## TECHNICAL COUNSELING FAQ

This time, we will introduce "Shear Angle" from the questions we have contacted the Tool Consultation.

### SHER OPTIONS ON PUNCH

**Q** When should the shear angle be applied? Also, please tell us the type and selection criteria of the shear angle.
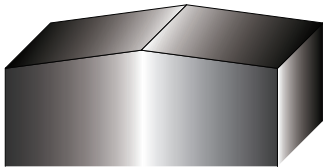
**A** The shear angle is obtained by processing the punch edge surface into a "convex" or "concave" shape, and is effective in
1. Reduce tonnage
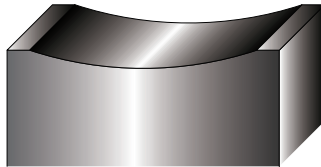2. Slug pulling
3. Reduce noise

Popular shear shapes are bellows.
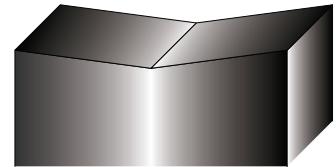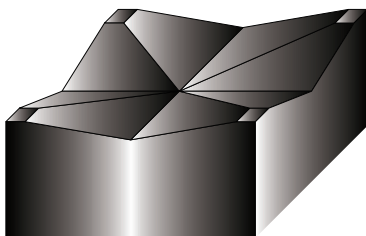
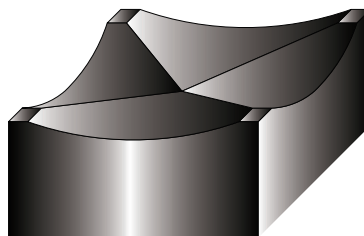### Fig.1  Type of shear angle
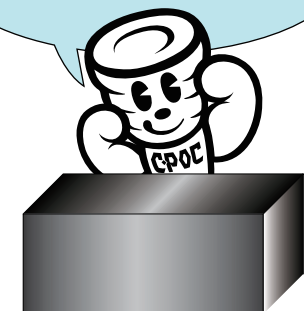
| Roof top shear | Concave shear | Inverted shear |
| --- | --- | --- |

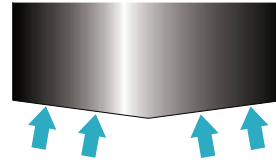| 4way inverted | 4way concave | Flat punch = No shear angle |
| --- | --- | --- |

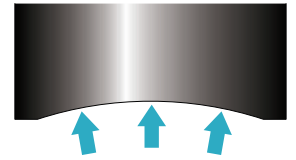## SHEAR ANGLE TYPES AND SELECTION CRITERIA

### ■ ROOF TOP SHEAR

1. The most common shear angle.

2. At Conic, shear angles are standard at 2 degree and 5 degree.

3. It is relatively easy for customers to perform regrinding.

Fig.2 Resistant direction to the punch tip

In case of roof top shear     In case of concave shear

### ■ CONCAVE SHEAR, INVERTED SHEAR

1. This shear angle is suitable for slitting processing.

2. Since force is applied outward to the cutting edge during punching (See Fig. 2), when processing a thick plate with a narrow punch, cracks may occur from the bottom. In the case of urethane kicker, it may be damaged early.

3. It is difficult for customers to regrind without dedicated jigs.

### ■ 4 WAY CONCAVE SHEAR, 4 WAY INVERTED SHEAR

1. This shear angle is suitable for slitting with a square shape in both X and Y directions.

### ■ FLAT (NO SHEAR)

1. In general, small diameter punches do not have a shear angle because the removal load is small. However, when processing thick plates, it may be added as a measure to prevent slug pilling.

2. There is no shear angle for the blank type (if the slug is a product) because the blank is deformed.

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**ADVICE ON ONE POINT**     Calculating formula of tonnage with shear

Tonnage with shear = tonnage without shear x shear coefficient

■ When the material thickness is thinner than the shear angle height.
Shear angle coefficient = 0.5

■ When the material thickness is thicker than the shear angle height.

$$\text{Shear coefficient} = 1-0.5 \times \frac{\text{Height of shear}}{\text{Material thickness}}$$

height of shear
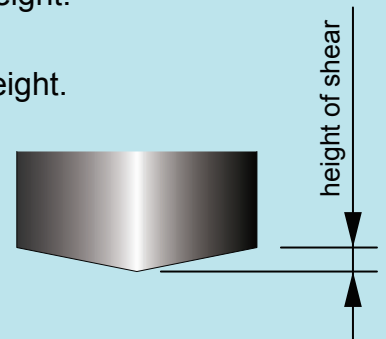
※ For calculation of tonnage without shear angle, refer to Technical Information Vol.13 "Calculation formula frequently used in sheet metal".

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