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УНИВЕРСИТЕТ МАШИНОСТРОЕНИЯ

STEEL PRODUCTION

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STEEL PRODUCTION

Steel production is an important step in the overall production cycle of ferrous metallurgy, the others being the production of pig iron in blast furnaces and the rolling of steel ingots and semifinished shapes. The two main technological processes in steel production are melting and pouring.



METHODS FOR THE MELTING OF STEEL

- basic oxygen process
- open-hearth process
- electric-furnace process



POURING IS A CRITICAL STEP IN STEEL PRODUCTION



BASIC OXYGEN PROCESS

- The furnaces used in the basic oxygen process usually have a capacity of 100–350 tons. The range of steel types obtained by this method is increasing continuously, and the quality of alloy steel produced through the basic oxygen process is on a par with that produced through the open-hearth process and electric steel of the same grade.



OPEN-HEARTH PROCESS

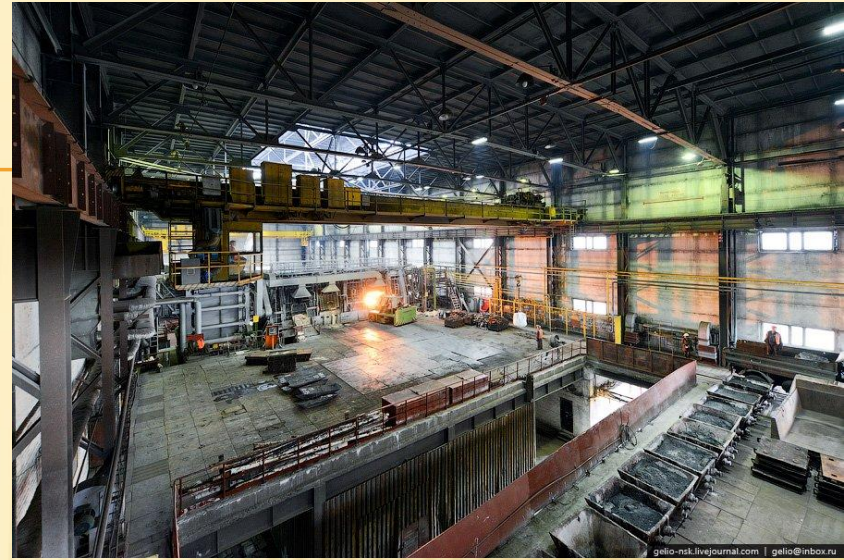
- The use of oxygen, natural gas, and high-quality refractories permits a significant rise in the process's productivity. However, new open-hearth furnaces are no longer being produced, and what now appears promising is a conversion of existing furnaces into two-bath furnaces.



- The second half of the 20th century has seen a marked development of steel production employing electric furnaces, a development encouraged by the numerous advantages of the electric-furnace process over other methods of steel production. Work is under way on constructing furnaces with 500–600-ton capacities using six electrodes. An important tendency in the electric-furnace production process is the considerable increase in the power per ton of the furnaces, from 250–300 to 500–600 kilovolt-amperes per ton and more.



- A development in steel production of great promise is the improvement of steel quality through refining processes carried out outside the furnace. The processes with the greatest industrial importance include bubbling inert gases or oxidizing mixtures through the metal in the ladle or in a special apparatus, vacuum processing, and treating the steel with synthetic slags.



THE MID-1960'S WITNESSED THE BEGINNING OF AN INTENSIVE DEVELOPMENT OF ELECTROMETALLURGICAL PROCESSES

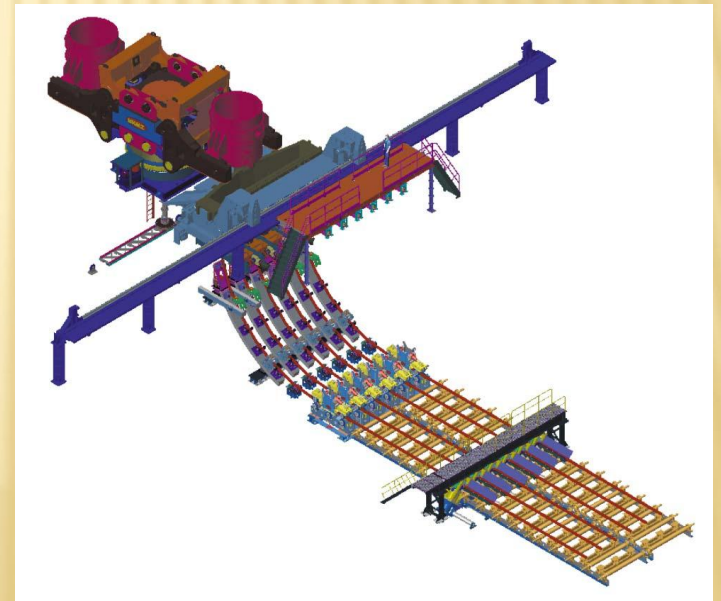
- Arc furnaces



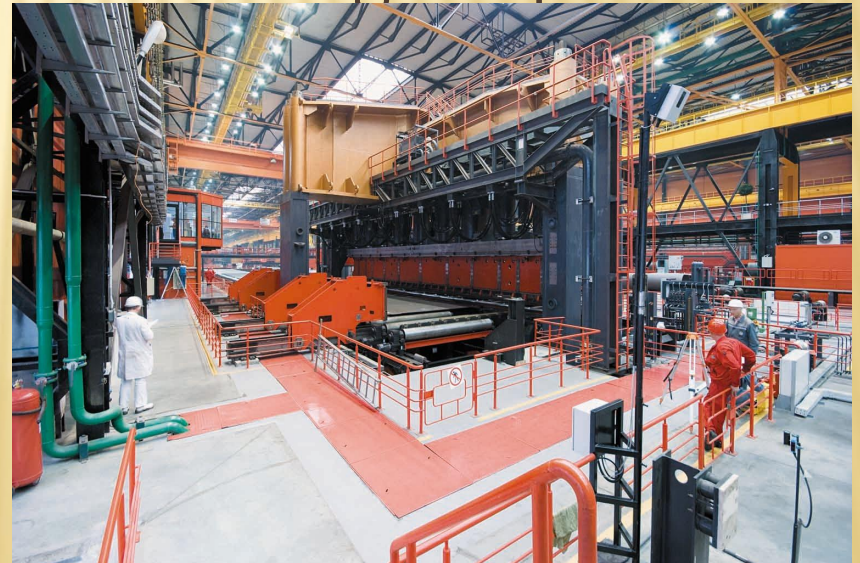
- Induction furnaces



- With regard to pouring, there has been an uninterrupted increase in the percentage of metal produced through continuous casting, and by the mid-1970's there were more than 500 continuous casting machines in operation. The curved-mold type of continuous casting machine is the most common.



- The tendency in steel production, as in ferrous metallurgy as a whole, is toward concentration of production and a greater use of continuous production processes. There is also a tendency for individual enterprises to specialize. These developments serve to lower unit costs, improve the quality of the steel, advance the degree of mechanization and automation of the entire metallurgical process, and facilitate the introduction of computers and automatic control systems. Work in progress in a number of countries on developing a continuous steelmaking process and production units for this process holds great promise for steelmaking.



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