DEFA

Instruction Book

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

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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 Screw
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.

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 ØD2

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

\[ \text{ØD2} = \text{ØD} + 2(\text{s}) \]

<table>
<thead>
<tr>
<th>Values for ‘s’</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Series</strong></td>
</tr>
<tr>
<td>02 thru 09</td>
</tr>
<tr>
<td>10 thru 13</td>
</tr>
<tr>
<td>14 thru 17</td>
</tr>
<tr>
<td>18 thru 32</td>
</tr>
</tbody>
</table>

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

Hint: When setting the 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 ØD2, and set the blade force (See sections 2 and 3).

Troubleshooting Information

<table>
<thead>
<tr>
<th>Problem</th>
<th>Probable Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chamfer is too small</td>
<td>ØD2 is set too small</td>
<td>• Turn Chamfer Adjusting set screw counter clockwise. See section 3 on how to set the ØD2.</td>
</tr>
<tr>
<td>Chamfer is too large</td>
<td>ØD2 is set too large</td>
<td>• Turn Chamfer Adjusting set screw clockwise. See section 3 on how to set the ØD2.</td>
</tr>
<tr>
<td>Inconsistent Chamfer</td>
<td>Blade force is too small</td>
<td>• When machining harder materials such as nickel based alloys, more blade tension may be required. Turn tension screw clockwise. Replace the blade set. See section 2.</td>
</tr>
<tr>
<td></td>
<td>Blades are worn out</td>
<td>• Center tool to hole.</td>
</tr>
<tr>
<td></td>
<td>Tool is not centered in hole</td>
<td>• Center tool to hole.</td>
</tr>
<tr>
<td>Poor Chamfer surface quality</td>
<td>Feed rate is too high</td>
<td>• Reduce the feed rate. Replace the blade set. See section 2.</td>
</tr>
<tr>
<td></td>
<td>Blades are worn out</td>
<td>• Reduce the feed rate. Replace the blade set. See section 2.</td>
</tr>
<tr>
<td>Secondary burr is formed</td>
<td>Feed rate is too high</td>
<td>• Reduce the feed rate. Replace the tension screw counter clockwise. Center tool to hole. Replace the blade set. See section 2.</td>
</tr>
<tr>
<td></td>
<td>Blade tension is too high</td>
<td>• Increase the cutting speed. Check holders or use bushings.</td>
</tr>
<tr>
<td></td>
<td>Tool is not centered in hole</td>
<td>• Tool is not centered in hole.</td>
</tr>
<tr>
<td></td>
<td>Blades are worn out</td>
<td>• Too much runout.</td>
</tr>
<tr>
<td></td>
<td>Cutting speed is too slow</td>
<td>• Increase the feed rate. Replace the blade set. See section 2.</td>
</tr>
<tr>
<td>Tool does not cut at all</td>
<td>ØD2 is too small</td>
<td>• Check the tool setting and set to correct ØD2.</td>
</tr>
<tr>
<td>Blades do not fit into tool or are tight and do not slide easily</td>
<td>Incorrect blade size</td>
<td>• Check Part numbers or blade dimensions from catalog. Ensure window and blades are clean and free of dirt or burrs.</td>
</tr>
</tbody>
</table>
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? (continued)

<table>
<thead>
<tr>
<th>Material</th>
<th>Feed IPR</th>
<th>Speed—SFM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Carbide—TIN</td>
</tr>
<tr>
<td>Aluminum 150&lt;Bn&lt;250</td>
<td>.001-.003</td>
<td>300-400</td>
</tr>
<tr>
<td>Brass 150&lt;Bn&lt;250</td>
<td>.001-.003</td>
<td>240-315</td>
</tr>
<tr>
<td>Low carbon steel 100&lt;Bn&lt;225</td>
<td>.001-.003</td>
<td>200-260</td>
</tr>
<tr>
<td>Med carbon steel 150&lt;Bn&lt;250</td>
<td>.001-.003</td>
<td>100-240</td>
</tr>
<tr>
<td>Free Machining Alloy 150&lt;Bn&lt;250</td>
<td>.001-.003</td>
<td>140-200</td>
</tr>
<tr>
<td>High Alloy Steel* 200&lt;Bn&lt;350</td>
<td>.001-.003</td>
<td>100-130</td>
</tr>
<tr>
<td>Steel Casting 90&lt;Bn&lt;225 150&lt;Bn&lt;250</td>
<td>.001-.003</td>
<td>80-160 80-130</td>
</tr>
<tr>
<td>Stainless Steel 150&lt;Bn&lt;250</td>
<td>.001-.003</td>
<td>100-150</td>
</tr>
<tr>
<td>Malleable Cast Iron 110&lt;Bn&lt;145 150&lt;Bn&lt;270</td>
<td>.001-.003</td>
<td>100-210 215-185</td>
</tr>
<tr>
<td>Gray Cast Iron 150&lt;Bn&lt;220 200&lt;Bn&lt;330</td>
<td>.001-.003</td>
<td>180-240 140-210</td>
</tr>
<tr>
<td>Nodular Cast Iron 150&lt;Bn&lt;250 200&lt;Bn&lt;300</td>
<td>.001-.003</td>
<td>182-150 140-210</td>
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<tr>
<td>Nickel Base Alloy* 22&lt;Bn&lt;32 32&lt;Bn&lt;42</td>
<td>.008-.0015</td>
<td>30-80 20-50</td>
</tr>
<tr>
<td>Titanium Alloy 14&lt;Bn&lt;22 22&lt;Bn&lt;32</td>
<td>.008-.0015</td>
<td>60-90 60-90</td>
</tr>
</tbody>
</table>

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

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.