

V.I.Bolshakov, A.I.Babachenko, L.G.Tuboltsev, L.I.Garmash

Iron and steel institute. Results of the 2012 and the aims of development.

It was considered the results of scientific activities of the ISI in 2012 and the results of research on the development and application in metallurgy a new technologies, equipment and controls, providing effective and efficient operation of metallurgical units. Presented questions of perspective development of the Institute.

V.I.Bolshakov, V.V.Lebed, A.A.Zherebetskiy

Features control the charging on modern blast furnaces

It was performed generalization of the existing terminology and principles of formation of modern charging system of a Blast Furnace equipped bell-less top charger. It was shown the informational structure of the parameters of charging mode, which determines the possible methods and techniques to manage the burden distribution in the furnace. It is shown that rational charging modes allow to implement bell-less top charger to ensure stable technical capacity and efficient operation of the furnace with the lowest energy consumption

I.G.Tovarovsky, A.E.Merkulov

Analysis of proceses and parameters of a new blast furnace technology with coal gasification products injection

With the developed in ISI of NAS of Ukraine multiband mathematical model, it was made an analytical study for Blast Furnace injection of coal gasification products. It was shown that during the usage of coal gasification products of temperature and concentration and the phase of the field of the charge and the gas flow changes in the same way as in the case of pulverized coal injection. There is a possibility of significant increase of the amount of injected coal in case of their pre-gasification.

A.S.Nesterov, V.S.Yakushev, M.G.Boldenko, L.I.Garmash, A.D.Dzhigota, V.T.Agapova, A.G.Shishatsky, Yu.V.Pitsyk

Results of sintering and properties of sinter made from the charge, prepared with the use of surface-active agents

The properties of sinter made from sinter green with using surface-active agents (surfactants) are investigates. Fixed current charge conditions in the different periods of sintering. It was held a comparative evaluation of changes in the performance of the sintering machines and properties of sinter in the preparation of the sinter green without and with use of agents. The positive environmental aspects of the technology were highlighted.

A.V.Borodulin, A.L.Chayka, A.A.Sohatsky, B.V.Kornilov, A.I.Shvachka
Questions of blast furnaces system reliability

The purpose of this paper is the improvement of the thermal regime of Blast Furnace smelting. Worked out the foundations of basic monitoring of BF production system reliability; developed the methods of calculation and made selecting the optimum thermal and gas-dynamic regime of system: turbo blower - air heater and gas heater units- hearth - tuyere zone - shaft - throat - non-kompressor exhaust gas turbines. Takes into account the restrictions on system in volume of production, consumption and quality of energy and raw materials, operational safety, wear, design of main units of Blast Furnace.

V.I.Bolshakov, I.G.Muravyova, D.N.Togobitskaya, N.M.Mozharenko, N.G.Ivancha, Yu.S.Semenov

Analysis of expert systems creating experience and features of developed intellectual system for blast furnace smelting management decision support

The paper presents an analysis of the known information-modeling systems (expert systems), it was shown the difference of performed functions, the level of technical, mathematical and information of management, as well as the hierarchical structure. Are shown the features of the developed intellectual system to support decision-making for blast furnace smelting management. Intellectual system includes a number of mathematical models, in particular: the blast and gas-dynamic melting mode, charge materials component distribution in the cross-section furnace top areas, lowering the charge materials in the dry zone of the furnace, the charge elements distribution between the products of melting

D.N.Togobitskaya, A.I.Belkova, N.A.Gladkov, A.S.Skachko

Iron-ore materials quality estimate for the direct forming of the liquid product of blast furnace smelting

The aim of the work is to analyze the existing approaches to assessing the quality of iron ore materials. Developed a composite index of the BF charge, which includes the most important metallurgical properties of sinter and pellets determining the level of their recovery of formation liquid phase and of end products of smelting. Were highlighted the methodology of constructing an integrated charge indicator with using of generalized Harrington desirability function for the conditions of concrete Blast Furnace.

V.I.Bolshakov, N.G.Ivancha, I.G.Muravyova, V.I.Vishnyakov

Technological background of charge efficiency of multicomponent mixed burden materials in the blast furnace

It is grounded of advisability of charge of basical and unconventional components of burden materials, sifting fractions of charge materials and additives for various purposes in mixed batches. It is shown that further

improvements in technology of charging of mixed batches of charge materials in the Blast Furnace is necessary to develop methods of calculation of the rational parameters of forming portions, provide the required components of the charge distribution at the throat.

A.P. Tolstopyat, V.V. Davidson, L.A. Fleyer, V.I.Eliseyev, T.A.Ruzova, I.A.Manachin, A.F.Shevchenko, S.A.Shevchenko

Determining the speed of particles in two-phase flow applied to magnesium-line of two-nozzle lance

The aim of the work is to show the researching assessment of influence of the angle of the flow divider (lance tip) on the velocity of the particles of magnesium in it for the process of the bucket rafinirova the magnesium by blowing through a lance. The rate of magnesium and polystyrene particles ($d \approx 1,5$ mm) as the passage of a vertical pipe (steel, $D \approx 13$ mm), and the passage of the divider (steel) does not depend on the design of the divider ($\alpha = 30^\circ, 60^\circ, 90^\circ$), but only on the physical characteristics of the interacting materials of constructive elements of the lance and the particles.

V.P.Piptyuk, S.E.Samohvalov, V.F.Polyakov, I.V.Krikent, S.V.Grekov, V.A.Burshitin

Features of mass transfer in bath of dc ladle furnace unit with capacity 140 tons

The purpose of the work was to study hydrodynamics of the melt in ladle furnace (LF). Numerical simulation of the peculiarities of the mass transfer capacity of 140 tons in the bath in the processing melt ladle furnace DC. Confirmed the prevailing effect of the intensity argon purging bath, and the effects of heating and electric-power design and layout arrangement bottom purge unit on the mass transfer characteristics in the ladle. The rational parameters of blowing out are certain at heating of melt on the equipment of this type.

S.I.Semykin, T.S.Kiyashko

Study of features of low potential impact on the formation slag phase in the work environment industrial 60-t converter pjsc «EVRAZ DMZ im. Petrovskogo»

In the work under the industrial converter were studied features of the formation of a slag phase and its saturation of entrapped cold shots in conditions of application to the melt of low-voltage potential of different polarity. Revealed that this technology allows to reduce the level of loss of metal with slag owing to a higher level of proceeding of exchanging and refining processes for purging.

V.F.Polyakov, L.G.Tuboltsev, V.P.Korchenko, S.I.Semykin, N.I.Padun

Analysis of the scientific-technological solutions to reduce gas content in the iron melts with converter steel making

The aim of the work is to analyze the scientific-based approaches and technological solutions to further improvement of the technology of steel production that ensure of reducing of the gas content in iron melts. Based on known literature were considered the approaches to the study of the nature of the gas dissolving in iron melts. Results of the study will be used to detect of possibility of purposeful changes in converter steelmaking technology in order to develop advanced technical solutions for the production of metal products of improved property complex.

A.I.Leschenko, S.A.Vorobey, A.P.Lohmatov

Neutral corner while rolling in the non-driving rolls

The aim of the work is to develop a method for calculating the value of a neutral corner in the deformation zone of the two-roll non-driving working stand. With the application of the energy theory of the rolls and the rolled strip interaction obtained the expressions for determining the value of a neutral corner by rolling in non-driving rolls with rear thrust or front pull.

V.M.Kuzmichev, O.N.Perkov

Increase of wheel centers reliability

The aim of the work is to increase the strength and reliability of locomotive wheel centers through the use of heat treatment. The paper demonstrates the causes of the residual tensile stress in the metal of disk of center. Are developed the technological methods to help the prevention their formation. It was held the analysis of the results of testing of the proposed technology.

S.A.Vorobey, A.P.Lohmatov, D.G.Palamar, S.I.Badyuk, P.A.Kiselev

Problems of rolling schedule choosing with switching of light section and wire rod mills to continuously cast blank

The greatest number of discontinuities and defects of various continuous cast blanks are concentrated in the central zone. It was shown that critical to the penetration of the deforming force in the center of the workpiece is the design of the rolls and the reduction degree. We consider the problem of choosing the rolling schedule, which will provide enhanced deformation of workpiece axial zone.

A.I.Babachenko, A.A.Kononenko, A.Yu.Borisenko, P.L.Litvinenko, E.A.Shpak, A.A.Taranenko, S.N.Stepanyuk, I.P.Fedorova, A. I.Yatsenko

Effect of hot plastic deformation and heat treatment on structure and mechanical properties of steels for railway wheels

The aim of the work is to determine the features of the formation of the structural state and mechanical properties of carbon steels for railway wheels with the hereditary influence of the initial dendritic-grainy austenite structure formed after crystallization. Were studied the structure and properties of carbon steels for railway wheels from 0.50 and 0.59% C after crystallization, hot plastic deformation and heat treatment. It was shown that the formation of hypoeutectoid ferrite depends on the chemical micro-inhomogeneity formed during crystallisation of steel and changing during hot plastic deformation. It was found that with increasing degree of deformation, with retaining a high level of strength is observed increase in plasticity and impact strength of the steel, which is retained after subsequent heat treatment.

T.N.Golubenko, V.A.Lutsenko

FEATURES OF FORMATION OF STRUCTURE AND PROPERTIES

In the hot-rolled steel alloyed with chromium, molybdenum and vanadium

Were studied the features of structure forming and hardness changes in the cross section of hot-rolled alloyed steel made from continuous casting 42Cr4Mo2 and 31CrMoV9. It was shown that alloying of chrome-molybdenum steel with vanadium lead to shifts of pearlite transformation zone and to precipitation of fine carbides, so structure of steel 31CrMoV9 after the air cooling consists of bainite having a polyhedral morphology, and ferrite.

G.V.Timofeev

Structural heredity at the heavy section steel made from continuously cast blanks

The aim of the work is to determine the influence of the laws of inheritance of primary structure cast billets on quality - the structure and properties of large rolled sections. It was shown that the formation of the structure and properties of complex steel billets and large cross sections in the process of deformation and heat treatment, besides the parameters of rolling and cooling, significantly affect the structural characteristics of castings, which are dependent on the crystallization conditions and structure.

G.V.Levchenko, E.E.Nefed'eva

Requirements of standards and ways to improve of the macro- and microstructure of railway axes

The requirements of national and international standards to the axles for railway rolling stock have been analyzed in the work. A special attention in studied standards focuses on the requirements to the microstructure of steel. It has been shown that it is necessary to improve the deformation of the cast structure on section of billets and to optimize the parameters of deformation and heat treatment to meet standards.

D.N.Togobitskaya, D.A.Stepanenko, N.A.Tsivataya, A.S.Skachko

Physic-chemical models for evaluation of the influence of alkalis on the viscosity of the finite blast furnace slag

It was considered the problem of the negative influence of alkalis on the course of Blast Furnace process. It was made an attempt to explain the effect of alkalis on the basis of slag melts physic-chemical criteria model developed by E.V.Prikhodko. A model was proposed to predict the viscosity of the final Blast-Furnace slag with the influence of alkali and temperature factor.

M.F.Evsyukov, Zh.A.Dementeva, P.D.Grushko, Zh.Z.Chehuta

Phase transformations in low-carbon steels, alloyed a manganese.

The features of kinetics of structural and phase transformations of austenite are studied for low-carbon steels, alloyed by manganese. Are described the conformities of low-carbon steels austenite disintegration in the process of cooling both on a diffusive mechanism with formation of ferrite and pearlite and at disintegration by displacement mechanism with formation of martensite. It was shown an influence of heat of phase transformation on kinetics of disintegration of austenite in the large interval of cooling speeds

A.S.Kozachek, O.V.Lutsenko, E.V.Prihodko, L.A.Golovko

Selection of the optimum composition for low-carbon wire rod

Speeding up of the scientific and technological progress in metallurgy is leading to a necessity of a more in-depth study of conformities of the polycomponent steels structure and properties formation. The developments of the new theoretical and off-standard empiric approaches enable the applied tasks and scientific problems to be solved, among them, the forecast of the finished steel properties. This work offers a method of estimation how the mechanical properties of steels are influenced by a chemical composition.

V.S.Luchkin, L.G.Tuboltsev, V.P.Korchenko, N.I.Padun

Effect of silicon on structure formation in liquid Fe-C alloys

Is developed the method for the qualitative and quantitative determination of the structure of Fe-C-Si-alloys under any heat rises above the liquidus in the range of concentrations of carbon and silicon indicated on Fe-C-Si-chart. For liquid metastable Fe-C-Si alloys show the possibility of existence of different Si-containing carbides, the composition of which depends on the content of carbon and silicon alloys. Based on the qualitative and quantitative composition of the melt is shown that the structure of Fe-C-Si alloy can be formed by various chemical compounds of silicon content type Fe_mSi_n constant composition, changes each other with increase (or decrease) of the silicon content in the alloy.

K.V.Bayul, V.I.Petrenko

Analysis of contact stress on the working surfaces of the roller press tires.

Were analyzed by authors the contact stress on the working surfaces of the tires of roller presses. Developed computational scheme for determining the contact stresses and show that the elements configuration and properties of the briquetted charge have a significant influence on the contact stress and wear of the working surfaces of the tires of roller presses.

V.I.Bolshakov, V.V.Verenev, S.V.Belodedenko, N.I.Podobedov

Methodical bases of load estimation for broad strip mill stands drive line

It is proposed an method of estimation for loading of stands drive line with the random disturbances and the time factor, which determines the wear and corner clearances in equipment. It was shown the possibility of obtaining of loading data that necessary to calculate the strength and durability of the parts and components of equipment. Are held the options and features for the load spectra build for long-term operation of the mill. An example of the statistical modeling of dynamic and static loads with the disordered task was studied for different size bands rolling.

V.I.Bolshakov, L.G.Tuboltsev, V.A.Gorohova

Greenhouse effect and environmental problems of ferrous metallurgy

The purpose of this paper is to analyze the amount of greenhouse gas emissions and their impact on climate change. It is shown that natural phenomena and man-made greenhouse gases cause climate change, which leads to negative consequences in almost all areas of human activity. From the intensity of pollution ferrous metallurgy is the next after the energy and transport. At the same time, the direct impact of ferrous metallurgy on the greenhouse effect has not been studied and requires an integrated scientific approach.

V.I.Bolshakov

B.E.Paton and development of i&si as the lead r&d institute of ukraine ferrous metallurgy.

It were presented the data on the life and creative activity of the President of the National Academy of Sciences of Ukraine, academician B.E. Paton and his role in the establishment of the Iron and Steel Institute of NAS Ukraine.

I.Bolshakov, A.I.Babachenko

Creative way of scientist-metallurgist and material-scientist

The article is dedicated to the 90th anniversary of the Honored Worker of Science of Ukraine, laureate of the State Prize and the Prize of the Council of Ministers of the USSR, Doctor of Technical Sciences, Professor Ivan Gerasimovich Uzlov.