

REGRINDING MANUAL FOR SOLID CARBIDE DRILLS
FOR HEAT RESISTANT SUPER ALLOYS

DSA Series

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■ Checking conditions of the cutting edge

- Check wear conditions of and damage to the cutting edge.
- If there is serious damage such as fracture on the edge, grind the edge until the damage is all gone.

■ Grinding primary relief face

Fig. 1

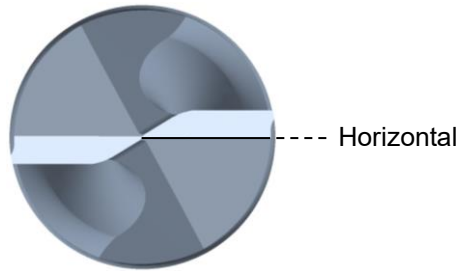


Fig. 2

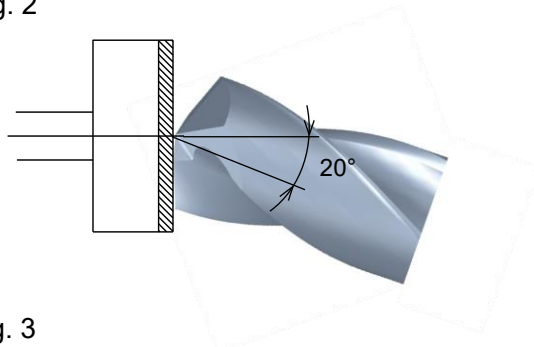
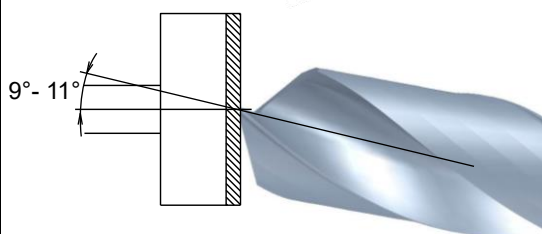


Fig. 3



- Install the drill by using collet chuck. As shown in fig.1, set the drill phase in order that the corner of center cutting edge and the shoulder of outer peripheral edge become parallel to each other when seen from the top.

- As shown in fig.2, rotate the drill (work head) 20° so that the point angle will be 140°.

- As shown in fig.3, set inclination angle of the drill (work head) at 9° - 11°. This angle will become primary relief angle.

- Finishing first relief face on one side of the cutting edge, index the drill 180° and grind the other side until both sides are at the same position.

*Depth of cut is 0.02 - 0.03mm/path.
Finally decrease depth of cut to about 0.01mm, and finish both sides at the position.

For finishing, repeat oscillation 2 - 3 times as slow as possible. This also serves for the purpose of spark-out.

- Grind until there is no wear or fracture left on the cutting edge.
- Make sure Lip height (axial runout of front cutting edge) < 0.02mm.

■ Grinding secondary relief face

Fig. 4

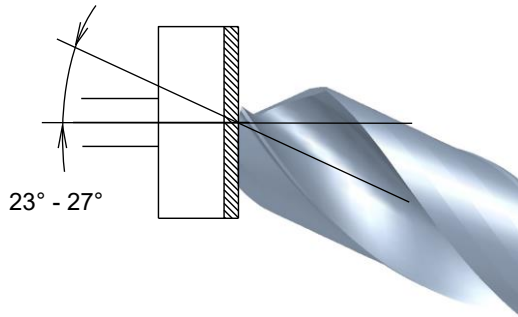


Fig. 5

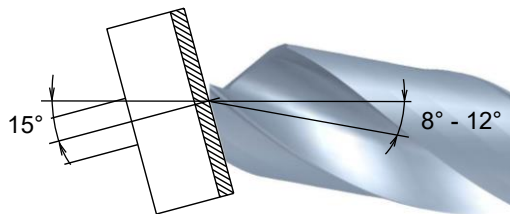


Fig. 6

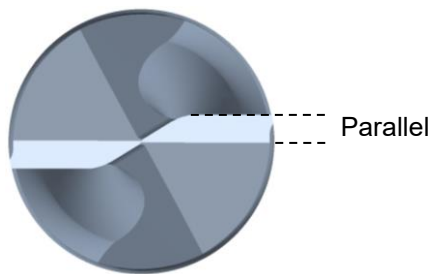
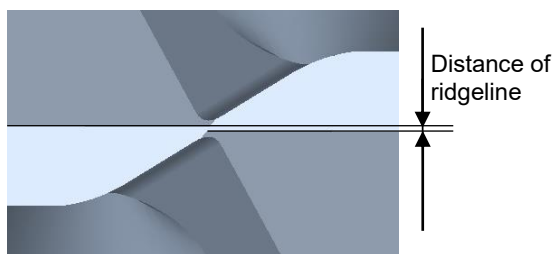


Fig. 7



- After grinding primary relief face, grind secondary relief face.
- As shown in **fig.2** of the previous section, keep rotation angle of the drill (work head) at 20°.
- As shown in **fig.4**, set inclination angle of the drill (work head) at 23° - 27°. If inclination angle of the drill (work head) cannot be increased to 23° - 27°, get the wheel inclined 15° as shown in **fig.5**.
- After secondary relief grinding, the ridgeline is formed.
- As shown in **fig.6**, it is ideal that the ridgeline is parallel to the main cutting. Adjust the drill phase while grinding.
- Make sure the distance of ridgeline shown in **fig.7** is under control of table below. (Please refer to **table 1**)

Table. 1

Diameter (mm)	Distance of ridgeline (mm)
Φ3 - Φ6	0.04
Φ6 over - Φ8	0.06
Φ8 over - Φ10	0.08
Φ10 over - Φ12	0.10

■ Grinding thinning face (X-thinning)

Fig. 8

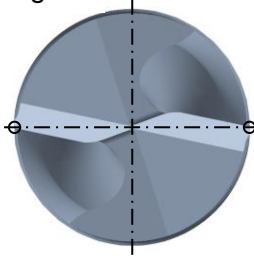


Fig. 9

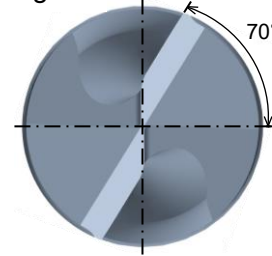


Fig. 10

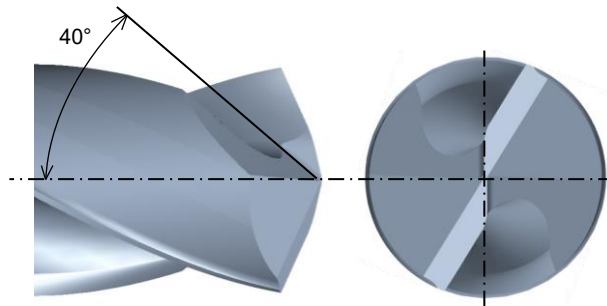
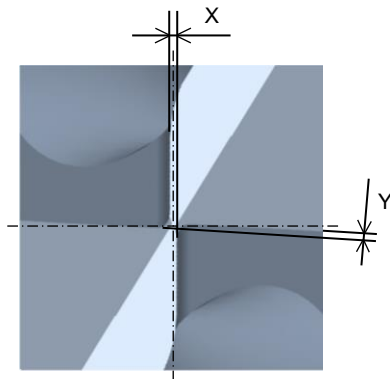


Fig. 11



- After grinding secondary relief face, grind thinning face.
- Type of the thinning is **X-thinning**.
- Refer to geometry of thinning wheel (P6).
- As shown in **fig.8**, set the drill phase so that the line connecting the shoulder of both sides will be horizontal by using a device such as height gauge.
- Then, as shown in **fig.9**, rotate the drill counter clockwise 70° when seen from the top.
- Set the vertical position of the wheel so that the open angle of the thinning from the drill center will be 40° , as shown in **fig.10**.
- Refer to fig.11 and table 2. Make sure thinning dimension is under control of X, Y.

Table. 2

Tool diameter (mm)	X	Y
$\Phi 3\text{over} - \Phi 6\text{less}$	0.06	0.06
$\Phi 6\text{over} - \Phi 10\text{less}$	0.10	0.10
$\Phi 10\text{over} - \Phi 12\text{less}$	0.15	0.15

■ Honing

Fig. 12

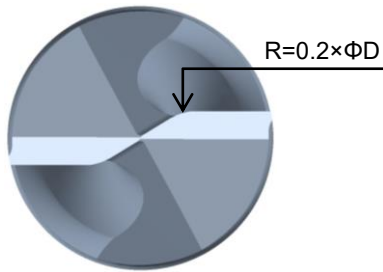


Fig. 13

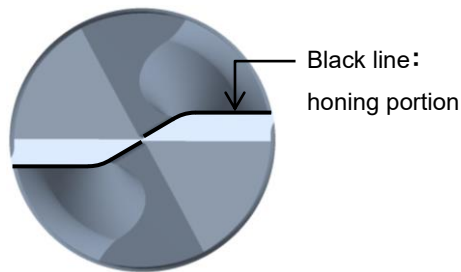
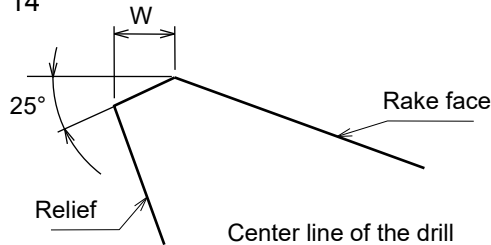


Fig. 14



- After grinding thinning face, grind honed edges. This is the last procedure for regrinding.
- First, as shown in **Fig.12**, grind the edge at the cross section of the thinning edge and major cutting edge with diamond file until it becomes R-shaped.
- Appropriate R size is approximately (0.2) x $\varnothing D$.
- As shown in **Fig.13**, thoroughly grind honed edges on both sides evenly.
- As shown in **Fig.14**, honing angle is 25°
- Change honing width in accordance with tool diameter (Please refer to **table 3**).

Table. 3

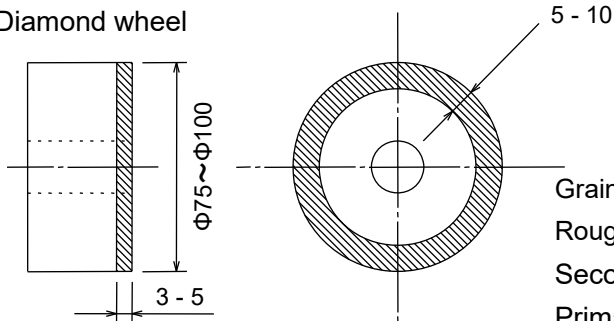
Tool diameter (mm)	Honing width W (mm)
$\varnothing 6 \text{ \&less}$	0.03
$\varnothing 6 \text{ over} - \varnothing 10 \text{ \&less}$	0.04
$\varnothing 10 \text{ over} - \varnothing 12 \text{ \&less}$	0.06

This is the end of regrinding. Please ascertain that all the following specifications are fulfilled before using DSA drill again.

- Lip height difference (axial runout of front cutting edge) < 0.02mm
- There is no damage left on the cutting edge.
- There is no grinding burr.

■ Grinding tools for primary & secondary relief

Diamond wheel



Grain size

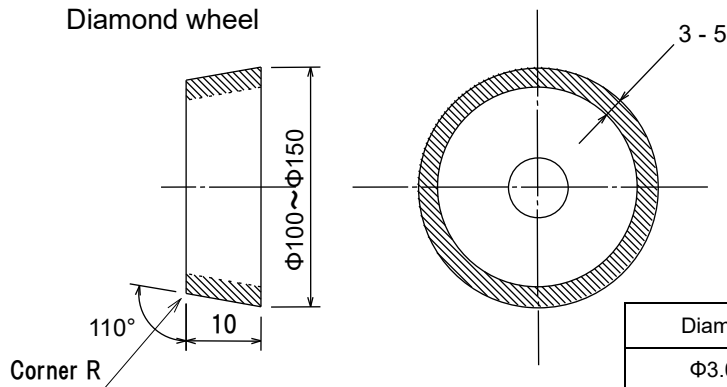
Rough grind: #200

Secondary relief finish grind: #400

Primary relief finish grind: #800

■ Grinding tools for thinning face

Diamond wheel

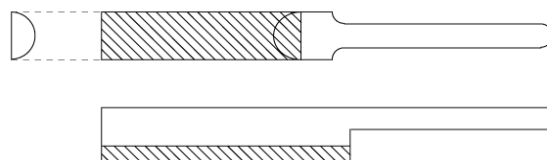


Grain size: #400& over

Diameter (mm)	Corner R (mm)
$\Phi 3.0 - \Phi 4.9$	0.10&less
$\Phi 5.0 - \Phi 7.0$ & less	0.15
$\Phi 7.0$ over - $\Phi 12$ & less	0.30

■ Grinding tools for honing (in case of chamfer honing)

Diamond file



Half round file

Grain size: #800

Hand hone

Grain size: #1500