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Autor: Miller, V.Ja. / Kondakov, G.P.
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21. 5'000 m3 Blast Furnace

Design Institute: TSNIIproektstalkonstructsiya, USSR
Parameters:
The blast furnace hearth diameter: over 16 m
Upper elevation of the whole construction: up to 100 m
Blast pressure at tuyeres: 5 kgf/cm2
Pressure under the furnace top: 2.5 kgf/cm2
Blast temperature: 1'400 °C
Material:
For the blast furnace shell:
steel of grade: C 60/45
Mass:
Metal structures of central assembly: 21'000 t
High-strength steels: 1'000 t
Steels of higher strength: 11'000 t

In designing blast furnace No. 9 for Krivorozhsky Iron and Steel Works named after V.I. Lenin quite new solutions have been worked out which helped to a considerable improvement of the construction technical level and provided conditions for a high-production technological process of smelting iron.

Some of these solutions have been officially registered as inventions, four among them are being patented aborad. The new progressive forms of steel structures contributed to cutting down of steel and labour consumption and construction cost and provided a wide use of such advanced methods of construction as a complex erection, erection by large units and automatic electro-slag welding which permitted to reduce the period of construction. At the same time safety of the aggregate service has been improved and that contributed to reduce its idle time during repairs.

The high-strength steels and steels of higher strength have been widely used in the project.

The research works and design studies of separate variants helped to the process of the project development and gave an opportunity to take an advantage of the below mentioned and for the first time used for the blast furnace construction solutions.

The most essential features characterizing the novelty and advancement of this structures are as follows:

- Blast furnace and casthouse layout, which makes it possible to provide mechanization of the whole operating platform of the blast furnaces;
- Use of high-strength steel for the blast furnace structures which gives an opportunity to increase pressure and temperature inside the blast furnace as well as contributes to fabrication and erection of the structures on the base of the existing equipment;
- The blast furnace top is without a drop breaker which gives an opportunity to use a filling device of a new type, which contributes to steel saving and to simplification and acceleration of the construction erection;
- An erection girder is supported by twin dust catchers and this cuts down the steel consumption and reduces the period of construction;
- A new solution of a circular hot-blast main which helps to fix it relative to the blast furnace centre without changing the standardized length of tuyeres and that simplifies the blast furnace maintenance and shortens its idle time;
- Stoves (Fig. 2) are provided with an outside bruning chamber which increases the productivity and the safety of the aggregate operation;
- The lay-out of the hot-blast main and its structure with an elastic fixing at the supports considerably improve the conditions of the structure operation and reduce the idle time of the blast furnace during repairing;
- Use of more steady anticorrosive coatings which increase the life of the blast furnace;
- Introduction of new methods and development of special structures making possible a rapid erection of such main components of the complex as the blast furnace itself, the casthouse and the stoves.

The above mentioned improvements gave an opportunity:

- To cut down the cost of the central assembly of the construction by 8 o/o;
- To cut down steel consumption due to increase of specific mass of high-strength steel and steel of higher strength up to 60 o/o;
- To shorten the erection period and to cut down labour consumption.

All above mentioned improvements made it possible to perform a high-effective technological process which, according to Institute GIPROMEZ data, contributed to:

- Cutting down of the capital investments per 1 t of smelted iron by 11 o/o;
- Cutting down of iron cost price by 2 o/o;
- Increase of iron smelting productivity per worker by 23 o/o.

(V.Ja. Miller, G.P. Kondakov)

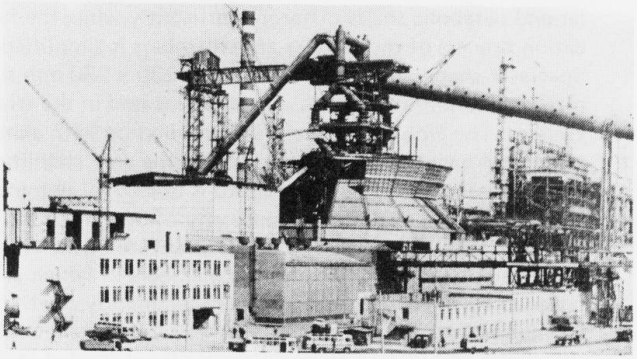

Fig. 1 Blast Furnace No. 9. General View of Construction

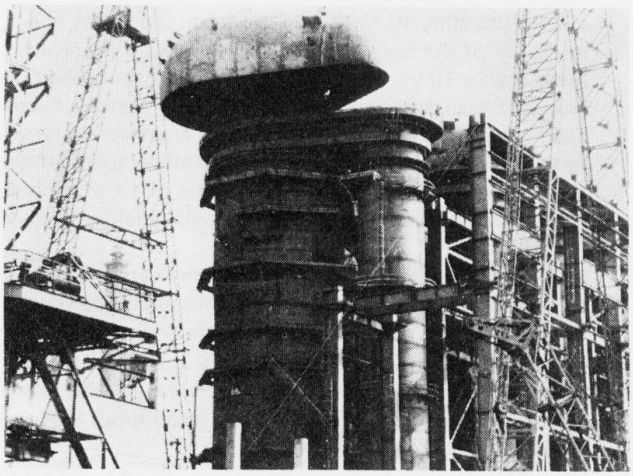

Fig. 2 Erection of Stoves