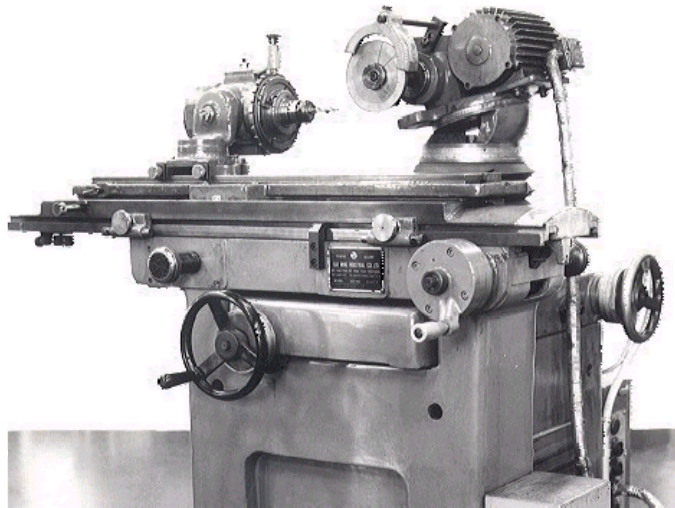


REGRINDING MANUAL FOR SOLID CARBIDE DRILL

MAE / MAS *type*

April 30, 2009

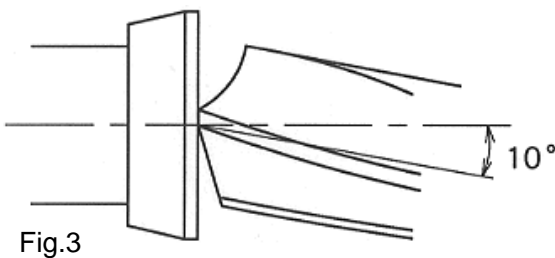
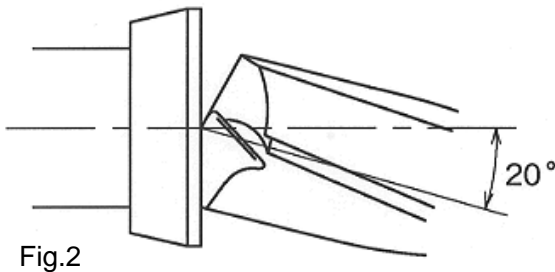
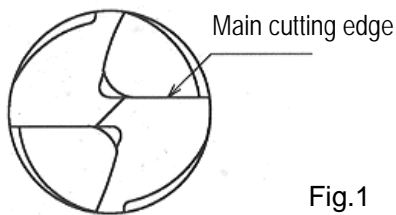


MITSUBISHI MATERIALS CORPORATION CARBIDE & TOOLS DIVISION

■ Confirm the cutting edge

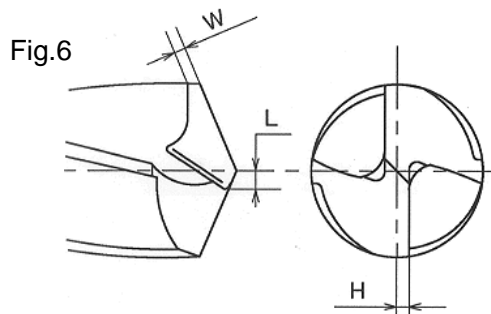
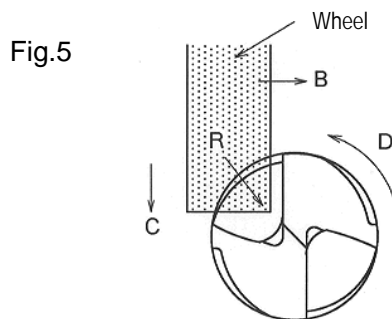
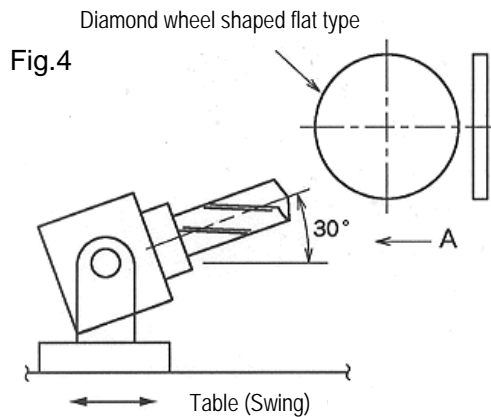
- Confirm the worn and damaged condition of the cutting edge.
- In case of extensive chipping on the cutting edge, eliminate with GC wheel.

■ Primary relief grinding



- Use a collet chuck when installing a drill.
The main cutting edge should be parallel from 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° (**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 the cutting edge. The grinding depth is 0.01-0.02mm per traverse.
- <Spark out>
- Last, finish the both cutting edges with the grinding depth at 0.01mm. Repeat this procedure 2 over 3 times including a spark out with a slow traverse for finishing precisely.
- <Axial run out>
- Maintain the axial run out within 0.01mm.
 - Grind until the worn and chipped segment of the cutting edge is eliminated.

■ Thinning grinding



- After the completion of the primary relief, execute the thinning grinding.
- Incline the drill (work head) to 30° as shown in **Fig. 4**.
- Diamond wheel shaped flat type should be used (Wheel diameter $\phi 100$ over - $\phi 150$).
- The main cutting edge should be vertical from arrow A view as shown in **Fig.5**.
- Fig.5 also shows the position of the drill point and the grinding wheel.
- Grinding will be done by moving the table to the direction indicated in **Fig.4**.
- Dimension H, L and W will be required to complete the thinning grinding. These three dimensions are indicated in the tool drawing (**Fig.6**).
- First, complete the grinding to maintain Dimension H by moving the wheel to horizontal direction (arrow B shown in **Fig.5**).
- Secondly, maintain Dimension L by moving the wheel to perpendicular direction (Arrow C shown in **Fig.5**).
- Last, maintain Dimension W by rotating the drill to Arrow D direction.
- The corner shape of the wheel should be maintained as sharply as possible.

- The management under the following table is recommendable.

Drill diameter	Corner radius
ø9 less	0.3 less
ø9 over ~ø12 less	0.4 less
ø12 over ~ø16 less	0.5 less

- To protect the generating of pressure adhesion, it is effective to grind spark out fully. And pay extra attention to the surface finish at the thinning rake face. (The surface finish is recommended within 0.4S.)

■ Secondary relief grinding

Fig.7

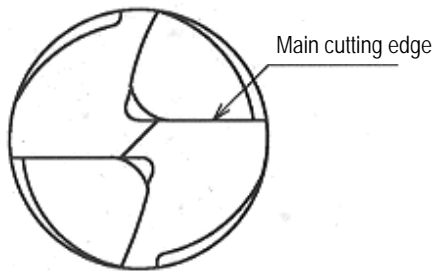


Fig.8

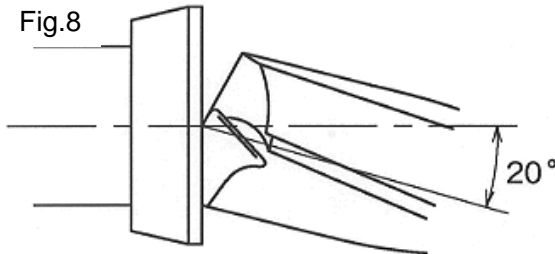
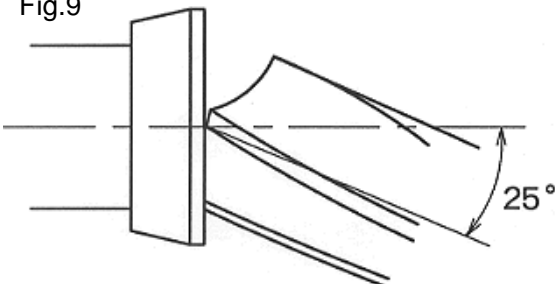
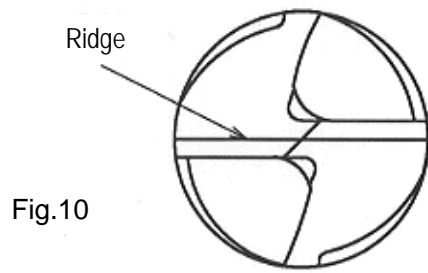


Fig.9



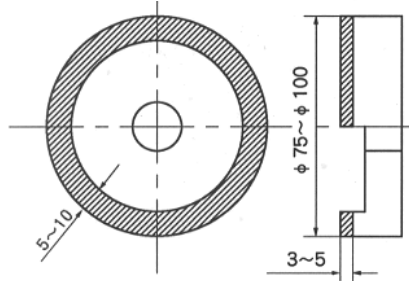
- After the completion of the thinning grinding, grind the secondary relief.
- The main cutting edge should be parallel identical as the primary relief grinding process (**Fig.7**).
- The swivel angle of the drill is designated to 20° as shown in **Fig.8**.
- Incline the angle of the drill to 25° (**Fig.9**). The angle will be the secondary relief.
- Grind identical way as the primary relief grinding.
- 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. It is ideal for the ridge to be parallel with the main cutting edge.



- Grind until the both ridges become a straight line. It forms a central point on the top of the cutting edge. It is easier to adjust a straight line by grinding the secondary relief alternatively.

■ Primary relief grinding

Diamond wheel



Grain size

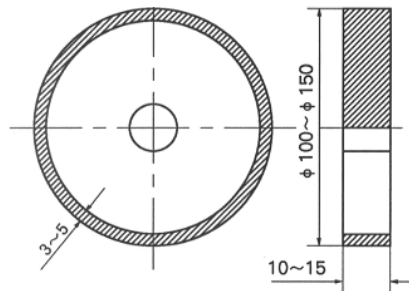
Rough grind : #200-#325

Finish grind : #600 over

- If necessary, grind roughly before finish grinding.

■ Thinning grinding

Diamond wheel



Grain size

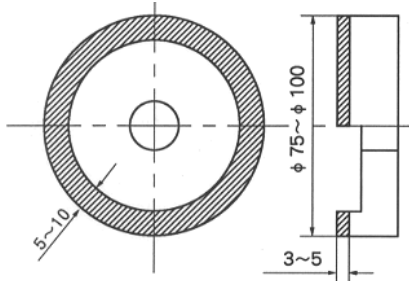
Rough grind : #400

Finish grind : #1000 over

- If necessary, grind roughly before finish grinding. It is effective to keep sharp edge on the wheel corner.

■ Secondary relief grinding

Diamond wheel



Grain size

Rough grind : #200

Finish grind : #325

- If necessary, grind roughly before finish grinding.