

TECHNICAL COUNSELING FAQ

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

SHEAR OPTIONS ON PUNCH

Q When should the shear angle be applied? Also, please tell us the type and selection criteria of the shear angle.

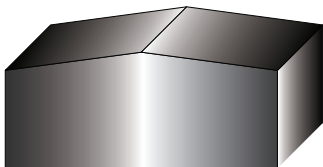
A The shear angle is obtained by processing the punch edge surface into a “convex” or “concave” shape, and is effective in

1. Reduce tonnage
2. Slug pulling
3. Reduce noise

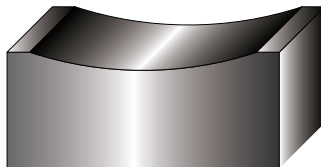
Popular shear shapes are bellows.

Fig.1 Type of shear angle

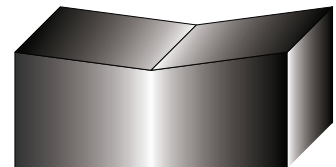
Roof top shear



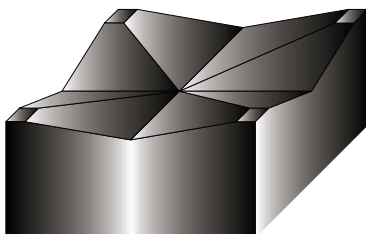
Concave shear



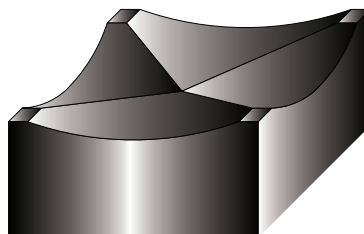
Inverted shear



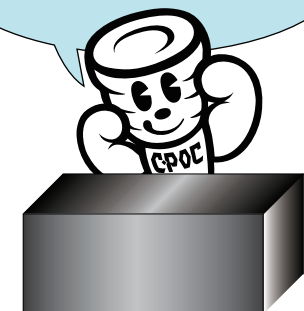
4way inverted



4way concave



Flat punch = No shear angle



TECHNICAL COUNSELING FAQ

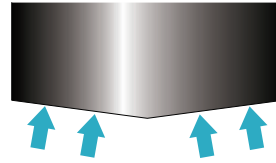
SHEAR ANGLE TYPES AND SELECTION CRITERIA

■ ROOF TOP SHEAR

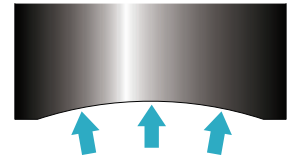
1. The most common shear angle.
2. At Conic, shear angles are standard at 2 degree and 5 degree.
3. It is relatively easy for customers to perform regrinding.

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.

ADVICE ON ONE POINT

Calculating formula of tonnage with shear

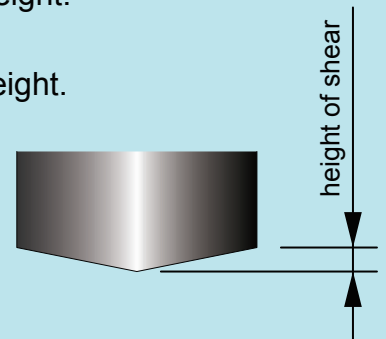
Tonnage with shear = tonnage without shear x shear coefficient

- 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.

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



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

For MORE information,
please contact
CONIC tool sales desk.

CONIC Co., Ltd.

10-5 Taiheidai, Shoo-cho, Katsuta-gun,
Okayama 709-4321 Japan
Email: tools@conic.co.jp
https://www.conic.co.jp

CONIC PRECISION Co., Ltd.

55/22 Moo 4, Buengkumphroy, Lumlukka,
Phatumthani 12150 Thailand
TEL: (662) 159-9870 FAX: (662) 159-9872
Email: conic_thai@conic.co.jp