Confirm the cutting edge

- Confirm the worn and damaged condition of the cutting edge.
- In case of extensive chipping on the cutting edge, eliminate the segment with GC wheel.

Primary relief grinding

- Use a collet chuck when installing a drill. The main cutting edge should be parallel form the drill's point view as shown in Fig.1.

- The point angle of the drill should be 140° with the swivel angle designated to 20° as shown in Fig.2.

- Incline the angle of the drill to 10°-12° (Fig.3).
- The angle will be the primary relief angle of the cutting edge.

- After the completion of a single cutting edge, index the drill 180° to grind another side of a cutting edge. The grinding depth is 0.02-0.03mm per traverse.

<Spark out>
- Last, finish the both cutting edges with the grinding depth at 0.01mm. Repeat the procedure 2-3 times including a spark out with a slow traverse for finishing.

<Axial run out>
- Maintain the axial run out within 0.02mm.
- Grind until the worn and chipped segment of the cutting edge is eliminated. Pay extra attention to the wear on the major portion.
## Secondary relief grinding

- After the completion of the primary relief, grind the secondary relief.
- Incline the drill (work head) to 20°-22° for the secondary relief grinding (Fig.4).
- If it is difficult to deviate the drill angle, incline the wheel 10° as shown in Fig.5.
- The swivel angle of the drill for Fig.4 and Fig.5 is 20°, and the point angle at 140° (identical as Fig.2).

- The ridge in the conjunction with the primary relief will appear after the secondary relief grinding.
- Adjust the rotational position of the drill while grinding (Fig.6). It is ideal for the ridge to be parallel with the straight cutting edge.
- Grind until the both ridges become a straight line.
  It forms a central point on the top of the cutting edge.
- Be extra careful of the overlapping ridges.
- It is easier to adjust a straight line by grinding each secondary relief alternatively.
After the completion of grinding the secondary relief, execute the thinning grind. Type of the thinning is **X-thinning**.

Set the work head parallel so that the drill axis will be parallel. Set the swivel angle to 0°, and parallelize it according to the traverse table's direction.

Using a height gauge, establish the rotational position of the drill to be parallel with a line which connects the both cutting edges and a shoulder (Fig.7), or the main cutting edge to be parallel as Fig.8.

Rotate 60° counter clockwise for Fig.7, and 45° for Fig.8 (observing form the cutting edge of the tool) to establish a vertical chisel edge completed by grinding the secondary relief.

For establishing perpendicular direction position of the wheel, set the opening angle to be 35° from the drill axis of the thinning as Fig.10 and Fig.11 indicate.

Grinding will be done by sliding the table to the direction indicated on Fig.10, and by pushing the drill to the wheel. The grinding depth operation is done slowly by adjusting the edge of the grinding depth by the stopper.

The final description of the drill is a dotted line on Fig.12. Adjust the wheel position so that off set amount of the thinning cutting edge will be 0.05mm to 0.1mm from the drill axis.
Honing

- After the completion of the thinning, execute the honing.
- Using a diamond file, fabricate a round edge where the thinning and the main cutting edge connect.
- \( R \approx 0.1 \times D \).

- The honing should be done homogeneously on the entire cutting edge as Fig. 14.

- The honing angle is 30° as shown in Fig. 15.
- The honing width is according to the tool diameter.

<table>
<thead>
<tr>
<th>Drill diameter</th>
<th>Honing width W</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \phi 5 ) less ( \phi 10 ) less</td>
<td>0.05 × 30°</td>
</tr>
<tr>
<td>( \phi 5 ) over ( \phi 10 ) less</td>
<td>0.05 ~ 0.1 × 30°</td>
</tr>
<tr>
<td>( \phi 10 ) over ( \phi 20 ) less</td>
<td>0.1 ~ 0.15 × 30°</td>
</tr>
</tbody>
</table>

The completion of the regrinding process. Confirm the following criteria before using:

- Within 0.02mm lip height difference
- Complete grinding of damaged segments of the cutting edge
- Optimal honing
- Grinding burr is eliminated
Primary, secondary relief grinding

Diamond wheel

If necessary, grind roughly before finish grinding.

Grain size
Rough grinding : #200
Finish grinding : #400

Thinning grinding

Diamond wheel

Grain size : #200

Honing

Diamond file

Grain size
Rough grinding : #400
Finish grinding : #1500

※ Diamond wheels and diamond files above are available at our divisions and sales offices. To order these products, please contact one of our sales offices or divisions near from you.