

УДК 669.01=111

Yeroshenko P., Saidi L.

## **The Development of Metallurgy Industry**

Belarusian National Technical University  
Minsk, Belarus

Metallurgy is an area of industry without which there would be no modern world. Thanks to history we can follow the entire path of its development.

The first mention of what the human was doing in metal melting dates back to the 5,000 – 6,000 BC. Majdanpek, Plocnik and other places in Serbia, Bulgaria, Palmela (Portugal), Spain, Stonehenge (Great Britain) were found. However, the age of such phenomena can't always be determined with high accuracy.

In 3,500 BC people made the first alloy – bronze: an alloy of tin and copper, and this period was called The Bronze Age (3,000 – 1,000 BC). The first mention of iron also refers to the Bronze age: "sky daggers" were made in Egypt. Bronze was used for making tools, weapons, casting bells, etc.

In 1,200 BC the method of producing iron from ore was invented. It is considered that this technology was invented by the Hittites. Before that man was smelting meteoric iron. In the beginning, iron was valued very highly due to the complexity of production, but due to the development of methods for obtaining iron from ore, tools were made from it. This period is called The Iron Age and covers the time frame from 2<sup>nd</sup> to the 1<sup>st</sup> millennium BC.

China has a rich tradition of producing iron products. Here, perhaps earlier than other peoples, they learned to get liquid cast iron and to make castings from it. Some unique iron castings were made in the first Millennium and have survived

to the present day, for example, a bell with a height of 4 meters and a diameter of 3 meters, weighing 60 tons. Unique products of metallurgists of ancient India are known. A classic example is the famous vertical Qutb column in Delhi weighing 6 tons, 7.5 meters high and 40 cm in diameter. The inscription on the column states that it was built in about 380-330 BC. Analysis shows that it was constructed from individual tiles, welded in a forge. There is no rust on the column. Steel weapons made in the middle of the first Millennium BC have been found in the tombs of ancient India [1].

In the Middle ages, the height of the melting furnaces was already three meters, and they worked using energy obtained through water. These furnaces were called stukofen and became an incentive for the iron and steel industry to enter the next round of development.



Figure 1 – Stukofen

The origin of metallurgy as a science is associated with the works of George Agricola in the Renaissance. He created a twelve-volume work "About Metals", fundamental for that time. The first six volumes are devoted to mining, the seventh is "an essay on art", that is, methods of conducting experimental smelting, the eighth is enrichment and preparation of ores for smelting, the ninth deals with methods of metal smelting, the tenth describes separation of metals, the eleventh and twelfth volumes are about various devices and equipment. In this era there are new types of furnaces that are called blaufofens.

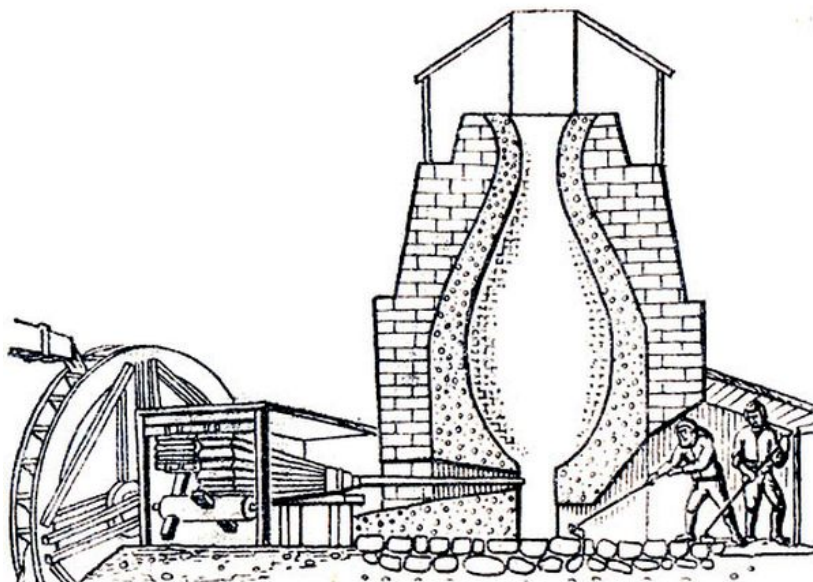


Figure 2 – Blaufen (Shaft Furnace)

After them blast furnaces of enormous dimensions came. They worked 24 hours a day, producing up to one and a half thousand tons of cast iron of excellent quality.

At the end of the XIX and beginning of the XX century, new technologies for the production of metals appeared. They are Bessemer, Thomas, and finally Martin methods. They helped people to increase production volumes by several times with the production capacity of six tons of metal per hour.

The next leap in the development of metallurgical business occurred at the end of the XIX century. During this period, almost simultaneously, three completely new methods were introduced into metal production: Open-Hearth, Thomas and Bessemer. All these methods have increased the volume of steel production enormously – up to six tons per hour [2].

Half a century later, many new processes were introduced into metallurgy, such as the continuous casting of steel and an oxygen blowing. Blowing oxygen to the molten metal in the converter furnaces has greatly accelerated the speed of chemical reactions.

Today scientists have returned to the technology of single-stage processes, developing a method of ore melting and steel production in electric furnaces.

#### References:

1. Wikipedia [Electronic resource]. – Mode of access: <https://ru.wikipedia.org/wiki/Металлургия>. – Date of access: 13.03.2020.
2. [Electronic resource]. – Mode of access: <https://metallplace.ru/about/stati-o-chernoy-metalurgii/istoriya-razvitiya-metalurgii/>. – Date of access: 02.04.2020.