



Implementation of Resource-Conserving Technologies in the Network of Technical Reequipment on Ukrainian Metallurgical Enterprises by Example of JSC «Donetsksteel»

M.A. YEMCHENKO ¹⁾, V.V. PASHINSKIY ²⁾, O.K. MOROZ ³⁾

¹⁾ Physical and Metallurgy Faculty, Donetsk National Technical University; 58 Artema st, 83001 Donetsk, Ukraine; e-mail: emchenko4@mail.ru

²⁾ Physical and Metallurgy Faculty, Donetsk National Technical University; 58 Artema st, 83001 Donetsk, Ukraine; e-mail: vvpashynsky@gmail.com

³⁾ Physical and Metallurgy Faculty, Donetsk National Technical University; 58 Artema st, 83001 Donetsk, Ukraine; e-mail: okmoroz@rambler.ru

Summary

Ecological situation that is present in Ukraine and how Ukrainian enterprises provide resource-conserving technologies by example of JSC «Donetsksteel». This article involves problems of environment pollution, problems of irrational energy-resources usage and how JSC «Donetsksteel» - metallurgical plant resolves it.

Keywords: metallurgy, environment, waste

Introduction

The metallurgical enterprises of Ukraine produce almost 30% domestic gross product and provide 40% currency of the country earnings budget. At the same time they claim responsibility for the most environmental pressure in metallurgical regions (Donbass, Pridneprov'e, Krivbass), where mass of gaz-dust emission per habitant exceeds the middle rate in the country in 8–10 times. For example, in the Donetsk region, with its highest density in Ukraine of population (180 persons per sq.km), specific gaz-dust emission make up 330–350 kg/pers., and the middle on a country, accepted in estimations as conditional for non-commercial regions, does not exceed 35–38 kg/pers. per year [1].

Among ten most developed metallurgical states Ukraine occupies the eighth place, suprising Brazil and India. Leading front-rank metallurgical European countries (Germany, France, Austria, Italy) are the prime examples of the progressive development of metallurgical complex and simultaneous solving of the ecological problems in its production [3].

However, without similar ecological achievements Ukraine has difficulties in entering the international markets of ferrous metals. Importers do not want to acquire the metallurgical products of the enterprises, which do not have certificates in the systems of ecological management (requirements of ISO standards series 14000) and quality management (requirements of ISO standards series 9000). In Ukraine this experience is taken into account at the development of the strategy of modernization of

metallurgical complex enterprises, but the rates of carrying of proper measures remain slow [5].

Analysis

In the metallurgical regions of Ukraine a crisis (more precisely critical) ecological situation is created by four metallurgical productions in the aggregate: chemical-recovery, sintering, blast-furnace and steel-melting. It's appropriate especially to mention that at the Ukrainian enterprises of complete metallurgical cycle the iron making and supplying it productions of coke and agglomerate emit in the atmosphere more than 50% dust, 62% sulphureous anhydride and sulphureted hydrogen, 90% monoxide of carbon and 38% toxic oxides of nitrogen; in aggregate it's more than 500 th/year only in Donbass.

The special danger is in the chemical-recovery production. More than 70% emission of benzapirena, basic part of ammonia emission, cyanogen hydrogen, phenol, benzoyl, soot and others. Considerable part of dust (emission almost 20%), and also gas emission in a kind of CO and especially NO_x is mainly related to the open-hearth production of steel, which in the world has totally been liquidated, and in Ukraine will also reduce and only by 2015–2017. The volume of melting of this steel can make 10–15% against 44% in 2007–2009 [2].

Results and discussion

At present complete passing to melting of steel only in oxygen converters and of the enterprises the group «Donetsksteel» are putting into effect eco-

logical programs, directed at improvement of the ecological situation in the region:

- JSC «MAKEEVKOKS» put into operation (1 June, 2012) a workshop of cleaning coke gas from the sulphureted hydrogen reduction of harmful emission
 - gaz desulfurization to 0,5 gram/meter;
 - reduction of the size of the sanitary-hygienic area of the enterprise to 500m.
- JSC «YAKKHZ» has reconstructed the workshop on waste processing of flotation
 - processing of waste production;
 - decrease in the influence of sludge tank on the environment. Processing and usage of passing products and wastes of the coal mining
 - utilization of hazardous wastes of mining industry;
 - high degree filtration of smoke fumes;
 - reduction of harmful emission;
 - drawing into economic circulation and usage of mine waters;
 - usage of the alternative sources of water in the region.

The metallurgical complex joint-stock company «Donetsksteel MP» is a complete metallurgical cycle enterprise. Basic workshops (blast-furnace, open-hearth, rolled metal) and auxiliary workshops, providing basic production, constitute the complex. The enterprise specializes in iron making steel, of high quality rolled metal.

The plant has developed and begun implementation the «Complex program of metallurgical complex reconstruction », the principal aims of which are considerable improvement of the ecological situation in the region and increase productive efficiency due

to application of modern technical decisions, allowing to cut the consumption of energy resources.

Within the execution of realization of the «Complex program» the fundamental modernization of blast-furnace production has already been put into effect. As a result of the overall reconstruction blast furnaces the indexes of the blast-furnace melting correspond to the level of leading world producers of cast-iron.

On the basis of technical-economic analysis energy saving measures were chosen:

- replacement of open-hearth furnace by electric furnace;
- building of new oxygen block;
- reconstruction of expenditure of compression of air [4].

Energy on melting of a 1 tone of steel became in open-hearth production amounted 5 857.7 MJ /t. The expenditure of energy on melting of a 1 tone according to data from «SIEMENS VAI» company in an electric furnace amounted to 2 296.3 MJ /t. Comparing the expenses of energy resources, reduced to the same indexes, it is possible to draw the conclusion, that the expenses of energy resources in electric furnace steelmaking are less than in a open-hearth furnace at the time in 2.6.

Before the beginning of the reconstruction the open-hearth furnace was located in the central part of the city and characterized by the large emission of harmful substances (dust, oxides) in the atmosphere. Present at the enterprise system the open-hearth furnaces gas purification were not equipped. In 2008 emission of the enterprise were 8.4% from an metropolitan index on emission from stationary sources.



Fig. 1. View on the plant before implementation of resource-conserving technologies

Rys. 1. Widok na zakład przez wprowadzeniem technologii chroniących zasoby



Fig. 2. View on the plant after implementation of resource-conserving technologies

Rys. 2. Widok na zakład po wprowadzeniu technologii chroniących zasoby

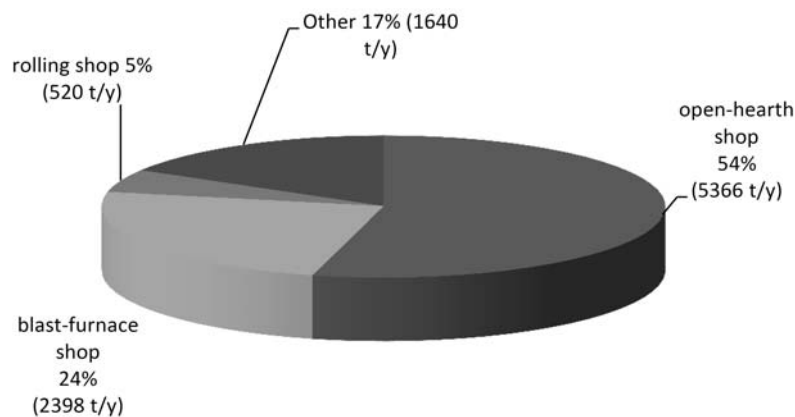


Fig. 3. Stake of emission of harmful matters on the types of production before implementation of resource-conserving technologies

Rys. 3. Wykres pokazujący emisję szkodliwych substancji ze względu na produkcję przed wprowadzeniem technologii chroniących zasoby

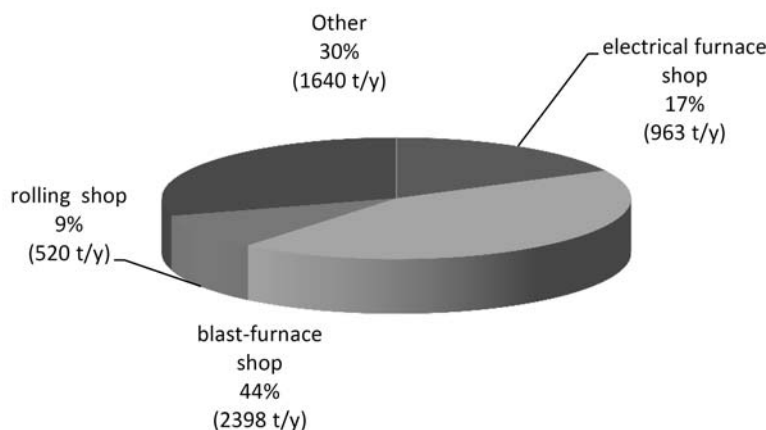


Fig. 4. Stake of emission of harmful matters on the types of production after implementation of resource-conserving technologies

Rys. 4. Wykres pokazujący emisję szkodliwych substancji ze względu na produkcję po wprowadzeniu technologii chroniących zasoby

Electric furnace steelmaking, due to high-efficiency gas purification systems is ecologically safe. During the work of electric furnace workshop from gas purification buildings by sight emission are not observed, and indexes of emission on an order below what at the open-hearth method of production became.

Technology and equipment, supplied a firm SIEMENS VAI Metals (Germany), to a full degree corresponded to all requirements produced to date to the modern metallurgical production and are most ecologically safe and energy saving.

Results and discussion

On the next figures we can see how emission of harmful matters on the types of production have changed after implementation of resource-conserving technologies.

Liquidation of open-hearth furnace allowed to shorten emission from 5356 to 963 thousand per year and it takes to cut from 54% of stake of emission of all plant to 17%.

Substituting of open-hearth furnace on electrical furnace will allow:

- to shorten emission in an atmosphere in 3.5 time: decline of emission of dust from 1.6 to 0.35 kg/t and oxides from 3 to 0.3 kg/t;
- to decide the ecological problem of metallurgical production, located in central part of city of Donetsk.

Conclusion

Metallurgical plant are responsible to ecological situation in Ukrainian regions like Donbass, Pridneprov'e and Krivbass. The issue is straddled in high

deterioration of capital assets, that don't satisfy demand of ecological and energy safety.

Resolving of this issue helps not only in improvement of ecological situation in the region, but make production of the metallurgical plant more competitive on the external market. Looking forward

ukrainians enterprises like JSC «Donetsksteel» are on the way to resolve this problem.

Acknowledgments

The paper was informational supported by JSC «Donetsksteel».

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Wdrożenie technologii chroniących zasoby w sieci „Odnowy Wyposażenia Technicznego” w Ukraińskich firmach na przykładzie JSC «Donetsksteel»

Obecna sytuacja ekologiczna na Ukrainie oraz jak ukraińskie przedsiębiorstwa dostarczają technologii chroniących zasoby na przykładzie JSC Donetsksteel. Artykuł porusza problemy zanieczyszczenia środowiska, problemy związane z nieracjonalnym zużyciem zasobów energetycznych oraz jak JSC Donetsksteel będące zakładem metalurgicznym sobie z nimi radzi.

Słowa kluczowe: metalurgia, środowisko, odpady