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.

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.
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.

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.

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  vyrážeč
flash  výronek
forge  kovat
forging  výkovek, kování
forming  tváření
hammer  kladivo
hardened  kalený, tvrzený
kicking  odmrštěný
parting plane  dělící rovina
punch  lisovník
punching  pěchování
rim  věnec
rolled product  vývalek
roller  váleček
rotary die  rotační kování
rotary head  rotační hlava
trimming cutter  ostřihovací 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. vyrážeč
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  vyrážeč  
hammer  kladivo  
die  zápustka  
rim  věnec  
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 – věnec s válečky  
2 … rotary head – rotační hlava  
3 … die - zápustka  
4 … formed material – tvářený materiál  
5 … hammers - kladivka

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