

Third School Year

SPECIAL FORMING METHODS

1) Rotary die

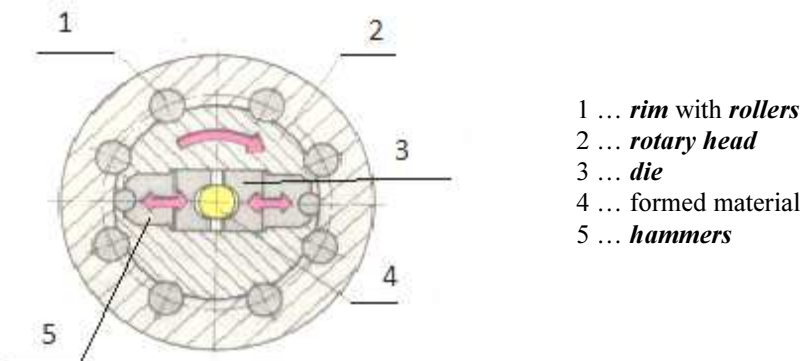
Use: It is used for the production of cylindrical and conical parts of exact shapes, which needn't be further machined.

Basics: *Hammers* with *hardened rollers* at the end are placed in a *rotary head*. During rotation these *hammers* are pressed out by centrifugal forces to the periphery, where they contact the *hardened rollers*, which are placed in the *rim*. During rotation the *hardened rollers* hit each other and the effect of the impact leads to *kicking* the *die* back to the centre. In the centre there is a *hardened* bar which is *forged*.

Advantages: Material savings, exact shapes and good surface quality, improved mechanical material properties, high productivity.

Disadvantages: Very noisy, high *acquisition price* for *dies*, limited size of products due to sizes of machines.

Picture 1- Rotary Die

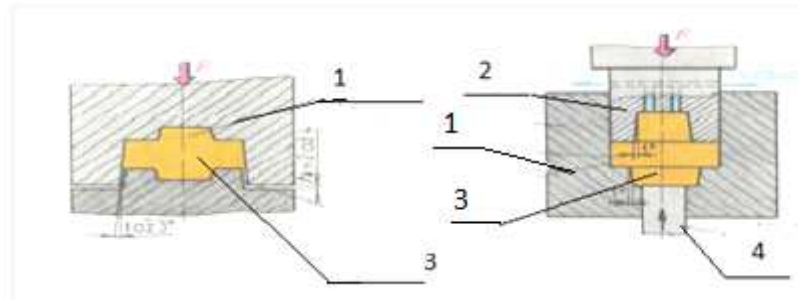


2) Forging into closed dies

Use: It is for *forgings* from an alloy of aluminium, copper and steel.

Basics: The exact amount of material is inserted into the *die*, where it is subjected to the pressure of the *punch*. This causes the required shape to form. For this method of *forging*, there does not have to be a *die* cavity for the *flash*. That is why the amount of material, which will be *forged*, has to be exactly calculated.

Picture - Forging into closed dies

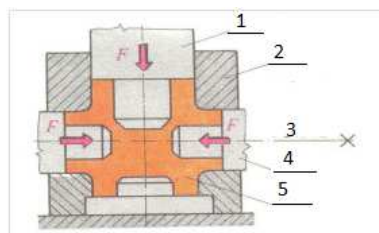


- 1 ... *die*
- 2 ... *punch*
- 3 ... *forging*
- 4 ... *ejector*

3) Multi-way forging

Use: For big mechanical components with complicated shapes.

Basics: The material in a closed *die* is subjected to pressure from several sides. The lower *die* is provided with an *ejector*. *Forgings* produced with this method are exact with minimal surplus material for machining.

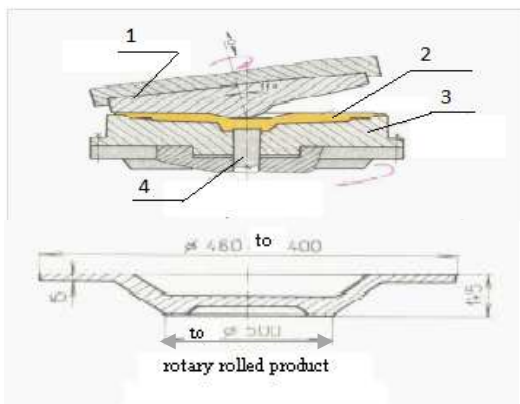


- 1 ... *punch*
- 2 ... *two-part die*
- 3 ... *parting plane*
- 4 ... *punch*
- 5 ... *forging*

4) Slick – Mill Method

Use: For rotary *forgings* with large diameters.

Basics: The lower *rotary die* is filled in with formed metal by working with upper rotary disk pressure. A combination of a hydraulic press and rolling operations is used.



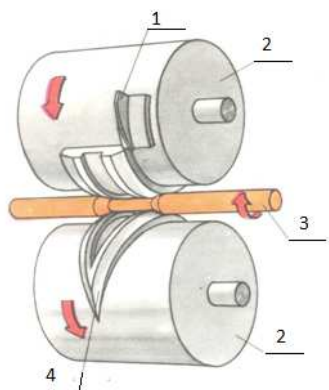
- 1 ... *upper rotary die*
- 2 ... *rotary rolled product*
- 3 ... *lower rotary die*
- 4 ... *ejector*

5) Cross wedge rolling

Use: It is for the production of rough *forgings* as well as for the production of „ready-made“ semi-products with rotational shapes.

Basics: The bar of the circular cross section is heated by induction and shifted into the *forming* machine.

Picture - Cross wedge rolling



- 1 ... *trimming cutter*
- 2 ... cylinder
- 3 ... formed material
- 4 ... *forming* segments

Literature used: M. Hluchý, J. Kolouch, R. Paňák – Strojírenská technologie 2, M. Hluchý a kolektiv – Strojírenská technologie 2

VOCABULARY

acquisition price	pořizovací cena
cross wedge rolling	příčné klínové válcování
die	zápustka
ejector	vyrážecí
flash	výronek
forge	kovat
forging	výkovek, kování
forming	tváření
hammer	kladivo
hardened	kalený, tvrzený
kicking	odmrštěný
parting plane	dělicí rovina
punch	lisovník
punching	pěchování
rim	věnec
rolled product	vývalek
roller	váleček
rotary die	rotační kování
rotary head	rotační hlava
trimming cutter	ostříhovací nůž
valve	ventil

COMPREHENSION QUESTIONS

1. What special forming methods do you remember from the text?
2. When do we use forging into closed dies?
3. What is the basis of the Slick – Mill Method?

EXERCISES

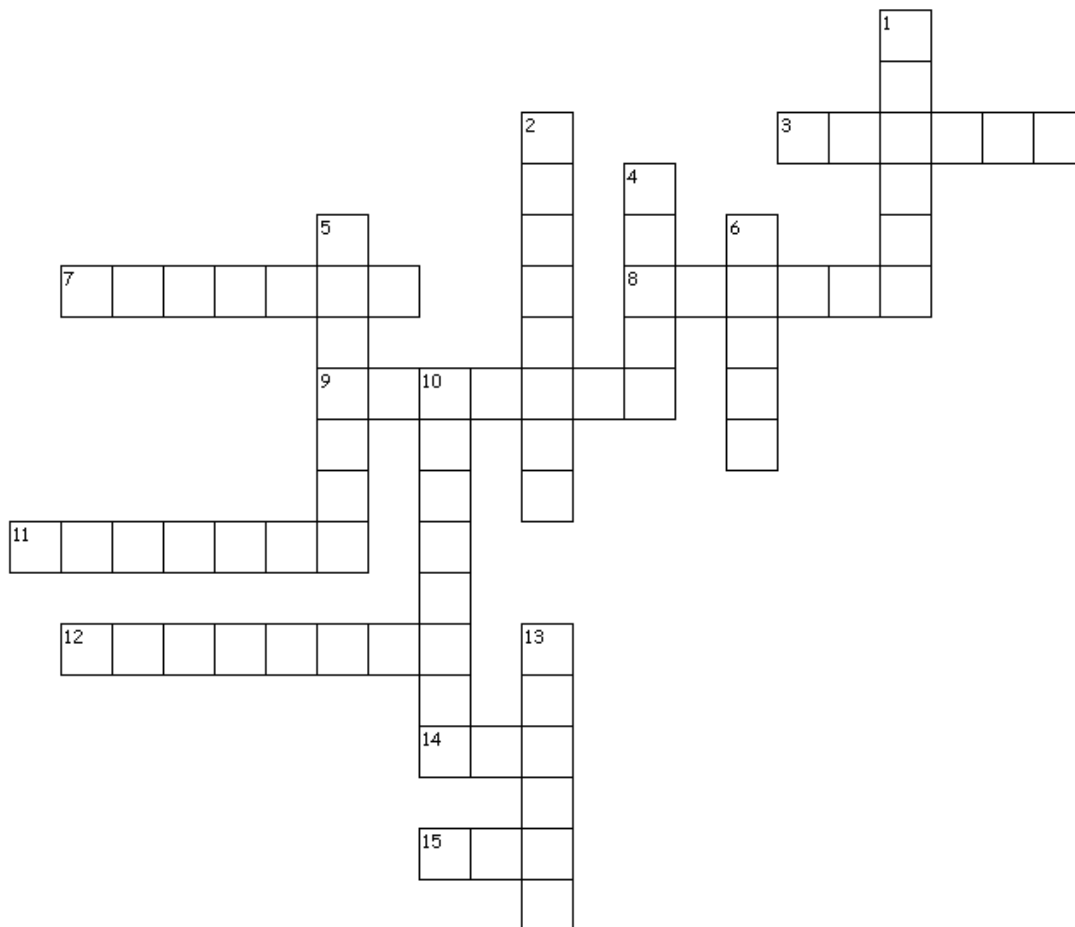
1. Criss Cross Puzzle - 15 words were placed into the puzzle.

Across

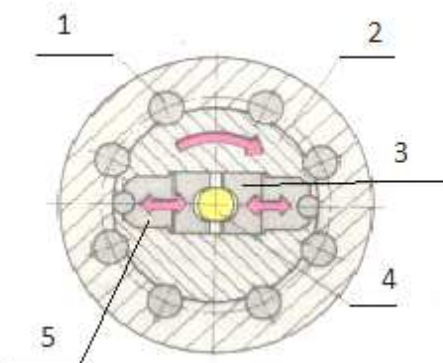
- 3. měď
- 7. vyrážec
- 8. množství
- 9. obrábět
- 11. kování
- 12. kalený
- 14. věnec
- 15. zápustka

Down

- 1. ráz
- 2. pěchování
- 4. tvar
- 5. tváření
- 6. kovat
- 10. válec
- 13. kladivo

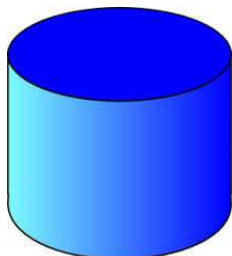


2. Describe the picture below and then translate:



3. Name what you see in the pictures:

1



2



3



4



5

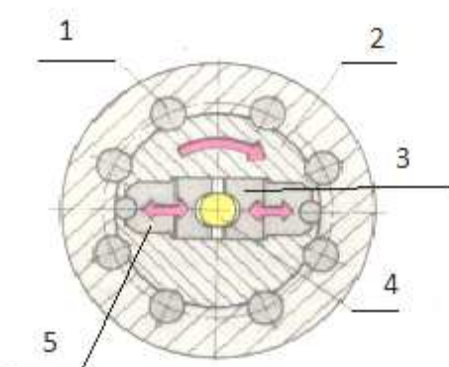


EXERCISES – KEY FOR TEACHERS

1. Criss Cross Puzzle

punching	pěchování
copper	měď
cylinder	válec
forging	kování
ejector	vyrážec
hammer	kladivo
die	zápustka
rim	věnc
amount	množství
forge	kovat
machine	obrábět
forming	tváření
impact	ráz
shape	tvar
hardened	kalený

2. Describe the picture – Rotary die / rotační kování



- 1 ... rim with rollers – věnc s válečky
- 2 ... rotary head – rotační hlava
- 3 ... die - zápustka
- 4 ... formed material – tvářený materiál
- 5 ... hammers - kladívka

3. 1 cylinder 2 forging 3 rolled products 4 hammer 5 metal