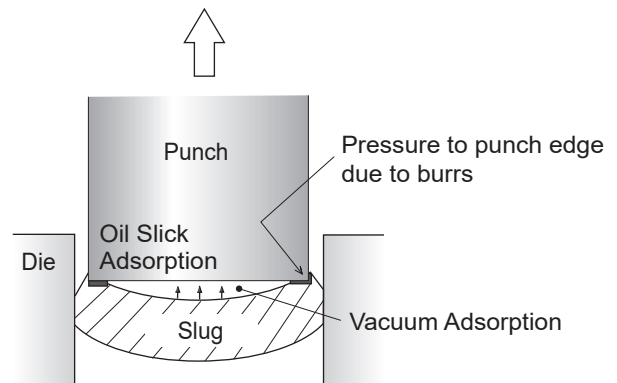


## COUNTERMEASURES FOR SLUG PULLING IN PUNCHING PROCESS

One of the problems that occur when punching with an NC turret punch press is slug pulling. It is generally said that slug pulling are round or simple in shape and often occur when the thick plate is thin. This chapter summarized some measures, including **slug catcher die**, for this slug pulling.

### ■ Mechanism of slug pulling

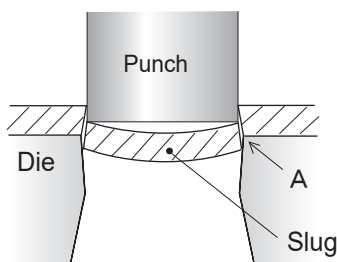
- A. Vacuum adsorption
- B. Oil film adsorption
- C. Magnetic adsorption
- D. Cutting edge pressure bonding by burrs etc.



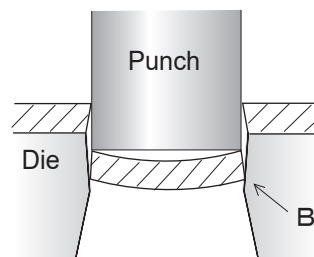
### ■ Countermeasures for slug pulling

#### Slug Catcher Die (Standard specification)

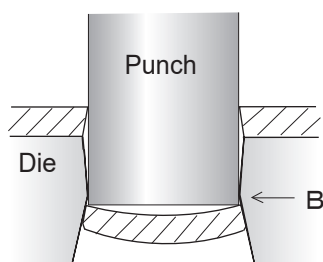
Catch the slug to prevent slug pulling.



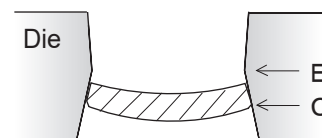
① Material is cut off at [A] part.



② The slug is compressed in the process of punching at [B] part.



③ Drags the slug through the relief.



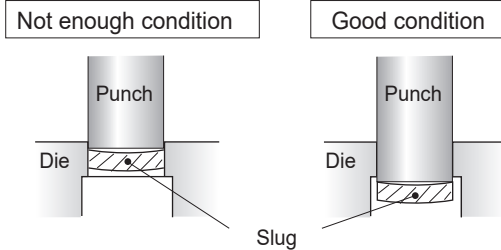
④ [B] part is narrower than [C] part so the slug cannot come up.

# COUNTERMEASURES FOR SLUG PULLING IN PUNCHING PROCESS

## COUNTERMEASURE FOR UPPER DIE (PUNCH SIDE)

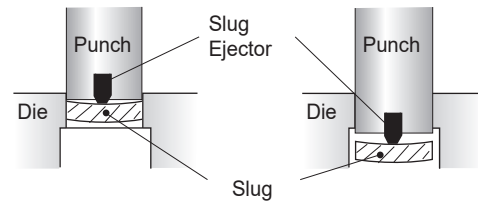
### 1) ADJUSTING UPPER TOOLING HEIGHT

Insert punch edge deeply to inside the die to push the slug properly.



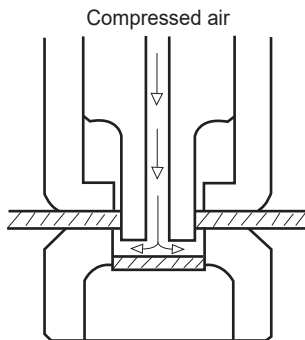
### 2) SLUG EJECTOR (STANDARD SPECIFICATION)

The slug ejector attached to the cutting edge of the punch forcibly removes scraps. (Preventing adhesion / adsorption)



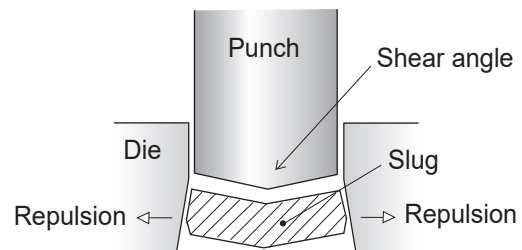
### 3) COMPRESSED AIR

The compressed air is discharged directly from the air hole of the tool center and blown to the slug to forcibly remove the slug.



### 4) SHEAR ANGLE

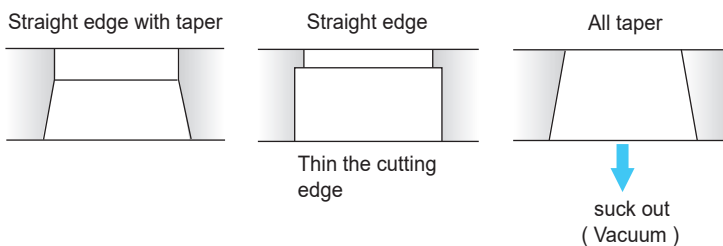
By attaching a shear angle to the cutting edge of the punch, the slug is deformed and its repulsive force (spring-back) is used to prevent slug pulling.



## COUNTERMEASURE FOR LOWER DIE (DIE SIDE)

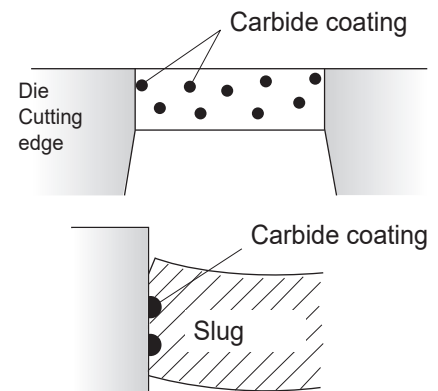
### 1) SELECTION OF DIE CUTTING EDGE

The cutting edge has the following specifications in addition to the slug catcher.



### 2) DEPOSITION PROCESS (D PROCESS)

It makes electric welding the carbide coating film onto the side of the die cutting edge and catches the slug.



## OTHER MEASURES

1. Do not use the processing oil.
2. Use with an appropriate clearance.
3. Do enough demagnetizing.

We recommend that you try these methods individually or in combination, depending on the material, thickness and punched form of the workpiece.

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