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ABSTRACT

MATERIALS SCIENCE

PERFORMANCE INFLUENCE STUDY ON BLAST FURNACE RAW MATERIALS BY ZINC AND PB

Zhijun HE, Junhong ZHANG

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Key words: blast furnace, zinc, Pb, raw materials and fuel performance.

Abstract. With the thermogravimetric experiment of blast furnace raw materials and fuel, the effect of Zn and Pb on raw materials and fuel performance were studied. The results indicate that Zn was deposited on the surface of coke with a round ball particle, with the increasing content of Zn and PbO, the Coke reactivity was increased, however, but the influence degree of PbO on coke reactivity was less than ZnO. At the same time, the sinter and pellet pulverization ratio were increased a little when the more PbO was added to. But in the practical process, if the charge didn't have the PbO, the pulverization ratio can be remitted in the low temperature zone of blast furnace.

THE MECHANISM AND KINETICS OF THE TUNGSTEN (VI)-OXIDE REDUCTION IN THE VERTICAL TUBE REACTOR

Željko KAMBEROVIĆ, Karlo RAIĆ, Mirjana FILIPOVIĆ, Zoran ANĐIĆ, Marija KORAC

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Key words: tungsten (VI)-oxide, reduction, vertical tube reactor, kinetics.

Abstract. Presented study shows the analysis of the process of reduction of WO_3 powder with hydrogen in the vertical tube reactor, representing a new approach in comparison to the conventional methods in the horizontal tube reactor. SEM analysis of the synthesized tungsten powder shows the existence of particles, approximately $1\mu m$ in size, both individual ones and those within the porous agglomerates with a spongy structure. In order to study the mechanism and kinetics of the reduction process, the reduction degree and retention time of particles of WO_3 powder in the reaction zone were calculated using a developed mathematical model, based on the application of Stokes' law. Kinetic parameters and activation energies were determined at the corresponding temperature intervals. Kinetic analysis showed that the process of WO_3 reduction with hydrogen in the vertical tube reactor in the temperature interval from 700 to 900°C occurs in the kinetic zone. Activation energy for the temperature interval from 700 to 800°C is $E_{a1}=7.5\pm 0.1 kJ/mol$, whereas for the temperature interval from 800 to 900°C, activation energy is $E_{a2}=14.6\pm 0.1 kJ/mol$. A model was proposed describing the mechanism of the reduction process in the vertical tube reactor according to which particles of tungsten powder $1\mu m$ in size arise from the stretching and cracking of coarse particles in the reduction zone, as well as from the appropriate temperature shock outside this zone.

NUMERICAL ANALYSIS OF OPTIMUM SOFT REDUCTION AMOUNT FOR CONTINUOUS CASTING SLAB

Ke LIU, Jiaquan ZHANG

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Key words: Continuous casting slab, Soft reduction, Volume shrinkage, Coupled FEM model.

Abstract. Soft reduction has been proved to be the best way to minimize center segregation and eliminate center porosity. This article focuses on the investigation of optimum soft reduction parameters applied online, for the purpose to developing a reliable approach to determine proper soft reduction parameters basing variation steel grades and casting conditions. A thermal-mechanical coupled FEM model has been developed to predict proper soft reduction amount for continuous casting slab. For a given steel grade and section size, the soft reduction amounts, with different solid fraction in the center of slab cross-section, are suggested according to calculate results. It may lay the practical foundation for the soft reduction amount optimization of continuous casting process.

SIMULATION METHODOLOGY AS THE BASIS OF CAD/CAM/CAE DESIGN OF DYNAMICALLY LOADED CASTINGS IN MACHINE BUILDING

Radomir SLAVKOVIĆ, Zvonimir JUGOVIĆ, Ivan MILIČEVIĆ, Marko POPOVIĆ, Nedeljko DUČIĆ, Borivoje NEDELJKOVIĆ

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Key words: product, design, quality, simulation, software.

Abstract. Simulation of technological process during the product design by using modern software systems instead of the traditional "testing" by designing an industrial prototype, significantly reduces the cost of the product development, shortens the time of the product's appearance on the market and eliminates errors in the production process. The paper provides an example of CAD/CAE/CAM technology of the design of a two-part tooth of bucket wheel excavator by using MAGMASOFT software for the simulation of technological process of casting. This type of design meets the stringent requirements of quality systems implementation with minimum risk of error in the casting.

REVIEW OF THE NEW FLEXIBLE LINE FOR COPPER SALTS PRODUCTION

Vladimir CVETKOVSKI, Branka PEŠOVSKI, Danijela SIMONOVIĆ, Suzana DRAGULOVIĆ

27

Key words: copper salts, flexible technological line, waste water treatment, waste gas.

Abstract. This paper presents the results of the laboratory investigations of all well known and used chemical methods to produce a large number of salts and other chemical products based on copper, that are used for various purposes in inorganic and organic chemical industry and which can be placed both on domestic and foreign markets. Due to those reasons, a proposal was made for a new flexible production line for the total production of 3000 kg per year of the following copper salts: copper sulphate, $CuSO_4 \cdot 5H_2O$; copper(II) chloride, $CuCl_2 \cdot 2H_2O$, basic copper carbonate, $CuCO_3 \cdot Cu(OH)_2$ and copper(II) nitrate, $Cu(NO_3)_2 \cdot 3H_2O$. In the experimental part of this paper, the proposed technological line for copper (II) chloride is described in detail, and the other mentioned inorganic copper salts are given briefly in a discussion of the results for comparative

analysis. Optimal technology was selected based on several factors. First of all, a technological justification was taken into consideration all necessary parameters of chemical reactions were tested. Balance of the used raw matters and chemicals was carried out as well as calculation of spent electricity. Selected technological process also involves the lowest production costs and ecological aspect expressed by the balance of waste water and gases from the production process, and the proposal for their treatment is given through the technical requirements and the basis for plant design for waste water and gas treatment. According to the required annual capacity, a new flexible production technology line of these copper salts is formed, with the equipment that fully meets the required production capacity and, in terms of energy, provides the lowest market price per unit.

THE MICROSTRUCTURE AND MECHANICAL PROPERTIES OF AS-CAST Sn-Sb-Zn LEAD FREE SOLDER ALLOYS

Srba MLADENVIĆ, Desimir MARKOVIĆ, Ljubica IVANIĆ, Svetlana IVANOV, Dragoslav GUSKOVIĆ

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Key words: Microstructure, SEM, EDS, Hardness, Tensile.
Abstract. The microstructures of the Sn-Sb-Zn lead-free solders have been investigated using optical microscope (OM) and scanning electron microscopy. The Sb and Zn contents of the investigated solders were 4 at% -18 at% and 16 at% -2 at%, respectively. The solders were prepared by bulk Sn, Sb, Zn (99,9 mas % of purity). Phases in these solders were analyzed for their compositions by energy dispersive spectroscopy. The Sn-Sb-Zn alloys exhibit high performance on tensile properties, hardness and microhardness, owing to the existence of SbZn intermetallic compounds (IMCs).

COMPUTER ADAPTIVE TESTS IN EVALUATION OF KNOWLEDGE OF C++ PROGRAMMING LANGUAGE

Sanja Maravić ČISAR, Petar ČISAR, Dragana VASIĆ, Borislav OBRADOVIĆ, Petar VASILJEVIĆ

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Key words: computer adaptive tests, e-learning, knowledge tests, marking of knowledge, adaptability.
Abstract. The paper discusses the application of the computer adaptive test in knowledge evaluation of the programming language C++. For the purpose of this research an application was realized which enables adaptive testing. Its functionality was checked in practice. A survey was carried out among students for the purpose of evaluation, the attained data was statistically analyzed and interpreted. Based on the results of the research it was determined that there is a statistically significant difference in favor of the students in the experimental group as opposed to the students who had taken the test in the conventional way (paper-pencil tests).

MULTI-CRITERIA APPROACH TO OPTIMIZATION OF OPTIMAL FEEDER CONDUCTOR SIZE

Momcilo D. VUJICIC, Stojan VASOVIC, Miroslav RADOJICIC, Jasmina VESIC VASOVIC, Zoran NESIC

.....47

Key words: Multicriteria decision making, feeder cable section, cost optimization.
Abstract. This paper presents an approach to optimization of selection of feeder conductor cross-section using methods of multicriteria decision making. The focus of the paper is

related to the application of the compromise ranking method and a method of uncertainty for determination of the cost-effective conductor size. Application of this method allows the decision makers argumentation regarding their decisions, as well as obtaining the best alternative in relation to other ones compared. Designed multicriterial access to the selection of section of feeder conductor allows involvement of diverse and disparate criteria, implementation of mathematical models and modification of criteria parameters as required by decision maker, with the aim of ranking and obtaining the optimal solution.

THE ORGANIZATIONAL SHIFT – KEY FACTOR IN DEVELOPING CORPORATE ENTERPRISES

Viorel BURUIANĂ, Mircea POPESCU

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Key words: industry, organization, policy, competitiveness, personnel.
Abstract. The signal for the enterprise organizational change is the result of interaction with the external environment. Enterprise management, in a reactive or proactive manner, triggers the change using specific instruments adapted to the changing needs and the available resources. Different techniques are being used, some of them being extremely valuable practically tested and optimized for effective implementation. The current knowledge facilitates the learning of these techniques, of the practical aspects related to implementation, and the access to expert consultancy is only limited by cost. However, these organizational models are not applied as such in all enterprises, despite the demonstrated effects in increasing productivity and enhancing economic performance. If the organizational systems change was so far only an internal affair of the companies, government policies are now increasingly oriented towards providing incentives to support these actions.

ANALYSIS AND CONTROL OF CHATTER MARKS OF STRIP STEEL ON HC COLD ROLLING MILL

Chang-gui XIE, , Zhi-Jiang XIE, Ping CHEN

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Key words: HC cold rolling mill; strip steel; chatter marks,rolling speed;natural frequency.
Abstract. According to the chatter marks on strip steel of HC cold rolling mill , by adopting continuous tracking measurement and analysing the collected vibration and simulation analysis on rolling mill,it is found that chatter marks of strip steel surface caused by the Seventh-order natural frequency.Then, for analysing cause of chatter marks on strip steel surface,this article put forward relevant inhibiting chatter marks measures,and the measures are used for production which got a good inhibition effect of chatter marks.

DEVELOPMENT OF OPTIMIZATION SYSTEM FOR IRON MATCHING IN SINTERING

Zongwang ZHANG, Longyuan ZHU

.....63

Key words: sintering, optimization, simplex method, degeneration.
Abstract. The optimization system for iron matching in sintering has a good interactive Windows standard interface with a user-friendly operation, which is facile to determine the solution of the lowest cost for getting a unit of sinter by the use of appropriate optimization algorithms and professional knowledge. It can provide operator for a

solution for iron matching in sintering, and provide a reliable scientific computing tool by which the cost of the sinter can reduce.

EFFICIENT AND COMPREHENSIVE UTILIZATION OF BLAST FURNACE DUST IN METALIZED PELLETIZING PROCESS

Dongping DUAN, Hongliang HAN, Siming CHEN

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Key words: Blast furnace dust, Metalized pelletizing, Volatility behavior, Collect non-ferrous metal.

Abstract. *In this study, for economic and rational use of blast furnace dust resource, fundamental properties of blast furnace dust were investigated firstly. Based on which, the experiments of blast furnace dust adding in metalized pelletizing process, volatility behavior of non-ferrous metal in blast furnace dust and collection of non-ferrous metal in metalized pelletizing dust were studied. The results showed that it can not only effectively use Fe, C in blast furnace dust, but also collect non-ferrous metal such as K, Na, Pb, Zn in the metalized pelletizing process. This method achieved resource regenerated utilization and reflected high economic value of blast furnace dust. The research and practice proved that it was the best way to comprehensively, efficiently use blast furnace dust by combined process of metalized pellets and hydrometallurgical extraction of non-ferrous metals.*

THE ANALYSIS OF SIMILARITIES AND DIFFERENCES IN THE PROCESS OF CARBON STEELS AND AlMgSi ALLOYS HARDENING

Slobodan STOJADINOVIĆ, Jasmina PEKEZ, Nikola BAJIĆ

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Key words: hardening, improving, aging, mechanical properties.

Abstract. *In the paper are given the results of the analysis of the similarities and differences in the process of the hardening of the carbon steels and AlMgSi alloys. On the basis of the analyzed it can be ascertained that: a) there is the similarity of the process at the obtaining of the supersaturated solid solutions and b) there is the principled difference in the solid solutions obtained by hardening as well as their further treatment.*

THE STUDY OF BTP SELF-ADAPTING FORECASTING METHOD

Zongwang ZHANG, Qingyang LI, Fan ZHOU, Xiaojun ZHAO

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Key words: Characteristics of temperature field, BTP (burning through point), Time series, Self-adapting method, Forecasting.

Abstract. *The paper studied the features extraction methods of the sintering exhaust gas temperature field which is in the latter part of sinter machine, analyzed the BTP impact factors and related characteristics of exhaust gas temperature. The BTP forecasting model was established based on the time series, and its self-adapting prediction method was put forward. The results show that this dynamic prediction model can predict the BTP position ahead of 15 minutes, and the hit rate reaches up to 86.94% when the error is between ± 0.2 below.*

FUNCTIONAL MODELING OF WELDING PROCESS USING IDEF0 METHODOLOGY

Dušan JOVANIĆ, Slobodan STOJADINOVIĆ, Alempijje VELJOVIĆ

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Key words: welding, IDEF0 methodology, BPwin CASE tool, Cost effective design.

Abstract. *The introduction of information technology and computers in the design process enables easier, faster and more accurate design of welding technology, as well as higher quality, repeatability and traceability of processes. This paper presents the modeling of welded welding process activities by IDEF0 methodology. Modeling determination welding process activities on a Al alloy (AlMgSi0,7) pallet using IDEF0 methodology (Integration DEFinition), the software implementation of which is the BPwin (Business Process windows) CASE (Computer Aided Software Engineering) tool, allows functional decomposition and design at all levels of the system that consists of workers, machines, materials, computers and information.*

STUDY ON MELTING MOLYBDENUM STEEL BY DIRECT ALLOYING WITH SELF-REDUCTION BRIQUETTE OF MOLYBDENUM OXIDE

Sheng-qiang SONG, Zheng-liang XUE, Wei-xiang WANG, Ping LI, Rui-ning LIU, Gong-liang WANG

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Key words: molybdenum steel; self-reduction briquette; direct alloying; yield of molybdenum.

Abstract. *Based on thermodynamics analyzing of MoO₃ reduced by Si and SiC, the experiments have been done that addition CaO in molybdenum oxide (MoO₃) to inhibit the volatilization of MoO₃, and the direct alloying using self-reduction briquette of MoO₃ reduced by FeSi and SiC individually with the help of medium-frequency induction furnace. The results show that the addition of about 25% CaO in MoO₃-CaO system can effectively inhibit the evaporation of MoO₃. If about 36.36% SiC is added in self-reduction briquette of MoO₃ as reducing agent, the yield of molybdenum is more than 96.5%, and if about 40.82% FeSi is added in self-reduction briquette of MoO₃ as reducing agent, the yield of molybdenum is more than 97%.*

DYNAMIC STRESS STUDY DURING DEEP-DRAWING PROCESS

Adrian BIRLAN

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Key words: ferromagnetic bulk amorphous alloy, kinetic of crystallization process, crystallization process.

Abstract. *This study keeps track of the stress evolution mode, dynamically, under the action of a dynamic simulation model, implemented by using the ABAQUS program. One can evaluate the behavior of rolled steels for the particular OL37 simulation case of a sheet-metal plate that will be subject to simulation during the process of drawing. Still through this study, one can make a dynamic prediction on the stresses that are being developed during the process, by interpreting the graphs obtained for different frames (stress control panels) and can predict both dangerous sections where cracks and ruptures of the material may appear and cold-straining sections obtained upon the deep-drawing process.*

FEM ANALYSIS OF INTERNAL REDUCTION EFFICIENCY OF CONTINUOUS CASTING BLOOM WITH LIQUID CORE

Ke LIU, Jiaquan ZHANG

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Key words: Internal reduction efficiency, Continuous casting bloom, Soft reduction, Coupled FEM model.

Abstract. To clarify the efficiency of internal reduction at the continuous casting bloom when the technology of soft reduction is applied. A thermal-mechanical coupled FEM model was developed to investigate the internal reduction efficiency. Basing on the model developed in this article, the area of the mushy zone, before and after soft reduction, could be calculated. A new calculation method of internal reduction efficiency through the area variation of mushy zone was proposed. The variation of internal reduction efficiency as a function of soft reduction amount, calculated by two different methods, was discussed.

STUDY ON THE FORMATION OF Ti(C,N) BETWEEN BLAST FURNACE HOT METAL AND SLAG BEARING HIGH TiO₂

Guibao QIU, Shiwei MA, Qingyu DENG, Xuwei LV, Hua WANG

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Key words: Blast Furnace Slag Bearing Titania, Thermodynamics, Ti(C,N), FactSage.

Abstract. Due to the formation of high melting point carbonitride in the blast furnace slag, the fluidity characteristics such as viscosity of this kind of slag will change a lot, which causing serious problems on the separation between the hot metal and the slag. Therefore, the critical condition for the formation of Ti(C,N) in blast furnace is vital importance for the ironmaking process. In this study, the formation conditions of Ti(C,N) in blast furnace and the influences of various factors on the Ti(C,N) formation have been investigated with FactSage software calculation and experiment. It is suggested that the mass of Ti(C,N) would reach the maximum at 1480 °C (1753 K), and the product is mainly TiN below 1620 °C (1893 K), while it is mainly TiC above 1620 °C (1893 K). The order of the factors by the importance from strong to weak is: temperature, the content of TiO₂ in slag, dual basicity of slag, the content of MgO and Al₂O₃. The FactSage thermodynamic model calculations are compared with some experimental results.

OPTIMIZATION OF PULSED Nd:YAG LASER SPOT WELDING OF LOW CARBON STEEL BY USING THE TAGUCHI METHOD

M. MASOUMI, S.P.H. MARASHI, M. POURANVARI

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Key words: Laser spot welding, Taguchi analysis, Failure energy.

Abstract. In this investigation laser spot welding was used to join low carbon steel sheets. The relationship between the joint quality and laser spot welding parameters was studied using Taguchi design of experiment method. Taguchi analysis was used to determine the most effective parameters in the investigated range on the quality of laser welded joints. To address this issue, the tensile-shear tests were performed on laser spot welded joints. Joint quality and mechanical behavior are evaluated by energy absorption capability of weld before crack initiation. Optimum process parameters in the studied range were found which would result in the maximum failure energy.

RESEARCH ON SURFACE SLAG INCLUSION IN CONTINUOUS CASTING SLAB

Ping LI, Zhengliang XUE, Xiaoqin LIU, Shengtang PENG, Yue YU, Dongnan ZHAO

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Key words: continuous casting slab; surface slag inclusion; mould slag.

Abstract. The distribution, type, composition and cause of formation of slag inclusion in continuous casting slabs' surface have been researched and discussed through observing metallographic samples from No.4 Steelmaking Plant of WISCO by microscopes. The result shows that: 1) Slag inclusion can be classified into four characteristic types with different formation mechanism; 2) Slag entrapment of mould powder and big-size deoxidation products drop-out from nozzle sediments are the principal source of slag inclusion in continuous casting slabs. Raising the cleanliness of molten steel, alleviating the fluctuation of liquid level in mould or strengthening the anti-fluctuating ability of molten slag layer is helpful to reduce the incidence of slag inclusion in continuous casting slabs.

REGRESSION MODEL OF ORGANIZATIONAL CULTURE AND EMPLOYEES' PERSONALITY DIMENSIONS

Maja CVIJETIĆ, Dejan SAVIČEVIĆ

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Key words: employee personality dimensions, organizational culture, metal industry.

Abstract. This paper presents research directed to identification of relations between dimensions of employees' perception and organizational concept culture in metal industry. The research included the sample of 118 employees of Metalfer Steel Mill and Sirmium Steel companies in Sremska Mitrovica. Big Five Inventory and revised questionnaire for evaluation of organizational culture, Organizational Culture Profile, were applied as measuring instruments. This questionnaire consists of seven factors of organizational culture: Competitiveness, Social Responsibility, Support (Team Work), Innovation, Reward, Effectiveness Orientation and Stability. The results of Cronbach-alfa coefficient show satisfactory reliability of applied instruments ($\alpha = .78$). The relations were assessed by multiple regression analysis. Observed personality dimensions were measured by BFI questionnaire, whereas score at seven factors of organizational culture was used as a criterium. The results of multiple regression analysis set statistically significant positive linear correlation of high intensity between personality dimension variables and set of variables of organizational culture ($R = .476$; $p < .01$), significant positive contribution of independent variables of extraversion ($\beta = .43$; $p < .01$) and conscientiousness ($\beta = .28$; $p < .01$), as well as negative statistically significant influence of neuroticism as personality dimension. Univariate analysis of variance (ANOVA) was applied for each factor of organizational culture in order to get comprehensive answer to the question if personality dimensions can become predictors of expected organizational culture. Testing of the model defined two factor model of personality determined with dimensions of pleasantness and openness, as significant predictor of organizational culture.

OPTIMIZING RISER DESIGN

Florin CHICHERNEA

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Key words: feeder, riser casting, dimensioning methode, optimizing riser design.

Abstract. Solidification process of the casting is accompanied by contraction of components in liquid and solid state. It raises the question as offsets porosity, open and blind Shrink cracks & cavities using the riser. This paper gives an answer to this problem. The size calculation of riser was made using the modules method. Calculations were made using a computer program developed by the author, for a cylindrical riser that feeds 1 to 4 parts casting. Are presented the diagrams which can choose the size of the riser, depending on the size castings Size optimization of the riser is done by adopting the following assumptions: Minimum volume (V_{min}) in the feeder, Equal size ($D \approx h$) to the feeder, Different dimensions ($h = 2D$) of feeder and ($D=2h$).

RESEARCH ON THE CORROSION BEHAVIOUR OF ALUMINUM-BASED METAL MATRIX COMPOSITES REINFORCED WITH GRAPHITE AND SiC

Ana VETEANU

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Key words: electrochemical corrosion, composite material, corrosion rate, graphite, silicon carbide.

Abstract. This article is intended as an overview, which presents the results of studies on the influence of the concentration of silicon carbide and graphite on the behaviour to corrosion of Aluminium Matrix Hybrid Composites (AIMCHs). In order to determine the corrosion behaviour, accelerated electrochemistry studies were conducted using the potentiodynamic method in a corrosive medium (3.5 % NaCl). The polarization curves were plotted for the analyzed materials, and the Tafel parameters and corrosion rate were determined. Corrosion resistance of the composites analyzed depends on the concentration of the silicon carbide and graphite and also because of technology used to process the materials.

FORMATION OF Fe-TiCN COMPOSITE POWDERS FROM ILMENITE CONCENTRATE

Min CHEN, Aitao TANG, Shengmin LIU, Chuanpu LIU, Jian WANG

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Key words: carbothermal reduction; ilmenite; iron; microstructure; titanium carbonitride.

Abstract. In this study, titanium carbonitride composite powders containing iron were prepared via carbothermal reduction of ilmenite. Reduction was investigated in temperature-programmed and isothermal reduction experiments in a tube reactor with continuously flowing nitrogen. The phase transformation, chemical composition, microstructure and morphology of reduced samples were investigated by using X-ray diffraction, chemical nonmetal analysis, energy disperse spectroscopy, and scanning electron microscopy. CO and CO₂ contents in the o₂-gas were measured online using infrared sensors. The results confirm that reduction of ilmenite to metallic iron completed in the solid-solid reaction stage. Iron melted lower than its theoretical temperature due to carburization and further penetrated into titanium carbonitride interstice. There was no reaction occurred between iron and titanium phases in the whole process. Titanium nitride formed at 1000 °C. Formation of cubic phase is beneficial to grain refinement especially can

be observed at 1200 °C when no intermediate titanium oxides existed. Reaction rate in the solid-gas step was faster, which was attributed to involvement of CO in the reduction reactions. Titanium carbonitride powders with fine grain size agglomerated and shrank in the final diffusion stage.

THE STUDY OF DYNAMIC STATE OF DEFORMATION DURING A COLD PLASTIC DEFORMATION PROCESS IN THE CASE OF DEEP-DRAWING

Adrian BIRLAN

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Key words: Stress, ABAQUS, Path, Step, Frame.

Abstract. This study keeps track of the evolution mode of maximum instantaneous deformation under the action of a dynamic simulation model implemented by using the ABAQUS program, evaluating at the same time the behavior of the C 37 rolled steel subjected to the punching process. One can make a prediction, dynamically, on deformations arising during the interpretation of graphs that are obtained for different frames (stress control panels), on the dangerous section where cracks and ruptures of the material may appear and on cold-straining sections obtained upon the deep-drawing process.

MATERIALS BASED ON HARD ALLOYS USED IN THE EXTRACTIVE INDUSTRY

Emilia COMAN (CIOVICĂ)

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Key words: extractive industry, hard alloys, sintering.

Abstract. The complexity of pressure occurring during the extraction process combined with several factors influencing the working characteristics of rock dislocation tools as well as the increasing importance given to the working efficiency renewed the concern for the development of materials. The sintered hard alloys from the WC-Co system are characterized by toughness values, which are direct proportional to the Cobalt content (restricted to 30%) or the grain size (5-6 μm). Thus, the lower Cobalt contents (less than 4%) as well as the finer granulation have a reverse effect on toughness. Based on this evidence, we can observe the great importance of the development of FGMs made from hard sintered alloys. The experimental work focuses on obtaining a type of matrix consisting in two subsequent layers from the WC-Ni and WC-Co system, with high competitive characteristics, for elements used in the Romanian extractive industry.

THEORETICAL AND PRACTICAL ASPECTS REGARDING THE DEVELOPMENT AND CONTROL OF MICROBIAL BIOFILMS ATTACHED TO THE SURFACE OF DENTAL MATERIALS AND DENTAL PROSTHESES IN PARTICULAR

Sonila ZISI, Sergio BORTOLLINI, Ligia MUNTIANU, Kiro PAPA KOCA, Mihai BURLIBAȘA

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Key words: microbial biofilms, dental alloys, acrylic resin, sutures.

Abstract. Microbial biofilms are involved in the etiology of acute or chronic infections, sometimes quite serious, and the identification of their constituent bacterial strains, isolated from the plaque or biofilms attached to the surfaces of dental alloys, acrylic materials, impression materials, denture fasteners has a key role in their formation dynamics related to the physicochemical properties of the material they attach to. In modern times, the discovery of antibiotics has allowed

the treatment of acute or chronic bacterial infections caused by isolated bacterial species, but involves less microbial biofilms, making possible the development of chronic or recurrent infections. This paper attempts to unravel the causes of bacterial biofilm antibiotic resistance and also the opportunities to prevent the infections caused by them.

POSSIBILITIES OF APPLICATION OF MULTICRITERIA DECISION MAKING FOR THE SELECTION OF IRRIGATION SYSTEMS

Slavica PRVULOVIC, Dragisa TOLMAC, Djordje NIKOLIC, Marija MATIC

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Key words: irrigation systems, PROMETHEE/GAIA method, alternatives, criteria

Abstract. *In this paper the multi-criteria analysis of seven technological alternatives for agricultural irrigation was done, with the aid of PROMETHEE/GAIA methodology. Based on five criteria, which are considered important for decision makers in the selection, we made the ranking and selection of most optimal irrigation solution. On the basis of the offered variants of irrigation and the application of PROMETHEE / GAIA methodology that allows the ranking and selection of several alternatives on the basis of several criteria, the decision-maker is able to choose the alternative that satisfy his cost-effective needs, i.e., the alternative that is the most useful and expenses made to a minimum.*

TRAINING AND DEVELOPMENT OF EMPLOYEES THROUGH E-LEARNING

Snežana JOKIĆ, Marjana PARDANJAC, Erika ELEVEN, Savina ĐURIN

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Key words: e-learning, ICT, employee training and development, competitiveness.

Abstract. *Constantly searching for increased efficiency and effectiveness, corporations, as well as small and medium enterprises (SME) look for a way to gain and maintain competitive advantage in the market. The development of intellectual capital, know-what, know-how and know-why and understanding the importance of this knowledge becomes the key to achieving the desired effects. The ability of organizations to educate and train employees while at workplace is utterly valuable. E-learning is one way that enables employees to obtain and renew the knowledge necessary to perform their tasks. This paper focuses on the application of e-learning in organizations. Innovations in information and communication technologies, as well as the current development of e-learning, conditions create new forms of learning, attractive to small and medium-sized organizations for overcoming traditional barriers such as lack of financial resources, time, expertise and facilities. The paper presents the corporation needs to learn. The purpose of this paper is to explore existing and potential role of e-learning in small and medium organizations as a means of developing skills of employees. The results show that respondents have a positive attitude towards the use of e-learning for personal training and development. However, this kind of training in surveyed corporations was not used. It is also notable that ICT is not used frequently enough, and it is necessary to train, motivate and encourage employees to use it.*

RESEARCH OF THE SPECIALTY ORIENTATION OF MECHANICAL ENGINEERS CASE STUDY IN SERBIA

Zoran NESIC, Miroslav RADOJICIC

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Key words: Career decidedness, engineering education.

Abstract. *This paper is a contribution to the study of motives of recently graduated mechanical engineers for choosing their specialty. The research was done in social and economic circumstances of a country in transition - case study in Serbia. Displayed research has included several dimensions and aspects: students who are studying and working or are unemployed, students with different residence, of different genders and different family influences.*

ALTERNATIVE TECHNOLOGIES OF DRYING COMBUSTIBLE WASTE IN ORDER TO EFFICIENTLY CAPITALIZE IT

Jan Cornelius BURLACU, Nicolae CONSTANTIN

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Key words: drying waste, pyrolysis, gasification, cooling ashes.

Abstract. *To operate controlled and optimized thermochemical processes, an important step in the treatment of the broad categories of combustible waste is their preliminary drying; in the case of municipal waste, this leads to a higher quality by increasing P_c , and efficiently using the difference $P_{c_s} - P_{c_i}$. The paper will present some advanced technologies of drying various types of waste, which includes a wide range of technical procedures, and it will present alternative solutions applicable to drying combustible waste and the complex chemothermal treatment - pyrolysis, gasification, cooling ashes.*

THERMODYNAMIC ANALYSIS AND OBSERVATION ON PRECIPITATION OF INCLUSIONS IN RE-253MA HEAT RESISTANCE STEEL

Shu-cai ZHOU

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Key words: rare earths; 253MA Heat Resistance Steel; inclusion; thermodynamic calculation.

Abstract. *The effect of Ce on modifying inclusions of 253MA heat resistance stainless steel was studied by metallographic examination, SEM and electron spectroscopy. Thermodynamic calculation was used to analyze the formation and transformation of RE inclusions in 253MA heat resistance stainless steel. The result shows that Al_2O_3 and MnS can be entirely replaced by Ce_2O_2S and CeS that are spherical.*

GLOBAL INFLUENCE OF CONSTRUCTIVE AND FUNCTIONAL FACTORS ON THE MECHANICAL CHARACTERISTICS OF S235N STEEL

Voicu Ioan SAFTA

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Key words: stress concentration, mechanical characteristics, unalloyed steel, temperature, fracture typology.

Abstract. *The research defines a methodological approach for measuring performances by using information system that enables centralized warehousing and managing of all data relevant from the aspect of measuring performances of qualitative data for inconsistency analysis. The inconsistency analysis is only one type of data analysis within the Quality Management System (QMS). The paper sets out the*

established relationship between the QMS and projected information sub-system for inconsistency management. The information model for managing inconsistencies based on the data warehouse, provides possibilities of analysing inconsistencies from the aspect of multiple dimensions. The analysis is based on multidimensional tables (OLAP cubes) created in the programme MS SQL Server – Analysis Services whereas MS Excel is used for graphic presentation. That ensures quality information for drawing significant conclusions regarding the success of operations or making decisions on particular measures for gradual and continual improvement.

RESEARCH ON EXPERIMENTAL QUALITATIVE CHARACTERISTICS OF FINE- GRAINED IRON ORES

Jan BURLACU, Nicolae CONSTANTIN

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Key words: iron ores, instilling mixed, furnaces, coal dust.

Abstract. The direct use of iron ores with wavy fine-grained and very fine to blast furnaces without prior agglomeration has the effect of a reduction in operating and energy costs and lead to the reduction of pollutant effect by default of the steel industry on the environment. Under the environmental aspect of technology development, the inculcation of furnace dust, which utilizes iron ores and carbine with wavy grain dust, are important to many fine points of view. This would allow for the recycling of ferrous scrap iron and steel (powder absorbents, dry, slams skims lamination etc) directly, by instilling in a furnace without being processed in the process of agglomeration, where their use may lead to problems (volatile releases that adversely affect the operation of electro-filters etc). In the performance of research experiments have been conducted by the laboratory for determination of the physico-chemical properties of small material (iron ores , dolomite, coal dust) currently used in blast furnaces at the plant from Agglomeration-ARCELOR MITTAL Galati and which could be taken into account in the pursuit of new technology of iron mixed with Insufflation.

TRENDS IN COPPER-COLORED GLASSES OBTAINING

Camelia CĂPĂȚÎNĂ, Claudia Maria SIMONESCU, Gheorghe FLOREA

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Key words: ecological, copper, melting, thermal treatment

Abstract. In recent years glass industry was affected by the tendency to avoid use of potentially hazardous or polluting substances. This trend was found especially on the more developed country markets, but also for Romanian glass manufacturers. The paper presents obtaining of some red colored glasses containing copper which replace cadmium-based red glasses because cadmium is considered toxic. These glasses are used in mechanical engineering for automotive signaling. Melting was done in an electric furnace in platinum crucible at a temperature of 1430° C for 110 minutes and 140 minutes and 230 minutes. Thermal treatment for developing of color was achieved at a temperature of 540°C, 560°C and 580°C. The time for developing during the thermal treatment is 130 minutes. Experimental data show the importance of technological parameters on the reproducibility of red colored glasses qualities.

EXPERIMENTAL RESEARCH ON PNEUMATIC CONVEYING REACTION TO IRON ORE FINE-GRAINED

Jan BURLACU, Nicolae CONSTANTIN

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Key words: iron ore, mixed jet, pneumatic transport, skims.

Abstract. Combined blowing in blast furnace iron ore and coal dust, fine-grained, involves determining the behavior of these materials during pneumatic conveying by pipeline and dense state pneumatic setting flow control possibilities of material transported to the values corresponding to this process. For this purpose parameters were determined for the main types of pneumatic transport of iron ore and limestone used in Arcelor Mittal Galati. Besides purpose of iron ore and jet flux has been considered and experimental verification of the possibilities of instilling ilmenite crucible furnace for protection. In the case of TiO₂ required of 10-20 kg / t iron. amount of TiO₂ result of 57-114 kg / h.g.v. [1] [2]. On the other hand in the present experiments was observed and verify the possibilities of jet trimming of the mill in the furnace. Trimming inspiration can be taken into account in the idea of recycling waste in blast furnace iron but that added to enhance the combustion process in the mouths of the wind [5].

MODERN ENTITIES THROUGH COST LEADERSHIP. SPECIFIC ASPECTS OF METALLURGICAL INDUSTRY

Gheorghe V. LEPĂDATU

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Key words: cost control, modern management, entity.

Abstract. The doctrine of western European, especially French, concerning driving through the costs is defined as a technique for analyzing the activity of an enterprise, a data processing method, having mainly aim to understand the different functions of business costs (of production, commercial, administrative, research and development), manufactured products, work performed and services rendered (including the production in progress).

TQM IN HUMAN RESOURCE MANAGEMENT AND THE IMPACT ON ORGANIZATIONAL PERFORMANCE

Claudia Maria OPRESCU

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Key words: organizational excellence, TQM, performance, training, employees empowerment.

Abstract. The overall aim of present paper is to study the role and the tasks of a HR department regarding the implementation of total quality management principles. This paper presents the way in which the principles of Total Quality Management (TQM) are applied in human resource management (HRM) decisions and the their influence on organizational performance, being described several insights intended to help the practitioners studying these issues get a serious knowledge that will have implications both in theory and practice. Here are mentioned several approaches to be avoided. The case study included aims to prove the fact that employees' training and empowerment, as two of the main tasks managed and planned by an HR department, represent a fundamental component regarding the improvement of organizational performance.

SELECTION OF CENTRAL HEATING SYSTEMS WITH THE INCREASE OF THE ENERGY EFFICIENCY

Zivko N. RALIC, Miroslav RADOJICIC, Zoran NESIC, Dragan D. MILANOVIC, Dragan L.J. MILANOVIC

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Key words: Energy consumption, energy efficiency, the method of multi ranking.

Abstract. *This paper presents the multicriterial approach to the selection of central heating systems. It is a result of analysis of the existing residential building and a desire to improve its energy efficiency during the reconstruction. The building was built at the time when no attention was given to thermal protection. It was necessary to reduce energy consumption, determine the influential factors and their contribution to total energy demand. A qualitative substitution of the building elements and additional insulation of the desired thickness and quality were defined. The proposed intervention leads to increased energy efficiency of the building. The aim of this paper is to make the selection of central heating systems based on evaluation and comparison of alternatives. For this purpose, a system of criteria is established by which a comprehensive and objective evaluation of alternative solutions can be made in order to use the method of multi ranking, for the selection of the best solution. A system of criteria is formed that allows the best structuring of the problem of choosing the most favorable project.*

GENERAL NOTIONS ABOUT HUMAN RESOURCES MANAGEMENT

Cristian GHENA

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Key words: human resources, competitive, management, efficiency.

Abstract. *Human Resources or Personnel management represents a set of general and specific activities, aimed to assure, maintain and use efficiently the staff of the economic agents (public utilities, banks, insurance companies etc). Competitive human resource management is essential for the success of any organization. The companies are looking out to find an effective manager of human resources, who must possess a number of qualities: be persistent in pursuing enforcement of decisions, patient and sympathetic to the views of others, to be good negotiator, have a sense of humor. HR function includes all activities aimed at human factors, with the following objectives: conception, design, optimal use, maintenance, human social development.*

CORPORATE MOTIVATIONAL STRATEGIES – INCENTIVES FOR HIGH PROFESSIONAL PERFORMANCE

Claudia Maria OPRESCU

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Key words: motivation; professional performance; job satisfaction; HR strategies; key performance indicators.

Abstract. *The present paper explore the direct relationship between motivational strategies conceived and applied by an HR department and professional performance of the employees, being taken into account also the job satisfaction. To examine this relationship, I started from a survey that I personally conducted within a small advertising agency, where I investigated which were the main motivators for the employees and how satisfied they felt in their current workplace. Then, in collaboration with the HR manager, I proposed several strategies derived from the findings in the survey, in order to enhance motivation and, consequently, the workplace performance. We evaluated the performance based on targets established at the end of the year in which the study was conducted and the results were compared to those of the previous two years. We discovered an increase in performance, which led us to conclude that motivational strategies tailored to employees' needs lead to an enhanced performance in the workplace.*

THE CLUSTERING DATA MINING MODULE AS A PART OF THE E-LEARNING SYSTEM

Eleonora BRTKA, Vladimir BRTKA, Dragica RADOSAV

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Key words: e-Learning, data mining, Course Menagement System, clustering.

Abstract. *The data mining techniques and their applications are widely recognized as powerful tools in various domains. In the domain of education there is a variety of data of various types collected during the process. The main question is: Is it possible to process collected data with the Data Mining System and what are main advantages of data mining and e-learning interaction? In this paper we present an insight into the possible interaction between Course Management System and Data Mining Techniques. The main goal of this work is to investigate some data mining techniques in order to deliver most appropriate learning object to the learner. The proposed application of educational data mining techniques is clustering followed by a case study. We have used free data mining tool so that any user can immediately begin to apply data mining without having to purchase a commercial tool or program a specific personalized tool.*