

Abstracts

V.I.Bolshakov, L.G.Tuboltsev

Condition and prospects of development of iron and steel industry of Ukraine in the conditions of crisis

Objective of this research is the estimation of prospects of development of metallurgical manufacture in the conditions of world financial crisis. The carried out analysis of tendencies of development of a world iron and steel industry of Ukraine has given the opportunity to reveal perspective directions of scientific researches for development of domestic metallurgy. Arrangements for maintenance of effective work of a metallurgical complex are offered.

V.I.Bolshakov, S.M. Zhuchkov

The analysis of work results of Z.I.Nekrasov Iron & Steel Institute of National Academy of sciences of Ukraine in 2008

Research objective is the analysis of scientific and personnel possibilities of Iron & Steel Institute of National Academy of Sciences of Ukraine for holding fundamental and applied researches in the field of iron and steel industry. Results of researches have shown that the Institute has material, financial and personnel possibilities for qualitative performance of scientific researches. Ways and prospects for realisation of scientific potential of Institute are shown.

V.I.Bolshakov, N.M.Mozharenko, I.G.Muraveva, G.N.Golubyh

Technological features of the blowout of blast furnaces at blowing-down on the capital repairs

Research objective is working out of technological parameters of the blast furnaces work providing their accident-free blow-out at blowing-down on capital repairs. It is shown, that the furnace blow-out should be carefully prepared according to requirements of the technological instruction. Observance of the developed parameters of blast furnaces work is recommended at blow-out on all blast furnaces of Ukraine that will provide industrial safety and prolongation of furnaces service life.

D.N.Togobitskaja, A.F.Hamhotko, N.A.Gladkov, N.E.Hodotova

Developing of models for forecasting of modular transformations iron ore materials in a blast furnace

The purpose of present research is developing of the complex approach for an all-round estimation of iron ore quality and the analysis of the offered variant for developing predictive models for softening and melting of the agglomerates, pellets and ores. Using the data received by the standard technique, performed analytical generalisation of information about phase transformations of iron ore materials in the original conditions and recovered conditions of blast furnace smelting. The offered physical and chemical models can be used to predict the softening and melting of charge materials temperatures.

V.I.Bolshakov, V.V.Lebed

Modern control condition of gas-distribution in blast furnace

The purpose of present research is analysis and developing of scientific and technical perspective directions for improvement of various control devices of distribution of gases in blast furnaces. It shown, that for an informative and reliable

control of gas distribution it is appropriate to equip the blast furnace with mobile and stationary gas-tube sondes under the charge surface. The perspective directions of introductions in the field of automation for increase to improve management of blast furnace smelting are brought.

I.G.Muraveva, J.S.Semenov, F.M.Shutylev, E.I.Shumelchik, S.T.Shuliko, J.A.Bogachev

Estimation method of displaceable volume of coke during unloading on him the iron-containing components of charge

The purpose of present research is the developing of estimation method of the displaceable volume of coke during unloading on him the iron-containing components of charge in a blast furnace. It is established, that the volume of displaceable coke is defined as the mass landed on him the iron-containing components and depends on the mass of the unloaded coke. It is shown, that the developed method can be used as part of an information system about the level of charge, received by radio-locating profile-measuring device, and as part of mathematical model of radial distribution charge materials on blast-furnace top.

A.S.Nesterov, V.I.Bolshakov, N.M.Mozhareno, I.P.Lusenko, I.V.Loginov, V.J.Kuchin

The research of processes of melt filtration through the coke nozzle in the blast furnace smelting at coal dust fuel application

The purpose of the research was studying of input influence of finely dispersed partially burnt grains of coke dust fuel on viscosity characteristics of homogeneous slag melt in a blast furnace. The experiments were held on laboratory liquid viskosimeter using the capillary method. It is shown, that during coke dust fuel (CDF) application, the defining link of efficiency of replacement of the coke part of CDF is stability of coke quality during high temperatures and rational distribution of iron-ore materials on blast furnace section. The results of the work can be used at realisation of charging process of coke dust fuel in a blast furnace.

D.N.Togobitskaya, A.I.Belkova, A.F.Hamhotko, D.A.Stepanenko, P.I.Otorvin, S.V.Nyn

The experience of creation and introduction of the control system of the slag regime of the blast furnace smelting in the charge and technological conditions of the works of Ukraine

With the purpose of solving practical problems of management of the slag regime of blast furnace smelting in the Institute of iron and steel of the National Academy of Sciences there are created physical and chemical bases of predicting of structure and properties of blast furnace smelted products, automatic system "Slag" is developed for the control and management of a slag regime of blast furnace smelting. The system introduction has allowed to stabilise a slag regime in the limits providing pig-iron smelting of required quality. It is shown, that the system "Slag" development is connected with an establishment of scientifically proved dependences of mutual influence of components of pig-iron and slag in shaft of the blast furnace, working out of criteria and the ratios, describing conditions of the coordination of their structures.

V.I.Bolshakov, A.F.Shevchenko, A.S.Bulahtin, A.M.Bashmakov, L.P.Kurilova
Material and energy saving process of deep pig-iron desulfuration

The purpose of the work was comparison of the basic technological indicators of industrial work of complexes on the number of steel works with capacity from 2, 1 to 6, 0 million ton per year and sulphur decrease in pig-iron from 0,006-0,099 % to 0, 0005-0,010 %. It is shown, that the new technological process of refinement of pig-iron developed and mastered by the Ukrainian experts by magnesium blowing without additives provides deep and especially deep pig-iron desulfuration in the conditions of large industrial metallurgical manufacture. The development is checked up by the wide industrial experimental work and it is recommended for wide application at the metallurgical enterprises.

A.S.Vergun, V.G.Kislyakov, A.F.Shevchenko, B.V.Dvoskin, A.M.Bashmakov

The condition and perspectives of the industrial realization of the external iron desulfurization process

The purpose of the work was further development of the iron desulfurization technology by the granulated magnesium without addition agents. The information concerning industrial implementation of this technology and of the new generation equipment is given and the suggestions for realization of this technology on the Ukrainian metallurgical enterprises are also developed.

S.I.Semykin, V.F.Polykov, E.V.Semykina, T.S.Kiyashko, A.S.Semykina

Comparison of the refining metal effectiveness in the converter and casting ladle during electric potential application

The goal of the work was the application perspectives detection of the electrical energy of the low power density during the converter metal smelting and on the stage of metal working in the casting ladle. The peculiarities and effectiveness of using of low-voltage electric potential on the melt are compared. The fundamentals, concerning the nature of the obtaining effects are formulated. The research showed the availability of the complex low-voltage electrical energy application on the both stages of the steel remelting.

S.I.Semykin, V.F.Polyakov, V.V.Vakulchuk, S.A.Dudchenko

Temperature distribution study on the volume of the bath during cold modeling using of the top-blown converter process

The goal of the work was study of influence of blast regime parameters on temperature distribution in the volume of the converter and detection of temperature distribution mechanisms during using electric potentials influencing on bath. The research of the process was carried out on the universal cold table simulator. The influence of the blast regime parameters on temperature distribution in the volume of the bath by using electric potential is shown. The influence of current intensity in the circuit of the tuyere is defined, which is electrode influencing the development of the thermal process.

V.P.Korchenko, L.G.Tyboltsev, V.F.Polyakov, N.I.Padyn, A.M.Shevchenko

Dephosphorization and desulphurization regularities on the final stages oxygen converter smelting with combined blowing

The purpose of the research was studying of phosphor and sulphur behavior in the process of oxygen converter smelting. Technological capabilities of the final stages of oxygen converter process with combined blowing for metal smelting with low phosphor and sulphur content are researched. It is shown that at constant amount of phosphor and

sulphur, taken along with lime and scrap, the dynamics of changing of sulphur content in the metal depends on sulphur content in the pig iron. Minimal phosphor content, achieved on the stage of the full decline of the flame, doesn't decrease on the afterblow stage. In the afterblow process and during metal washing by the neutral gas through bottom tuyere without oxygen feed from above, the sulphur content decreases to 0,0030 – 0,0072 %.

V.P.Piptyk, V.F.Polyakov, A.B.Kovyra, A.A.Travinchev, S.N.Pavlov, I.L.Byzyn

The data for numerical research of the ladleman bath thermal condition of high capacity during smelt working on the ladle furnace

The purpose of the research was study of using capability of mathematical modeling for researching of melt behavior in the volumes of hostile environment (hot metal and slag) in the conditions of sampling impossibility and inability of temperature melt measuring. The data for numerical investigation of thermal processes in the metallic bath of the ladle furnace with the ladle capacity 350 t are given. The choice for basic data is carried out by using statistical and numerical analytical procedures.

A.A. Gorbanev

The development of scientific manufacture fundamentals of the high-quality rolled wire

The purpose of the research is discussing the results of scientific research complex and applied developments, carried out under the direction of Zhuchkov S.M. The results of these researches and the possibility of their usage in the practice of rolling manufacture on the metallurgical enterprises of Ukraine are given.

S.M.Zhuchkov, D.G.Palamar, V.G.Razdobreev, A.P.Ivanov, A.I.Leshenko

Information and analytical system of continuous section rolling

The purpose of the research is creation of information support of problem solution of energy supply economic usage in the metallurgical manufacture. The characteristics of the created information and analytical system of the continuous section rolling, which allows to carry out analytical researches of the continuous section rolling process on the mills with different technological schemes of manufacture is given. It is shown that mathematical models usage, which are the part of the calculation set of information and analytical system on the mill 250–1 of the enterprise «Arselormittal Krivoi Rog» provides energy saving to 5%.

B.N.Kolosov, A.A.Gorbanev, P.V.Tokmakov, P.A.Kiselov

The choice and justification of the calculation technique of energy-power parameters of rolling on the reversible cogging-billet mill

The purpose of the research is the choice and justification of the calculation technique of the energy-power parameters of rolling on the reversible cogging-billet mill. As the basis of calculation technique of the energy-power parameters of rolling on the mill 850 assigned the main analytical, empirical and half empirical statements, which describe adequately the conditions of rolling on the cogging reversible mills. The calculation of the energy-power parameters of the reversible rolling of the round section billet with the diameter 80 mm from the steel grade IIIХ15.

S.M.Zhuchkov, K.J.Klychnikov, A.P.Lohmatov, I.V.Sikachina, J.S.Galenko, J.M.Beklemeshev, L.P.Barisheva

The development of the main approaches to the projection of parameters process of steel strips spreading of the wide dimensional assortment using the method «rolling – drawing»

The purpose of the research is development of basic approaches to the projection of the technological schemes of the process “rolling – drawing” for the production of strip profiles of the wide dimensional assortment. Mathematical simulation means of the spreading process, which allow projecting the technological schemes of strip profiles manufacture, are developed. Numerical and analytical investigations are carried out by means of modeling using final elemental model.

A.J.Pytynki, V.G.Ivanchenko, V.T.Tilik

Technological capabilities of using the whole field of thickness tolerances during hot strip rolling

The purpose of the research is occurrence of technological capabilities of using the whole field of thickness tolerances during hot strip rolling. Usually before adjustment of the mill for rolling one defines the magnitude of the required excess of the strip thickness above the nominal one when leaving the last stand. The equation for calculation of magnitude of this excess is suggested and it is proportional to actual magnitude of crosscut gage interference of the strip, this allows to hold on the thickness of the rolled strips in the field of blanks on allowable level.

S.A.Vorobei, A.N.Stepanenko, G.V.Levchenko, T.V.Gritsai

Rational schemes of thin hot strips production from low-carbon steel

The purpose of the research was the choice of rational schemes of thin hot strips manufacture with necessary structure and properties on hot broad-strip rolling mills. The Results of the research of various schemes of thin hot strips manufacture from low-carbon steel for cold forming. From attitude to the receipt of microstructure rational schemes of hot rolled strips manufacture depending on their thickness and type of a stand of hot rolling are offered.

I.I.Prihodko, P.P.Chernov, V.V.Raznosilin, A.A.Sergeenko, S.V.Trusillo, V.A.Agureev, A.I.Sobolev, E.A.Parsenjuk, J.A.Tsukanov

The first domestic system of the automatic control of flatness of strips by using contactless methods of measurement of flatness and temperature

The purpose of the research is the creation of a complex of systems of automatic control for sheet stands. The first domestic system of automatic control of flatness of strips for cold rolling stands, using a contactless optical method of measurement of flatness and thermal imaging method of measurement of strips temperature is presented. The advantages of this system in comparison with traditional systems on the basis of stressmetric roller, and also practical results of using system are described.

V.I.Spivakov, E.A.Orlov, P.L.Litvinenko

The ways of development of deformative-thermal hardening of thick sheet and broadband rolled stock

The purpose of the research was revealing of perspective ways of development of thick sheet and broadband rolled stock manufacture. The analysis of the works executed in the Institute of Steel and Iron of National Academy of Sciences of Ukraine of Z. I. Nekrasov of the problem of deformative-thermal hardening of structural thick sheet and broadband rolled stock is given. It is shown, that the achieved technical decisions

correspond to their world analogues and allow to manufacture economic and competitive hardened sheet rolled stock.

V.A.Lutsenko, V.A.Matochkin, O.V.Lutsenko, M.F.Evsjukov, V.G.Chernichenko, A.S.Kozachek, V.I.Shcherbakov*

Modern technological approaches to the directed formation of structure and properties of high-carbon rolled wire

The kinetics of disintegration of austenite from high-carbon steel 80 with the regulated content of chrome and manganese at continuous cooling in the range of speeds 0,4 ... 17,0⁰C/sec. is investigated. It is established, that at speeds of cooling 0, 4–4,8⁰C/sec the temperature of the beginning and the final austenite transformation in this steel raises on 10⁰C. Retrogressive dependence of ultimate strength from chrome and manganese content is revealed for the steel 80. The received results can be used for the directed formation of structure and properties in the high-carbon rolled wire intended for ultra high-strength of wire and metal cord manufacturing.

O.G.Sidorenko, I.P.Fedorova, A.P.Suhaj

The research of formation regularities of reinforcing bar rolled stock structure which is thermally strengthened with application of ways of interrupted and discrete hardening in the stream of the rolling mill

The purpose of the research was the research macro-and microstructures of reinforcing bar rolled stock thermally strengthened by the method of interrupted hardening in the stream of the stand. It is established, that within a strengthened bar at the distance of 0,3 – 0,4 of its radius one can see the border of transition from one regularities of formation of structure of rolled stock section to the other ones. It is shown, that occurrence at hardening of separate parts of degenerated perlite, and then the subsequent gradual replacement by them ferrite-perlite structures, is observed irrespective of the content of chemical elements in them.

M.F.Evsjukov

The ultrasonic quality assurance of railway wheels and bandages. development and achievement stages.

The purpose of the research is studying the stages of development of the ultrasonic method of railway wheels and bandages quality estimation in 1982 – 2006. It is established, that developed technologies of the ultrasonic method of the control of all elements of wheels and bandages allow to carry out 100 % of the control of all assortment of wheels and the bandages which are produced both for the internal consumer, and for export in compliance with national and foreign standards.

I.G.Uzlov, K.I.Uzlov, A.I.Babachenko, A.N.Hulin, A.A.Kononenko

Experimentally industrial realization of production technology of high-strength locomotive bandages of the raised wear resistance

Under production conditions of the wheel rolling shop of the public corporation «Interpipe NTZ» technological schemes of melt, out of furnace processings, rolling, and thermal hardening of high-strength with the raised wear resistance of railway bandages of grade «T» on Standard 35. 2–23365425–628:2008 are realized. From the tested ways of cooling of high-strength locomotive bandages 1060x143x98, produced from the microalloyed by vanadium steel, the most effective from the point of view of

achievement of competitiveness and necessary level of mechanical properties are piece hardening by the vertical hardening car and volume hardening by the stock.

V.S.Luchkin, L.G.Tuboltsev, N.I.Padun, A.M.Shevchenko

The diagram of the condition and the structure of liquid Fe-C alloys

The purpose of the research is the development of theoretical views about the structure and properties of multicomponent metal melts, detection of possible structure of liquid elementary cells, kinds and concentration intervals of existence of material particles from atoms of iron and carbon. The model of liquid elementary cells of corresponding crystal lattices Fe-C of the alloys defining materiality of particles in a liquid condition is offered on the basis of which the structures of liquid phases on the diagram of condition Fe-C of alloys are considered.

A.M.Nesterenko, A.B.Sychkov, V.J.Poluektov

Deformation ageing of rolled wire from the steel of grade CB-08G2C

The purpose of the work is the establishment of regularities of complex change of mechanical properties of wire rod from steel Cb-08G2C microalloyed by boron, at deformation temperatures 100-500°C. It is established, that the higher plasticity and processability at deformation by drawing wire rod from steel Cb-08G2C microalloyed by boron, in comparison with wire rod from the similar steel without boron is caused by smaller degree of development of dynamic deformation ageing.

G.V.Levchenko, A.M.Nesterenko, V.L.Pljuta, S.V.Bobyry, P.D.Grushko, O.S.Kasjan

The research of cast structure of manganous and chrome- manganous iron-carbon alloys

The purpose of the research is further studying and analysis of phase-structural transformations in the system Fe-Cr-C. It is shown, that cast chrome-manganous alloys with colonial eutectic on the basis of carbide Me_7C_3 are characterised by the high level of great impact-abrasive wear resistance defining availability of their use for manufacturing of wear-proof details of the replaceable metallurgical equipment.

M.F.Evsjukov, A.A.Brovko

The influence of the structural condition on thermal properties of steels and pig iron

The purpose of the research was complex studying of change of values of coefficient of linear expansion at heating and at cooling in high-strength pig iron and white wear-proof pig iron in the range of temperatures 20° ... 1000°C, an estimation of influence of structural components on values of coefficient of linear expansion in the course of cooling of real products. For the first time regular data on average and true values of coefficient of linear expansion (α) both at heating, and at cooling in the range of temperatures from 20°C to 1000°C are described.

V.F.Moroz, E.V.Prihodko, N.E.Hodotova

The behaviour of hydrogen in the various structural constituents of carbon-containing alloys and steels

The purpose of the research was studying of regularities of hydrogen behavior in the steels defining their hydrogen fragility. By using physical and chemical model of metal melts with ACC- the similar structure, the behaviour of hydrogen in various

structural carbon-containing alloys and steels was analyzed. The connection of hydrogen solubility, the coefficient of its diffusion and water permeability with parameters of internuclear interaction in multicomponent phases and alloys is established at numerical level.

V.I.Bolshakov, J.I.Cherevik, A.M.Bashmakov

Estimation of change frequency of the technological loading operating on tuyere during pig-iron desulphurization

The purpose of the work was definition of rational constructive and regime parameters of the equipment realizing the technology of out of furnace desulphurization of pig-iron. The analytical dependences, allowing defining the mechanism of formation of the forced vibrations, size and frequency of their change depending on design data of tuyere, modes of blasting and intensity of processes of steam formation are received during magnesium evaporation. It is shown that the knowledge of size and character of change of the technological loading operating on tuyere and its drive allows to provide high reliability and durability of the equipment.

K.V.Bajul, B.N.Majmur, N.A.Solodkaja

Development of the technical decisions providing the control and regulation of operating modes of rolling and briquetting presses

The purpose of the research was development of requirements to an automatic control system by the current parameters of briquetting process and rolling press work as a part of a technological line of briquette manufacture. The analysis of the parameters the knowledge of which is the most important for technological and technical modes estimation of rolling press operation is fulfilled. It is shown, that the main role plays first equipment of rolling presses with the measuring instrument of compacting force, the gage of the control of burden level in the over-press hopper, temperature and humidity gages of burden and the frequency converter. Technical capabilities of measurement of required parameters by using measuring means of various manufacturers and the level of equipment of foreign presses by registering and operating equipment are considered.

V.I.Bolshakov, A.M.Junakov, E.A.Evteev

The researches of loading of the equipment during mastering, operation and development of the wire stand

The purposes of the research were development and mastering of the production technology of high-quality wire rod of wide grade composition, research and optimisation of operating modes of the modern equipment, the establishment and use of its reserves. Research results of drive loading lines of the equipment, including dynamic and vibrating processes are presented. It is shown, that usage of the results of the given research during mastering, operation and development of the wire stand has allowed to provide release of the competitive production.

V.V.Verenev, V.I.Bolshakov, A.M.Junakov

Models of dynamic processes in rolling mills

The purpose of the research was the perfection of models of dynamic processes in rolling mills taking into account nonlinearity of elastic linkages. Several developed (in the Institute of iron and steel) base models of transitional processes depending on the solved problem are presented. The systematization of the computer models applied to the research of dynamic processes in the main lines and stands of rolling mills is given. On

the basis of models, technical offers about rolling speed increasing and improvement of technical characteristics of rolling mills are proved, developed and successfully realized.

A.V.Borodulin

The power and ecological aspects of coking blast furnace manufacture functioning in the conditions of the economic crisis

The purpose of the work is formation of suggestions about finding the way out from crisis for iron and steel industry. The system aspects of subindustry functioning are considered in the conditions of crisis at different levels, some measures in dominating blast furnace manufacture are given. It is shown, that during the energy crisis the role of structural optimisation of blast furnace manufacture, abilities to work on variable modes and their flexible economic reorganisation according to the market conditions and other restrictions increases.

E.V.Prihodko, D.N.Togobitskaja

The complex usage of methodology of physical, chemical and mathematical modelling for optimisation of metallurgical technologies

The purpose of the research was solving of optimisation problems of metallurgical technologies with usage of methodology of physical, chemical and mathematical modelling and the criteria connected among themselves by difficult nonlinear dependences. Examples of usage of long-term experience of creation of the information and intellectual resource are given. It is shown that the application of the developed models complex created on the basis of using the given methodology, allows solving problems of optimisation of interface metallurgical metal production successfully.

V.I.Bolshakov

Memoirs on the outstanding scientist-mechanic

New data about the life and creative activity of the Doctor of Engineering, prof. A.V.Prazdnikov who was the pupil and the successor of scientific school of dynamics of machines of correspondent-member of Academy of Science of USSR S.N.Kozhevnikov are presented.

M.P.Kuznetsova

MEMORIES ABOUT ANATOLIY VLADIMIROVICH PRAZDNIKOV

Maria Petrovna Kuznetsova's memories about the way of life of her husband – the Doctor of Engineering, prof. A.V.Prazdnikov who was the significant scientist in the field of dynamics of machines are presented.

A.M.Ioffe

Anatoliy Vladimirovich Prazdnikov

It is 80 years from the date of Anatoliy Vladimirovich Prazdnikov's birthday, who was the head of machine science department of the Institute of iron and steel, the professor, the Doctor of Engineering for a long time.

V.D.Chehranov

Going ahead

V.D.Chehranov's note about Anatolii Vladimirovich Prazdnikov has been published in the newspaper «Pravda Ukrainy» («The truth of Ukraine»), November

the 5th 1970, under the heading «the Word about a companion». The full text of this note is given below.

J.P.Karpinsky, O.N.Kukushkin, V.A.Chigrinsky, J.A.Dinnik, V.N.Kuvaev, D.A.Ivanov, I.V.Polotov

The system start-up – the creation and introduction history

The system of programmed control of the speed of stands "START-UP" is one of the significant developments of Institute of iron and steel, widely introduced into the industry on the continuous wire stands of works "Krivorogstal", Magnitogorskiy integrated iron-and-steel works, Makeevsky metal works, public corporation «Arselormittal Krivoi Rog».

A.I.Sivak, V.G.Chernichenko

The department of the thermal processing of metal for mechanical engineering: scientific problems and achievements

The data about the department of thermal processing of metal for mechanical engineering of the Institute of iron and steel of Ukrainian National Academy of Science which develops the scientific bases and technological processes of manufacture of high-quality rolled stock and wire rod of wide range of grades are given.

I.P.Fedorova, V.S.Luchkin

K.P.Bunin's scientific school in the Institute of Iron and Steel of Ukrainian National Academy of science

Memoirs of pupils about K.P.Bunin and about the development of his scientific school in the Institute of iron and steel.

A.I.Babachenko

Roads which we choose

Short data about leading experts of the department of deformative and thermal processing of structural steels of the Institute of iron and steel of Ukrainian National Academy of Science of Z.I.Nekrasova, working in Institute more than forty years are stated in the article. It is devoted to 70th anniversary of the Institute of iron and steel.

G.G.Efimenko

The development and introduction of the complex technologies of expenses reduction of coke and natural gas for efficiency increasing of pig-iron and ferroalloys smelting

There is the feedback on the work presented on nomination of the State science award of Ukraine for 2009.