

Compacting Press의 CNC화

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Among powder metallurgy products, complex shaped parts are difficult to be produced. Even if it shall be compacted until net shape, the parts are easily apt to crack, thus it causes inferior productivity. It is present condition that net shaped parts are obtained by adding after treatment. Clutch hub, pulley, representative parts with upper 2 steps, lower 3 steps parts are corresponded to the above case.

In recent years, required parts are get to be thinner and thinner, and therefore extremely high compacting techniques are required.

Definition of most preferable compacting parts are 1) Uniform density 2) Non crack and 3) Realization of net shape or near net shape production.

For the above purpose, YOSHIZUKA has developed a new press applying hydraulic servo control system.

CHARACTERISTICS
1 COMPACTING MOTION

(1) Control axes

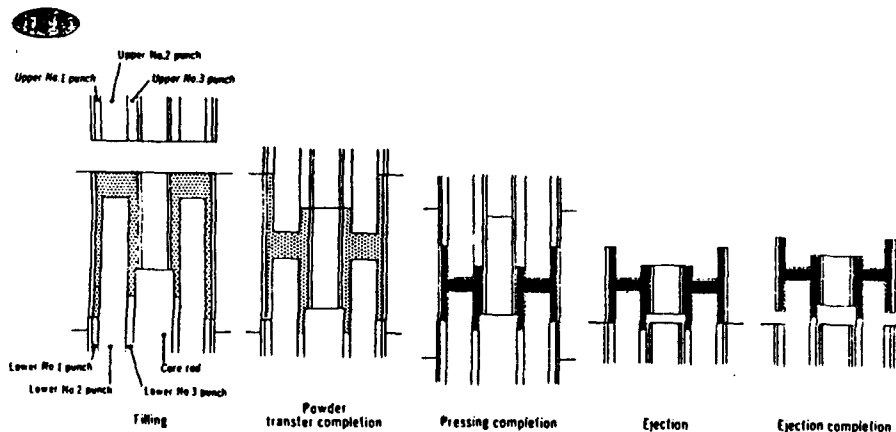
Upper No.1 punch, upper No.2 punch, upper No.3 punch (upper ram), die, lower No.2 punch, lower No.3 punch, core rod, feeder, in total 8 axes, are controlled respectively by means of hydraulic servo system. Therefore, upper 3 steps, lower 4 steps (with stepped core) parts can be produced.

(2) Compacting

1) Powder transfer (Refer to Fig. 1)

Below mentioned is a upper 3 steps, lower 4 steps compacting process. In the first stage, upper triple punch shall be descended until die surface. Next, upper No.2 and lower No.2 punches, both upper No.3 and lower No.3 punches together with core rod are to be descended by fixed extent respectively at 1:1 of speed ratio. Then, the portion of upper triple punch filling (powder transferring) is completed. Each punch shall be controlled to make each powder transfer which will be the same timing at beginning and completion.

2) Pressing



3) Ejection

After completion of pressing, ejection is carried out by descend of the die and lower punches. Depending on the shape of parts, there is such a case that movable punch lowered than stationary punch. In this case, difference can be adjusted to the same level of the die surface by ascending movable punch.

4) Filling

Filling shall be made by die and lower movable punch ascendant. Powder filling motion is carried out with feeder axls of hydraulic servo system. Powder feeding speed, feeder shaking number, forwarded tip position, stopping time and so on, are voluntarily can be set. Therefore, uniform filling can be obtained.

2 TOOL SET (DIE-SET)

- (1) Toolings consist of, upper triple punch, lower triple punch, core rod and die. These are fixed on the tool set. Therefore, upper 3 steps, lower 4 steps compacting is available. If stepped die is used, lower 5 steps parts can be produced.
- (2) Servo controlled punches built in the tool set consist of upper 2 punches, (further one more punch is fixed and directly connected with upper ram), lower 2 punches (further one more punch is fixed), and core punch, 5 punches in all. Die control is carried out with lower ram.
- (3) As intermediate plate is attached on just below die, tooling lay out can be made easily, especially for multi stepped parts which shaped inner flange.
- (4) Press stopper is not equipped with this press. Hydraulic servo system enables to perform precise position control. Stop position can be freely set without manufacturing press stopper.
- (5) The structure is remarkably simple because of doughnut style hydraulic cylinder for each of 5 punches.

3 OPERATION

Compacting is basically available by inputting the required figures, for instance, length of tools (including tool holder), part dimension, compression ratio (filling depth) and so on, into personal computer which displayed on the screen. Any technical skills are not required at all for operation.

4 TOOL SET EXCHANGE

- (1) Setting in and out of tool set is carried out from the rear of the press. Swing type is adopted.
- (2) Connection system
Connection of hydraulic piping (for instance, piping of upper double, triple punch), air piping and electric contacts are adopted "Jointless" method.
- (3) Hydraulic cylinders which used for feeder driving can be fixed on each tool set. Therefore, when tool set exchange, cylinder connection of feeder is also unnecessary.

SPECIFICATIONS

200-TON HYDRAULIC SERVO PRESS, MODEL SC-200

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|------------------------------|---|
| 1) Press body specifications | |
| 1. Mechanical construction | Tool set type, Hydraulic servo controlled press |
| 2. Maximum pressing capacity | Upper ram pressing capacity = 200 ton |
| 3. Maximum punch stroke | Upper ram stroke = 300mm |

- 4. Maximum ejection capacity 60ton
- 5. Maximum lower ram (Die) stroke 150mm
- 6. Motor capacity 86kw
- 7. Tonnage indicator Provided (Digital display, with max. and min. contact points)
- 8. Installation space Height from floor level approx. 4,700mm
Installation area Width approx. 7,000mm
Depth approx. 3,900mm

2) Tool set

Tool set specifications

- 1. Upper No.1 punch pressing capacity (Movable) 100ton
- 2. Upper No.2 punch pressing capacity (Movable) 100ton
- 3. Upper No.3 punch pressing capacity (Fixed) 200ton
- 4. Die float stop capacity 100ton
- 5. Lower No.1 punch pressing capacity (Fixed) 100ton
- 6. Lower No.2 punch pressing capacity (Movable) 100ton
- 7. Lower No.3 punch pressing capacity (Movable) 100ton
- 8. Lower No.4 punch pressing capacity (Fixed) 200ton
- 9. Core float stop capacity 50ton

3) Loader for tool set exchange

- 1. Tool set exchange method Swing type
- 2. Automatic clamping device Tool set setting in and out, clamping shall be automatically carried out.

4) Powder feeding device

- 1. Feeder motion Feeder driving is performed with hydraulic servo system. Shaking function is possessed.