

# CONTENTS

## Metalurgia International 10/2008

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### MATERIALS SCIENCE RESEARCH AND DEVELOPMENT ..... 5-74

- DIMA ADRIAN, ALINA ADRIANA MINEA*: Reducing oxide layer on AlCu<sub>2</sub>5Mg treated parts through improving heat transfer ..... 5
- ALINA ADRIANA MINEA, DIMA ADRIAN*: CFD Simulation in an oval furnace with variable radiation panels ..... 9
- RODICA STERIE, PANAIT N., MOLDOVAN P.*: Research regarding the microstructure of as-cast 6XXX serie aluminum alloys ..... 15
- BEDŐ TIBOR, SAMOILĂ CORNEL, CRĂCIUNAȘ DOREL*: Experimental research on the behaviour of refractory concretes with silicon carbide aggregate in a controlled atmosphere ..... 20
- MACHEDON PISU TEODOR, CRACIUN SORIN*: Research regarding the effect of manganese/sulphur ratio in the weld metal deposit on slag detachability for austenitic stainless steel electrode ..... 25
- ZICHIL VALENTIN, NEDEFF VALENTIN, SCHNAKOVSKY CAROL, CARMEN SAVIN, ADRIAN JUDELE*: The influence of the temperature upon stress distribution at chuck plate with circular stress concentrator, using finite element method ..... 28
- OLGA MITOȘERIU, SANDA CIREȘICA COCINDĂU, FLORENTINA POTECAȘU, LUCICA ORAC*: Composite coatings obtained through electrodeposition of Cadmium and short ceramic fibers ..... 35
- BRANDUSA GHIBAN, IACOBESCU REMUS ION, GHIBAN NICOLAE*: Structural behaviour of an osseosynthesis slip screw band for fracture recovery ..... 41
- DOINA RĂDUCANU, DAN I., CINCA ION, IVANESCU S., COJOCARU V. DĂNUȚ, RUSU-TRISCA C., ANA NOCIVIN*: A new AuPdAgTi-type high noble class alloy – synthesis and mechanical characteristics ..... 46

*VERMEȘAN HORAȚIU*: Some theoretical considerations regarding transformation and deformation mechanisms in austenitic stainless steels ..... 50

*ELENA POP, HOTEA VASILE, BĂNCILĂ NICOLAE, JUHASZ IOZSEF, BUȚU MIHAL, POP ROMULUS*: The influence of the iron, silver and oxygen impurities in the copper cathodes upon the electrical conductivity of the copper wire ..... 55

*PĂDUREAN IOAN, TRUȘCULESCU MARIN, ARPAD FAY, NEDELICU DORIAN, ELVIRA PĂDUREAN*: About cavitation erosion resistance of the martensitic stainless steel from zones reconditioned by welding ..... 60

*PUȚAN VASILE, LUCIA VÎLCEANU, ANA JOSAN*: Numerical simulating of thermal stratification phenomena in steel ladles ..... 67

### ECONOMIC AND FINANCIAL MANAGEMENT. ACCOUNTANCY IN METALLURGY ..... 75-90

*LEPĂDATU V. GHEORGHE, POPESCU H. GHEORGHE*: Transparency in financial statements ..... 75

*CĂPUȘNEANU SORINEL, LEPA DATU V. GHEORGHE*: The ABC-method (Activity-Based Costing) and the transversal organization of enterprises in the steel industry of Romania ..... 78

*DANIELA PENU*: Indirect taxes (value added tax and excises) in Romania ..... 81

*ROXANA IONESCU*: Demand tendencies on the Romanian insurance market ..... 84

*DANIELA ȘERBAN, MITRUȚ CONSTANTIN, SILVIA-ELENA CRISTACHE, DOBRIN COSMIN*: Statistical evaluation methods for high quality project management in metallurgic industry ..... 87

FOSECO Turbostop system – reference list..... I-II  
New books, published by *Romanian Metallurgical Foundation*.....III-IV

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# ABSTRACT

## Metalurgia International 10/2008

MATERIALS SCIENCE RESEARCH AND DEVELOPMENT ..... 5-74

**D.C.: 669.017.13**

**Key words:** heat transfer, aluminum alloys, oxide layer, furnaces, radiation

**DIMA ADRIAN, ALINA ADRIANA MINEA: Reducing oxide layer on AlCu<sub>2</sub>,5Mg treated parts through improving heat transfer**

Metalurgia International (vol. XIII), no.10, 2008, p. 5

*The main processes that take place in the thermal treatment furnaces with normal atmosphere are those of heating, dilatation and oxidation. As for the aluminum and its alloys, the heating is performed at a very high speed in all the mass of the parts subjected to the treatment due to the high thermal conductivity. As for the aluminum and some of its alloys, one of them being the AlCu<sub>2</sub>,5Mg alloy on which the experiments have been conducted, the oxidation process starts with a maximum speed and carries on according to a first degree reaction. From the experimental researches resulted that the oxidation process kinetics of aluminum depends of a few factors, the most important being temperature, alloy activity, chemical supersaturation, difference between the oxides dissociation tension and the oxygen partial pressure in the gaseous phase. From the analysis of the obtained data there can be noticed the existence of a correlation between the metallurgical phenomena and processes when heating and the constructive and functional improvements brought by the chamber type electric furnaces.*

*Based on the data resulted by following the experiments, we have obtained in this case the regression equations that describe the influence of the radiant panels' position over the oxide quantity that is formed during the heating period.*

*In conclusion, adopting a proper constructive form for the two radiant panels by studying the correlation between the metallurgical phenomena and processes that take place when heating and the constructive and functional improvements brought to the thermal treatment furnaces, leads to remarkable economic effects as well as to assuring the technical conditions imposed to the thermal treatment operations.*

**D.C.: 669.041**

**Key words:** computer fluid dynamics, radiation panels, furnace

**ALINA ADRIANA MINEA, DIMA ADRIAN: CFD Simulation in an oval furnace with variable radiation panels**

Metalurgia International (vol. XIII), no.10, 2008, p. 9

*The present paper aimed to acquire some qualitative aspects regarding the study of air circulation in an oval furnace with variable radiation panels. The CFD simulations, although they conduct to good results from an engineering point of view, have the big disadvantage that, for complex flows, they need great computational resources. The study of the different geometries was done with the help of journal files from Gambit. All the simulations were made using the latest version of Fluent CFD software and are based on the same conditions.*

**D.C.: 669.71**

**Key words:** aluminum alloys, iron-base intermetallics, scanning electron microscopy

**RODICA STERIE, PANAIT N., MOLDOVAN P.: Research regarding the microstructure of as-cast 6XXX serie aluminum alloys**

Metalurgia International (vol. XIII), no.10, 2008, p. 15

*In this paper is presented the study of wrought cast billets of 6060 and 6082 alloys. The behaviour of Fe, Mn and Si was especially investigated, to emphasize AlFe, AlFeMn and AlFeMnSi intermetallic phases, which can cause defects during plastic deformation process. Also, it is found calcium and zirconium appearance, the last having inhibitive effect on grain refining process.*

*The microscopical study was realized by scanning electron microscope (SEM) and energy dispersive X-ray spectroscopy (EDS).*

**D.C.: 666.76**

**Key words:** refractory concretes with silicon carbide aggregate

**BEDÓ TIBOR, SAMOILĂ CORNEL, CRĂCIUNAȘ DOREL:**

**Experimental research on the behaviour of refractory concretes with silicon carbide aggregate in a controlled atmosphere**

Metalurgia International (vol. XIII), no.10, 2008, p. 20

*The dry mixture of concrete (prior to the addition of water) consists of the aggregate and cement (Portland cement in the case of construction concretes or alumina cement in the case of refractory concretes). In the case of refractory concretes the aggregate may consist of an oxide type material: Al<sub>2</sub>O<sub>3</sub>, SiO<sub>2</sub>, chamotte – an alumina silicate, MgO, etc. or of a non-oxide type one – for example SiC (silicon carbide).*

*Refractory concretes with oxide type aggregates and calcium aluminates binder matrix (also of oxide type) are used for the thermal protection of thermo-technological aggregates operating in a standard (neutral) environment. These concretes cannot be used (with good durability related performance) for the thermal protection of technical equipment operating in reducing environments, as the oxides present in both the refractory aggregate and the matrix are reduced, which process is accompanied by the degradation of the initial mechanical and structural properties of the concrete. For this reason it is recommended also for environments of this (reducing) type to use refractory concrete with a non-oxide aggregate (for ex. SiC), and a binder matrix with a small as possible proportion of oxides. One of the ways to diminish the oxide content of the binder matrix is reducing the share of cement used in the preparation of concretes, as cement is the main contributor of oxides (CaO and Al<sub>2</sub>O<sub>3</sub>) to the binder matrix.*

**D.C.:621.731**

**Key words:** the effect of manganese/sulphur

**MACHEDON PISU TEODOR, CRACIUN SORIN: Research regarding the effect of manganese/sulphur ratio in the weld metal deposit on slag detachability for austenitic stainless steel electrode**

Metalurgia International (vol. XIII), no.10, 2008, p. 25

*The slag removal is one of the most important technological properties of welding consumables. During time, many attempts have been repeatedly made to improve the slag removal from a bead surface, but no consistent opinion has been established on the correlation between the detachability and chemical composition or/and physical properties of the slag. In some comprehensive investigations high softening and melting point, high coefficient of thermal expansion, fragility or crystalline lattice parameters of slags are given as one of the main factors improving slag detachability. It should be noted that these physical properties are of secondary importance if the chemical bond is formed between slag and bead surface.*

*This paper shows that this interfacial tension could be decreased by using a strong surfactant as sulphur in coating formulation combined with the changement of the oxidating potential of the slag. Consequently, a remarkable improvement of the slag removal could be achieved. This phenomena was studied for a particular case – stick electrode E 307 – 15 type – but could be extended also for other welding consumables.*

**D.C.: 536.45**

**Key words:** Finite Element Method (F.E.M.), von Mises criterion, circular stress concentrator, theoretical concentration coefficient

**ZICHIL VALENTIN, NEDEFF VALENTIN, SCHNAKOVSKY CAROL, CARMEN SAVIN, ADRIAN JUDELE: The influence of the temperature upon stress distribution at chuck plate with circular stress concentrator, using finite element method**

Metalurgia International (vol. XIII), no.10, 2008, p. 28

*Into the specialized references, for plates with circular stress concentrator, it may be found calculus relations or diagrams for the theoretical concentration coefficient. Based on this coefficient, it is possible to obtain the value of the maximal stress starting from a medium value. All these tables or diagrams are available for the*

# ABSTRACT

## Metalurgia International 10/2008

reference temperature (293,15 K). It is well known that during the exploitation process, the work temperature for some assemblies is higher than the environmental temperature and the initiation and the propagation of a crack appears at the level of the circular stress concentrator, but to another stress values that are expected. The authors propose an estimation of the fracture resistance for chuck plates with circular stress concentrator, which works at higher temperature, based on the internal energy shape modifying.

**D.C.: 669.056.9**

**Key words:** composite coating, cadmium matrix, ceramic fibers, microstructures

**OLGA MITOȘERIU, SANDA CIREȘICA COCINDĂU, FLORENTINA POTECAȘU, LUCICA ORAC: Composite coatings obtained through electrodeposition of Cadmium and short ceramic fibers**  
Metalurgia International (vol. XIII), no.10, 2008, p. 35

While developments in metals have had an impact on engine design, there is a growing trend toward the application of composite materials to lightweight structures. One of the reasons for this is that alloys do not offer substantial weight savings, which is a primary advantage of composites. In the case of the composite materials obtained through the electrodeposition method, others are: to accomplish an adequate structural and characteristics, facility to obtain a regular and adherent surface, low costs, possibility to automate and adjust the technology process, excluding other following mechanical processes. Thus covering composite have better characteristics such as: hardness degree, anti-friction behavior, anticorrosive and wear resistance.

It was shown that the electrodeposition composite was obtained from the sulphate solution and ceramic fibres (from binary system  $Al_2O_3-SiO_2$ ), at environment temperature. The role of including short ceramic fibres in cadmium matrix is to improve the covering stability at the industrial corrosion.

**D.C.: 620.192.4**

**Key words:** band implant for fractures recovery with slip screw.  
**BRANDUSA GHIBAN, IACOBESCU REMUS ION, GHIBAN NICOLAE: Structural behaviour of an osseosynthesis slip screw band for fracture recovery**

Metalurgia International (vol. XIII), no.10, 2008, p. 41

Present paper is fused on researches concerning band implant for fractures recovery with slip screw.

**D.C.: 669.017.14**

**Keywords:** new biocompatible alloy, noble metals, synthesis technology, mechanical characterization  
**DOINA RĂDUCANU, DAN I., CINCA ION, IVANESCU S., COJOCARU V. DĂNUȚ, RUSU-TRISCA C., ANA NOCIVIN: A new AuPdAgTi-type high noble class alloy – synthesis and mechanical characteristics**  
Metalurgia International (vol. XIII), no.10, 2008, p. 46

The point in view of this research work was obtaining and general characterization of a new biocompatible noble metals based alloy for applications in stomatology. Characteristics needed for metal-ceramic applications, noble alloy composition, casting and thermomechanical forming procedures were established. In the end a general characterization referring to structure and mechanical behaviour was done.

**D.C.: 669.15-194.56**

**Key words:** transformation and deformation mechanisms in austenitic stainless steels

**VERMEȘAN HORAȚIU: Some theoretical considerations regarding transformation and deformation mechanisms in austenitic stainless steels**

Metalurgia International (vol. XIII), no.10, 2008, p. 50

Some contributions and details on the austenitic stainless steel deformation's mechanisms and on the austenite transition into martensite are given. According with studies, the deformation of the

austenitic steels occurs through two complex mechanisms: through the normal glide dislocation and planar glide dissociated dislocation. These two mechanisms can coexist together. The predominance of one or the other depends on the epsilon-phase parameters.

**D.C.: 661.931**

**Key words:** electrical conductivity, iron, silver, oxygen, copper cathodes, copper wire

**ELENA POP, HOTEA VASILE, BĂNCILĂ NICOLAE, JUHASZ IOZSEF, BUȚU MIHAI, POP ROMULUS: The influence of the iron, silver and oxygen impurities in the copper cathodes upon the electrical conductivity of the copper wire**

Metalurgia International (vol. XIII), no.10, 2008, p. 55

To determine an equation of the electrical conductivity of the copper wire depending the iron, silver, and oxygen content of the raw material we have considered 27 assays for which we have determined the chemical composition and the electrical conductivity of the wire produced from this raw material. The kinetic model has been verified in the process of copper wire production for the calculation of the electrical conductivity of the copper wire associated with the raw material used in its production.

**D.C.: 620.193.2**

**Key words:** Cavitation, erosion, thermal influenced zone, vibratory device, welding, erosion velocity

**PĂDUREAN IOAN, TRUȘCULESCU MARIN, ARPAD FAY, NEDELUCU DORIAN, ELVIRA PĂDUREAN: About cavitation erosion resistance of the martensitic stainless steel from zones reconditioned by welding**

Metalurgia International (vol. XIII), no.10, 2008, p. 60

Paper presents the researches carried on upon the cavitation erosion of martensitic stainless steel GX4CrNi 13-4 (SR EN 10283/99) [1] used for manufacturing Kaplan runner blades.

The research is focused on the thermal influenced zones subsequently of the welding process performed in the repair work.

**D.C.: 621.746.32**

**Key words:** model, numerical simulation, CFD, steel ladle, fluid flow, heat transfer, stratification

**PUȚAN VASILE, LUCIA VÎLCEANU, ANA JOSAN: Numerical simulating of thermal stratification phenomena in steel ladles**  
Metalurgia International (vol. XIII), no.10, 2008, p. 67

This paper presents a three-dimensional numerical model simulating fluid flow and heat transfer in 105 t steel ladles before and during the casting process. The model was developed by combined implementation of a numerical simulation package, TEMPSIM, and a computational fluid dynamics (CFD), simulation package, ADINA (Automatic Dynamic Incremental Nonlinear Analysis). In this study, TEMPSIM was used to calculate the heat transfer in ladle linings and predict the heat losses from the steel melt to the linings. These data were used as input into ADINA for 3-D CFD modeling of fluid flow and heat transfer. The 3-D CFD model was used to predict the teeming stream temperature during continuous casting, which is useful information for further prediction and control of steel temperature in tundishes. Once we know the variation of the alloy flow temperature into the ladle, we can take technological steps in the sense of increasing, respectively decreasing the temperature inside the tundish in order to range it within the limits required by the continuous casting technology. The results of the simulations have been compared to those given in the reference literature and to those resulting from experiments and the CFD-3D model is valid from the point of view of results obtained.

# ABSTRACT

## Metalurgia International 10/2008

### ECONOMIC AND FINANCIAL MANAGEMENT. ACCOUNTANCY IN METALLURGY ..... 75-90

**Key words:** Financial statements, balance sheet, income statements, cash flow statement, IAS/IFRS

**LEPĂDATU V. GHEORGHE, POPESCU H. GHEORGHE: Transparency in financial statements**

Metalurgia International (vol. XIII), no.10, 2008, p. 75

*The provision of transparent and useful information on market participants and their transaction is essential for an orderly and efficient market, and it is one of the most important preconditions for imposing market discipline. Left to themselves, markets may not generate sufficient levels of disclosure. Market forces would normally balance the marginal benefits and marginal costs of additional information disclosure and the end result may not be what the market participants really need.*

**Key words:** transversal organization, steel industry, principles, steering, performance

**CĂPUȘNEANU SORINEL, LEPĂDATU V. GHEORGHE: The ABC-method (Activity-Based Costing) and the transversal organization of enterprises in the steel industry of Romania**

Metalurgia International (vol. XIII), no.10, 2008, p. 78

*This article deals with the problem of reorganization of the enterprises in the steel industry in Romania, starting from the general principles identified by experts.*

*The orientation of these principles finally leads to the transformation of the vertical organization manner into one of a transversal type, as is that specific for the activity-based costing (ABC).*

**Key words:** value added tax, excise duties, fiscal reform

**DANIELA PENU : Indirect taxes (value added tax and excises) in Romania**

Metalurgia International (vol. XIII), no.10, 2008, p. 81

*The state budget income mainly consists of indirect taxes,*

*namely value added tax and excises. So, my intention is to make an analysis of the two indirect taxes, putting emphasize on the efforts that Romania has made in order to harmonize them with the EU norms and their level impact on economy.*

**Key words:** insurance demand, insurance market values, demand dynamics, insurances density

**ROXANA IONESCU: Demand tendencies on the Romanian insurance market**

Metalurgia International (vol. XIII), no.10, 2008, p. 84

*Market economy, either national or worldwide, implies the existence of two major components: demand and supply. In a society where insurance market has a growing importance, insurance demand impact becomes visible and unquestionable. The clients of the Romanian market become more aware of the insurance necessity.*

**Key words:** project design, effectiveness assessment, before and after evaluation measurements, investment efficiency, financing sources evaluation, greenhouse effects costs

**DANIELA ȘERBAN, MITRUȚ CONSTANTIN, SILVIA-ELENA CRISTACHE, DOBRIN COSMIN: Statistical evaluation methods for high quality project management in metallurgic industry**

Metalurgia International (vol. XIII), no.10, 2008, p. 87

*The paper summarizes the main steps in project design and implementation and in project management process evaluation. Starting from the main functions of metallurgical companies and categories of factors influencing the mechanism of project management functioning in this industry: technical and technological factors, managerial, economic-financial and environmental factors, this paper will present the potential means of evaluation of projects efficiency and competitiveness as well as improving the system of economic efficiency indicators.*

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