Second School Year

THE PRODUCTION OF NON-STANDARDIZED SEMI-PRODUCTS – II. part

Bending is the shaping of material using a permanent deformation, when a material is bent to a required angle and ***bend radius***. The tool is a ***bending die***, and it has two heads: a ***fixed bending die*** and a ***bending punch***. The product is a ***pressing***.

Drawing is used for the production of rotational vessels of an ***even-sheeted shave***. The tool is a ***drawing die***, and the product is a ***cup***. The shave is extruded between the ***drawing punch*** and the ***fixed drawing die***.

Semi-products produced by *casting*

When we ***cast*** we produce parts from metals and other meltable materials. Melted metal fits into or is ***pressed*** into ***moulds***. The cavity of a ***mould*** has the shape of a future ***casting***. After a metal ***hardens*** in a ***mould*** a ***casting*** is formed. ***Castings*** are produced in ***foundries***. According to the ***casting*** production method we can classify ***casting*** into ***sand moulding*** and ***casting*** into a permanent ***mould***.

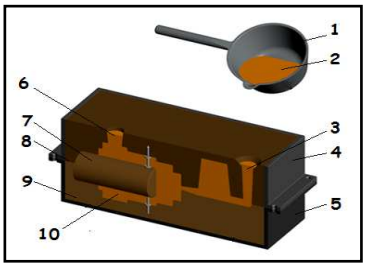
The production of *sand moulds*

Hand moulding is used for the piece production of ***castings***. A ***mould*** is created using a pattern on a pattern plate. ***Mould*** production using a ***template*** is carried out for big parts using a rotational or ***shifting template***. The ***templates*** we use are made of wood with plated edges or are made of metal.

Moulding using a ***pressing*** machine is a method of mechanical ***moulding*** using a pattern plate with a fixed pattern. The pattern is ***sprinkled*** with ***sand*** in a ***mould*** box and the ***sand*** is ***pressed*** using ***press*** pressure. ***Moulding*** using a shaking machine is a method when the ***sand*** is ***hardened*** by the impacts of the ***forming*** stand on the roll of a ***moulding*** machine.

Moulding using a ***slinging*** machine is used for ***moulding*** large-dimension ***castings***. The ***moulding sand*** is ***slung*** on the pattern by a rotating ***slinging*** head.

Picture 5 - Sand mould



1. ***Foundry ladle***
2. ***Molten*** metal
3. ***Pouring basin***
4. Upper ***moulding box***
5. Lower ***moulding box***
6. ***Vent***
7. ***Core***
8. ***Joint face***
9. ***Foundry sand***
10. ***Casting***

Casting into permanent *moulds*

Casting into cast-iron ***moulds*** is the method of precise ***casting*** into permanent metal ***moulds***. We produce precise ***castings*** with a ***fine-grain*** structure.

Casting under pressure is a method suitable for non-ferrous metals and their alloys. Under high pressure ***molten*** metal is ***pressed*** into the metal ***mould*** of injection ***moulding*** machines. According to the design of injection ***moulding*** machines we classify them:

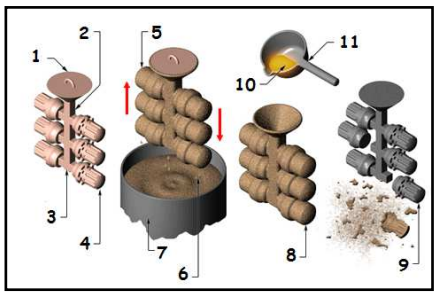
- with a hot-pressure chamber
- with a cold-pressure chamber

The ***castings*** are very precise and have a top-quality surface. Only the functional areas are required to be machined.

Centrifugal casting uses ***centrifugal*** forces which pressure ***molten*** metal onto the walls of rotating ***moulds***. ***Casting*** into ***shell moulds*** is used for the mass production of smaller ***castings***. The ***shell*** is produced from a mixture of ***sand*** and ***resin***.

Casting using ***investment patterns*** is a method of very precise ***casting*** into ceramic ***shell moulds***. These are produced by ***dipping*** a pattern from ***combustible*** materials in a paste covered with ethylene silicate. After drying the mould is ***sprinkled*** with ***sand*** in the ***mould box*** and burned in a furnace at T about 1000°C. The metal is immediately poured into hot ***moulds***.

Picture 6 - Shell mould production procedure



1. Closing
2. Gate
3. ***Wax*** running system
4. ***Wax*** casting pattern
5. Ceramic ***shell***
6. Ethylene silicate paste
7. Container
8. Hollow ***shell*** after ***wax*** is melted
9. ***Casting***
10. ***Molten*** metal
11. ***Foundry ladle***

Semi-products produced by welding

When we weld we produce mechanical parts and ***semi-products*** from the parts of simple forms. It is most often from standardized metallurgical ***semi-products***.

Semi-products produced by the ***sintering*** of powder

Powder metallurgy deals with the production of ***semi-products*** from ferrous and non-ferrous powders by ***sintering*** powders in temperatures below the melting point of individual components. Using this method it is possible to produce materials from mixtures that are not ***castable*** together.

Semi-products from plastics

Plastics are made from the products of chemical factories in the form of powders, granules or liquids. We can classify plastics into:

- **Thermoplastics** that are most often made by heating at the viscosity state temperature. They are recyclable.
- **Reactoplastics** that are ***hardened*** after processing and their shape can no longer be changed.
- **Elastomers** that are ***hardened*** by vulcanization and they stay permanently elastic.

Plastics are made for finished products or ***semi-products*** such as blocks, plates, ***foils***, ***tubes***, profiles, ***rough pressings***, and for other uses.

Literature and sources used: Hluchý a kol. Strojírenská technologie, Internet – Wikipedie, custompartnet.com, svarak.cz aj.

VOCABULARY

bend	ohyb	**investment pattern**	vytavitelný model
bending	ohýbání	**joint face**	dělící rovina
bending die	ohýbadlo	**molten**	tekutý, roztavený
bending punch	ohybnice	**mould**	forma
cast	odlévat	**moulding**	formování
castable	slévatelný	**moulding box**	formovací rám
casting	odlévání, odlitek	**pouring basin**	licí jamka
centrifugal	odstředivý	**press**	lis, lisovat
combustible	spalitelný	**pressing**	výlisek
core	jádro	**radius**	poloměr
cup	výtažek	**ram**	beran
die	zápustka	**resin**	pryskyřice
dipping	namáčení	**rough pressing**	předlisek
drawing	tažení	**sand**	pískový
drawing die	tažidlo	**semi-product**	polotovar
drawing punch	tažník	**shell mould**	skořepinová forma
even-sheeted shave	rovný plechový přístřih	**shifting**	posuvný
fine-grain	jemnozrnný	**sintering**	slinování
fixed bending die	ohybník	**sling (slung, slung)**	metat
fixed drawing die	tažnice	**slinging**	metací
foil	fólie	**sprinkled**	posypaný
forming	tváření	**template**	šablona
foundry	slévárna	**tube**	trubka
foundry ladle	licí pánev	**vent**	výfuk
hand moulding	ruční formování	**wax**	vosk
harden	tvrdnout, ztvrdnout		

COMPREHENSION QUESTIONS

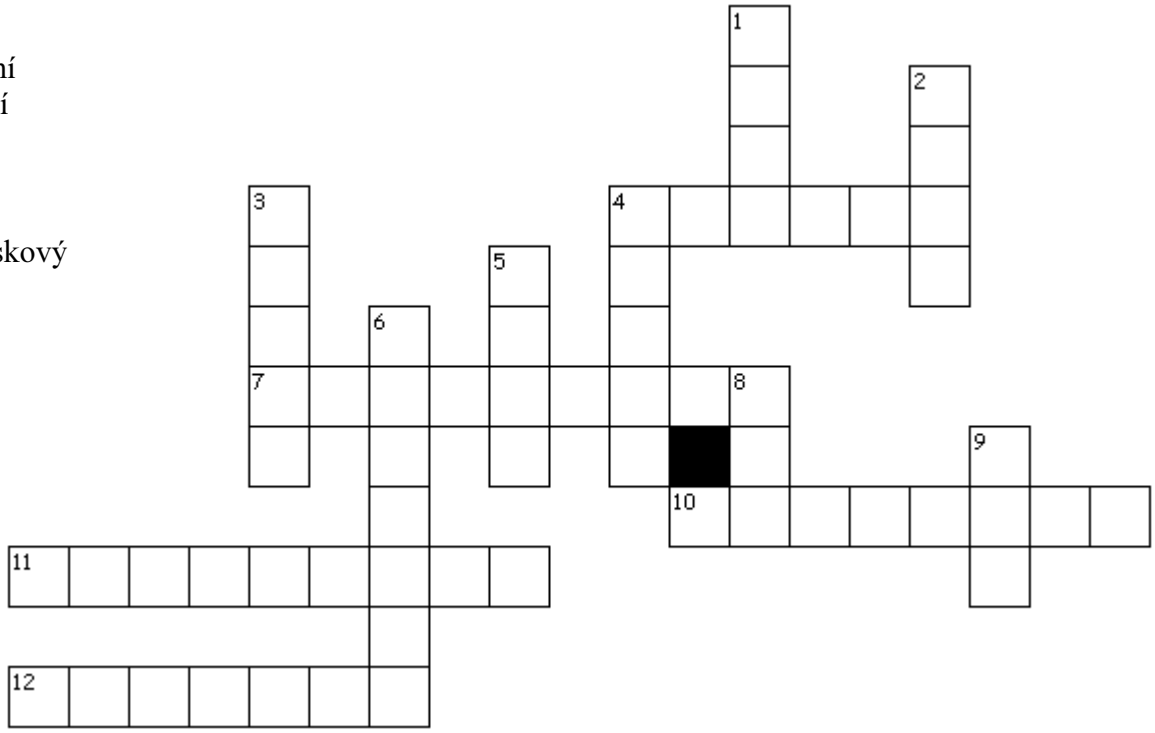
1. What do you remember about bending?
2. What do you remember about drawing?
3. How do we classify casting according to casting production methods?
4. How do we classify plastics?

EXERCISES

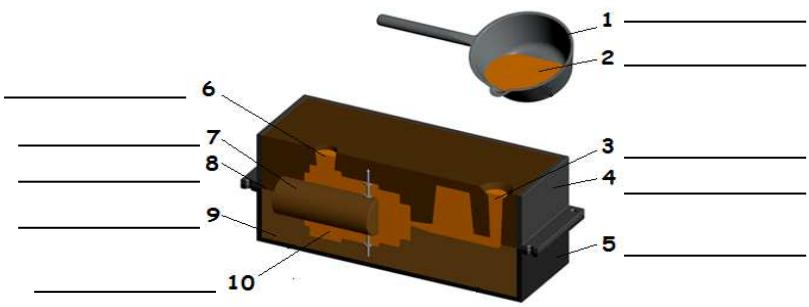
1. Criss Cross Puzzle - 13 words were placed into the puzzle.

Across
4. tekutý, roztavený
7. posypaný
10. šablona
11. slinování
12. odlévání

Down
1. fólie
2. písek, pískový
3. lisovat
4. forma
5. ohyb
6. tažení
8. zápustka
9. vosk



2. Describe the picture:



3. Here are the statements. Are they True (T) or False (F).

1) When we cast we produce parts from metals and other meltable materials.
2) Bending is the shaping of material using a temporary deformation.
3) Centrifugal casting uses small forces which pressure molten metal onto the walls of rotating moulds.
4) Casting using investment patterns is a method of very precise casting into plastic shell moulds.
5) Plastics are made from the products of chemical factories in the form of powders, granules or liquids.
6) Reactoplastics are hardened after processing and their shape can be changed.

4. Name what you see in the pictures:

1 

_____

2 

_____

3 

_____

4 

_____

5 

_____

6 

_____

EXERCISES – KEY FOR TEACHERS

1. Criss Cross Puzzle

bend	ohyb
foil	fólie
casting	odlévání
drawing	tažení
sand	písek, pískový
molten	tekutý, roztavený
wax	vosk
template	šablona
mould	forma
press	lisovat
die	zápustka
sprinkled	posypaný
sintering	slinování

2. Sand mould

1. Foundry ladle
2. Molten metal
3. Pouring basin
4. Upper moulding box
5. Lower moulding box
6. Vent
7. Core
8. Joint face
9. Foundry sand
10. Casting

3. True or False

1T 2F 3F 4F 5T 6F

4. Name what you see in the pictures:

1 casting
2 bending
3 metal
4 plastics
5 welding
6 core