of the hole.

## Sliding Surface

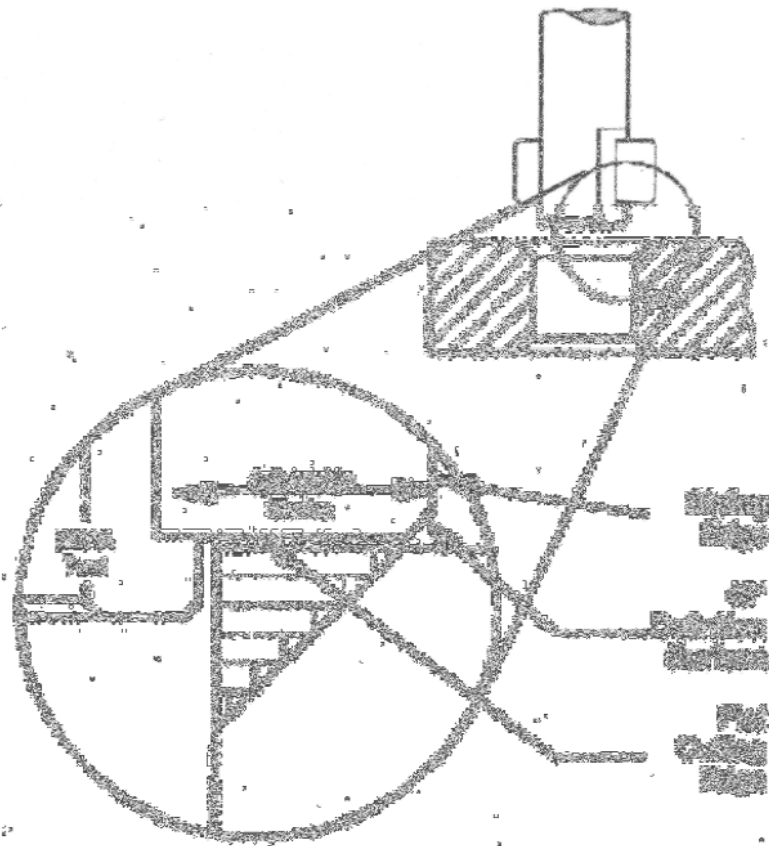
Ground edge with slight convexity to protect the bore surface.

## Chip Groove

Cutting Geometry ground for chip formation and evacuation.

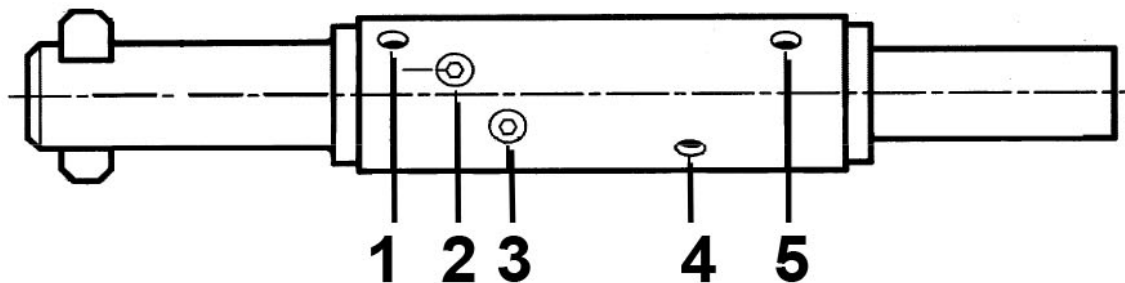
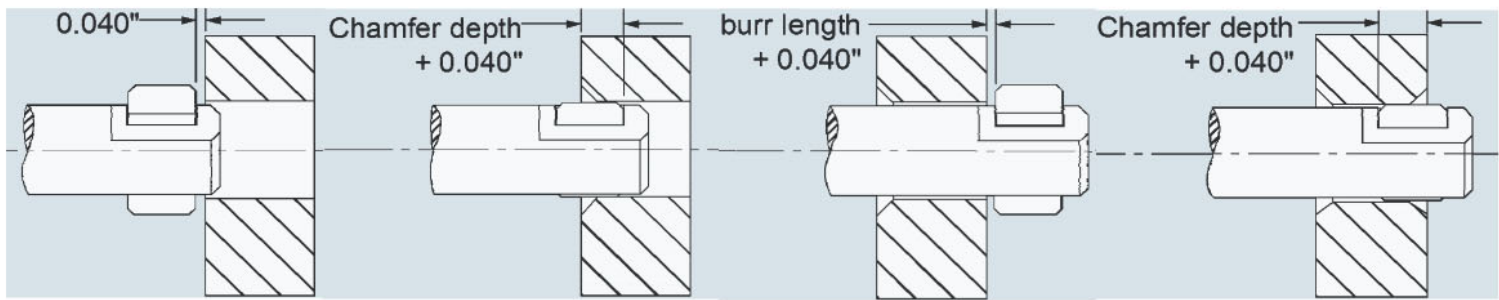
## Front Cutting Edge

Cuts the front chamfer.  
This edge is removed and replaced with a long 45° lead for back cutting only blades.



- The **Flat Cutting Edge** turns the chamfer at a controlled depth of cut.
- The non cutting **Definition Surface** cleans the stepped cut and guides the cutting edge at the required angle.
- The **Sliding Surface** prevents damage to the bore or threads.
- The design allows for pre-setting to an exact chamfer diameter.

# How do I program?



1	<b>Clamping Screw (Blade Housing)</b>	Holds the blade housing to the tool body. It must seat in the tapered pocket in the housing for maximum holding force.
2	<b>Eccentric Cam</b>	Disengages and engages the blade control pins from the blades making it possible to exchange the blades easily.
3	<b>Set Screw (Chamfer Adjusting)</b>	Adjusts $\text{ØD2}$ setting and chamfer $\text{ØD}$ . Turn clockwise to decrease chamfer, counter-clockwise to increase chamfer.
4	<b>Tension Screw</b>	Adjusts the force behind the blades. Turn clockwise to increase tension, counter-clockwise to decrease tension.
5	<b>Clamping Screw (Shank)</b>	Holds the shank to the tool body. It must seat in the tapered pocket in the shank for maximum holding force.



**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.**

## How do I program? *(continued)*

Material		Feed IPR	Speed—SFM Carbid—TiN
Aluminum	150<Bn<250	.001-.003	300-400
Brass	150<Bn<250	001-.003	240-315
Low carbon steel	100<Bn<225	001-.003	200-260
Med carbon steel	150<Bn<250	001-.003	100-240
Free Machining Alloy	150<Bn<250	001-.003	140-200
High Alloy Steel*	200<Bn<350	001-.003	100-130
Steel Casting	90<Bn<225 150<Bn<250	001-.003 001-.003	80-160 80-130
Stainless Steel	150<Bn<250	001-.003	100-150
Malleable Cast Iron	110<Bn<145 150<Bn<270	001-.003 001-.003	100-210 215-185
Gray Cast Iron	150<Bn<220 200<Bn<330	001-.003 001-.003	180-240 140-210
Nodular Cast Iron	150<Bn<250 200<Bn<300	001-.003 001-.003	182-150 140-210
Nickel Base Alloy*	22<Bn<32 32<Bn<42	.0008-.0015 .0008-.0015	30-80 20-50
Titanium Alloy	14<Bn<22 22<Bn<32	.0008-.0015 .0008-.0015	60-90 60-90

\* When machining materials with a hardness greater than 28Rc, Heule recommends using a tool with the blade housing sized .006" under the hole size.

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