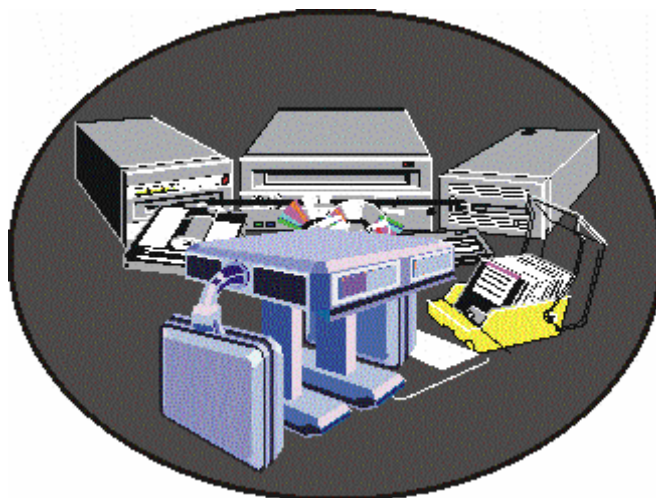


**AL XIII-LEA SIMPOZION NAȚIONAL DE „MECATRONICĂ ȘI  
INGINERIE MECANICĂ, MICROTEHNOLOGII ȘI MATERIALE  
NOI” – MIM-MMN-2015**

**UNIVERSITATEA “VALAHIA” DIN TÂRGOVIȘTE**



**FACULTATEA DE INGINERIA MATERIALELOR  
ȘI MECANICĂ – FIMM**



**UNIVERSITATEA “VALAHIA” DIN  
TÂRGOVIȘTE**



**INCDMTM BUCUREȘTI**



**MINISTERUL EDUCAȚIEI ȘI  
CERCETĂRII ȘTIINȚIFICE**



**ACADEMIA OAMENILOR DE  
ȘTIINȚĂ DIN ROMÂNIA**

**26 Iunie 2015**

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<b>Viviana FILIP</b>	Universitatea Valahia din Târgoviște
<b>Veturia CHIROIU</b>	Academia Romana Bucuresti
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Paula SAVASTON	Universitatea Valahia din Targoviste
Alexis NEGREA	Universitatea Valahia din Targoviste

## PROGRAMUL SIMPOZIONULUI

- Primirea participantilor va avea loc la sediul FACULTĂȚII DE INGINERIA MATERIALELOR SI MECANICA din cadrul Universității Valahia din Targoviste, la adresa: Str. Aleea Sinaia, Nr.13 (Corp A, CAMPUS U.V.T.): vineri 26 IUNIE 2015, incepand cu ora 9<sup>00</sup>
  - Primirea participantilor: 9<sup>00</sup> - 10<sup>00</sup>
  - Deschiderea simpozionului: 10<sup>00</sup> - 10<sup>45</sup>
  - Lucrari pe sectiuni: 11<sup>00</sup> - 13<sup>00</sup>
  - Pauza de cafea: 13<sup>00</sup> - 13<sup>30</sup>
  - Lucrari pe sectiuni: 13<sup>30</sup> - 15<sup>30</sup>
  - Masa festiva: 16<sup>00</sup>

Lucrările pe secțiuni vor avea loc în următoarele locații:

**Sala Anfiteatru Etaj 2 :** Sectiunea Inginerie mecanica, mecatronica, robotica si microrobotica

**Sala Anfiteatru Parter:** Sectiunea Materiale noi, microtehnologii, nanotehnologii

## **SECȚIUNEA**

# **MATERIALE NOI, MICROTEHNOLOGII, NANOTEHNOLOGII**

**CERCETĂRI PRIVIND DEZVOLTAREA UNEI METODE DE PREDICȚIE A UZURII  
CRISTALIZORULUI MAȘINII DE TURNARE CONTINUĂ**

Vasile BRATU, Violeta Florina ANGHELINA, Nicoleta Ileana POPESCU,  
Dan Nicolae UNGUREANU, Elena Valentina STOIAN  
Universitatea VALAHIA din Târgoviște  
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**Abstract.** Lucrarea dezvoltă o metodă de predicție a uzurii peretelui de cupru al cristalizorului de la o mașină de turnare continuă de la S.C. Mechel S.A. Parametrii de proces sunt monitorizați cu ajutorul unui calculator de proces, care prin intermediul unui interfețe realizată în Visual C++ calculează parametrul de uzură. Prin aplicarea metodei de predicție prezentată în lucrare se pot reduce defectele datorate uzurii avansate a cristalizorului, element component al mașinii de turnare continuă.

**MICROSTRUCTURA ALIAJELOR DE ALUMINIU SOLIDIFICATE ÎN CÂMP ELECTRIC ROTITOR**

Mirela POPESCU (DRAGOIU), Bela VARGA  
Universitatea Transilvania din Brasov, Facultatea de Știința și Ingineria Materialelor  
[mireladragoiu1@yahoo.com](mailto:mireladragoiu1@yahoo.com)

**Abstract.** Aceasta lucrare se dorește a fi un studiu al modificării structurii aliajelor de aluminiu solidificate în câmp electric rotitor. Se prezintă atât montajul folosit pentru generarea câmpului electric rotitor cât și cel pentru înregistrarea curbelor de racire. Au fost efectuate mai multe teste pe aliaje de diferite compoziții din sistemele Al-Si, Al-Cu și Al-Zn, la diferite frecvențe și intensități ale câmpului electric. Aprecierea gradului de modificare a structurii s-a realizat atât prin analiza curbelor de racire cât și prin analiza microstructurii la un microscop optic. Analizele structurale au urmărit determinarea cantitativă a proporției fazelor (constituenților) precum și dimensiunile acestora.

**INFLUENCE OF THE PROCESSING CONDITIONS ON STRUCTURE AND MECHANICAL  
PROPERTIES OF EUTECTOID Zn-Al ALLOY**

Mirela AGAPIE, Béla VARGA  
Universitatea Transilvania din Brasov  
[agapiemirela@yahoo.co.uk](mailto:agapiemirela@yahoo.co.uk)

**Abstract.** In the present paper an analyses concerning on the constituent properties in the eutectoid Zn-Al based alloys structure obtained by gravitational casting in various moulds and quenching from the two-phase area has been presented. Further presented are the results of microhardness and tribological analyses. Microhardness and tribological tests were performed using a FM-700 AHOTEC machine and a CSM Instruments tribometer. The obtained results were processed statistically. Are presented the functions of frequency distributions for properties analyzed.

**THE INFLUENCE OF SALINITY TREATMENT ON THERMOMECHANICAL PROPERTIES OF  
SUSTAINABLE JUTE TISSUE/NESTRAPOL 455-60 COMPOSITE**

Radu Francisc COTERLICI, Horatiu TEODORESCU-DRAGHICESCU, Virgil GEAMAN  
Universitatea Transilvania din Brasov  
[coterliciradufrancisc@yahoo.com](mailto:coterliciradufrancisc@yahoo.com)

**Abstract.** Unsaturated polyester resin and jute tissue are combined to obtaining a sustainable composite. In the present research paper, some aspects about the thermomechanical properties after immersion in aqueous solution with 5 % NaCl for 3 months at room temperature are presented. Thermo-gravimetric analysis (TGA) and three point bending test were used to study the thermal decomposition behavior and to determinate some aspects concerning the characteristics of this composite.

### MATERIAL RECOVERY GLASS IN COMPOSITES

Drd.Cristina- Ana Maria GEORGESCU<sup>1</sup>, Prof.dr.ing. Nicolae ANGELESCU<sup>2</sup>,  
Dr.ing. Carol LEHR – BLAZIU<sup>3</sup>, Dr.ing. Ioan ROPOTA<sup>4</sup>

<sup>1,2</sup> Valahia University Târgoviste; <sup>3</sup> National Research & Development Institute for Industrial Ecology<sup>4</sup>; Plastic Art  
College “Dimitrie PACIUREA”, Bucharest  
[cristinageorgescu42@gmail.com](mailto:cristinageorgescu42@gmail.com)

**Abstract.** In current conditions, when glass production of the Eastern Europe is decreased ,and the imports of glass packaging are continuously increasing, there is a surplus of packaging glass waste . Broken glass can be used as a packaging material in glass factories addition, the pieces should correspond to the quality condition, such as moisture content, colour, content of impurities. To reduce the amount of waste glass in urban environments, solutions for the collection and recovery must be found. The waste collected in the form of pieces are washed in basins with a jet of water, dried and milled to a size of 1-3 mm. For the experimental part it has been used soda lime silicate glass with different sizes (less than 1 mm, between 1-1,5mm and 1,5-3 mm) as a substitute for sand in mortar and concrete reinforcement material resins thermoplastic and thermosetting composites to obtain polimerics composites the resistance value to bending: Mortar  $R_i = 2-4 \text{ N/mm}^2$  , concrete  $R_i = 10 - 15 \text{ N/mm}^2$ , polymer composites  $R = 19 - 22 \text{ N/mm}^2$  and value mortar compressive strength  $R_c = 9-10 \text{ N/mm}^2$ , concrete  $R_c = 40-50 \text{ N/mm}^2$ , polymer composites  $R_c = 80-120 \text{ N/mm}^2$  gives SEM images combined with ground glass sand substitute the role of composites. They have obtained comparable results between building elements of concrete and mortars modified and classic materials. Polymer composites obtained find with remarkable results find use in the construction of streets, alleys, parks, warehouses, high traffic areas, etc.

### RECOVERY OF ORGANIC WASTE COMPOSITES

Drd. Cristina- Ana Maria GEORGESCU<sup>1</sup>, Prof.dr.ing. Nicolae ANGELESCU<sup>2</sup>,  
Dr.ing.L Carol LEHR – BLAZIU<sup>3</sup>, Dr.ing. Ioan ROPOTA<sup>4</sup>

<sup>1,2</sup> Valahia University Târgoviste; <sup>3</sup> National Research & Development Institute for Industrial Ecology<sup>4</sup>; Plastic Art  
College “Dimitrie PACIUREA”, Bucharest  
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**Abstract.** The level of economic and cultural development of geographic area and particular of a city is given and when the government succeeds in resolving the waste problem. The municipal waste are produced worldwide in a huge amount about 18 mln tons / day. Of this quantity ,8 wt% represents plastic waste and 4% wood waste. Often these wastes end up in landfills, and it lose the important material and energy resources. A "bottle"of PET - polyethylene terephthalate - naturally degrades in periods of decades up to 1000 years depending on environmental conditions. For to obtain composites with organic waste samples were made different types of composite materials with polymer matrix such as epoxy resin, polyester resin and the formaldehyde resin and as the reinforcing agent, it was used a variety of organic waste (pellets of polypropylene, polystyrene waste , waste wood, waste flakes PET). Waste plastic and composite wood can be processed into products with various applications, in the construction of streets, alleys and parks, ornamental elements, of absorbent elements or noise attenuators.

### STUDIUL BIOACTIVITĂȚII ȘI AL ACTIVITĂȚII ANTIMICROBIENE ÎNCAZUL UNOR STICLE DIN SISTEMUL TERNAR $\text{SiO}_2\text{-CaO-P}_2\text{O}_5$

Daniela AVRAM<sup>1</sup> , Dan Nicolae UNGUREANU<sup>2</sup>, Nicolae ANGELESCU<sup>2</sup>, Anca GHEBOIANU<sup>3</sup> , Iulian BANCUTA<sup>3</sup>, Magda Gabriela BRATU<sup>1</sup>

<sup>1</sup> Faculty of Environmental Engineering and Food Science, Valahia University Targoviste,

<sup>2</sup> Valahia University Targoviste, Faculty of Materials and Mechanical Engineering / Doctoral School, Valahia University Targoviste; <sup>3</sup> Multidisciplinary Research Institute for Science and Technologies, Valahia University Targoviste

[avramdana75@yahoo.com](mailto:avramdana75@yahoo.com)

**Abstract.** În aceasta lucrare este prezentat studiul bioactivității în cazul a doua compoziții de sticle silico-calco-fosfatice prin intermediul analizei de difracție cu raze X. Sticlele au fost sintetizate prin metoda sol-gel. Compoziția sticlelor a fost confirmată prin analiza WD-XRF. În scopul determinării proprietăților bioactive au fost realizate analize la un interval de 3, 7, 14 și 21 de zile de la imersarea probelor de sticlă în lichid uman simulat. A fost urmărit gradul de formare al apatitelor la suprafața respectivelor sticle. În urma imersării se constată că sticlele au capacitatea de a genera nuclearea cristalelor de apatită la suprafața acestora, prin urmare se confirmă proprietatea lor bioactivă. În vederea determinării activității antimicrobiene a fost analizată o probă de sticlă din același sistem ternar, dopată cu argint. Cercetarea a presupus testarea proprietăților antiseptice ale sticlei asupra a două culturi de referință de bacterii dintre cele

maifrecvent întâlnite în infecțiile nosocomiale (Staphylococcus aureus și Escherichia coli). S-a constatat că activitatea bacteriostatică a sticlei crește direct proporțional cu concentrația argintului din compoziția acesteia. La anumite concentrații ale ionilor de argint sticla are chiar proprietăți bactericide, pentru ambele tulpini de microorganisme.

### **COMPARAREA COEFICIENTULUI DE ABSORBȚIE ACUSTICĂ PENTRU PLACI DIN DESEURI TEXTILE RECICLATE ȘI ALTE PLACI RECUNOSCUTE CA FONOAȘORBANTE**

Iuliana IASNICU (STAMATE)<sup>1</sup>, Gheorghita TOMESCU<sup>2</sup>, Ovidiu VASILE<sup>3</sup>, Radu IATAN<sup>4</sup>

<sup>1</sup> Colegiul Tehnic Gheorghe Asachi, București; <sup>2</sup> SC UPET SA Târgoviște; <sup>3</sup> Dept. Mecanica, Universitatea Politehnică București; <sup>4</sup> Dept. Echipamente de Proces, Universitatea Politehnică București  
[yulyanastamate@yahoo.com](mailto:yulyanastamate@yahoo.com)

**Abstract.** Starting this study is the textile industry, the largest producer of waste [1, 2], materials returned to a specific manufacturing process turns into textile plates used in making laminated composites [3, 4, 5]. We are studying these textile plates in terms of sound-absorbing properties. Determinations were made on the seven types of materials, one of which was chosen for this study were the following:

- Cork board material thickness of 10 mm - P 1 (fig. 1);
- Plate of expanded polyethylene with closed cell spatial structure, laminated on one side with an aluminum foil thickness of 9 μm total thickness of the material 10 mm - P 3 (Fig. 1b);
- Plate of fabric made from recovered fiber wool short, thick material 10 mm - P 6 (Fig. 1 c);
- Plate of fabric made from short fiber recovered, containing 85% PNA, plus 15% fiber PA or PE, or the first use recovered fiber; the thickness of the material 10 mm - P 7 (Fig. 1d).

By analyzing the absorption coefficient values shows that the material have soundproofing characteristics. There is a directly proportional increase in the value of the coefficient of absorption depending on frequency for all samples. About these plates, two plates acknowledged as soundproofing and two textile waste, it is concluded that all can use in soundproofing, reaching absorption class B to cork board, class C absorber plate made from fabric short synthetic fiber recovered, class D absorption plate made from short fiber fabric, wool, recovered and expanded polyethylene plate. Using these plates can be as such as are or possibly by integrating a layered composite which hold other components with absorbing properties. We study these characteristics in order to use these plates to encapsulation industrial noise sources, namely construction or industry.

### **STUDIUL CORELAȚIILOR PROPRIETĂȚILOR MAGNETICE ALE BENZILOR LAMINATE LA RECE DIN OTEL SILICIOS CU GRAUNȚI NEORIENTAȚI**

Elena Valentina STOIAN  
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**Abstract.** Lucrarea prezintă studiul proprietăților magnetice ale benzilor laminate la rece din oțel silicios cu graunți neorientați. Sunt prezentate corelațiile între caracteristicile benzilor din oțel silicios cu graunți neorientați, realizate cu ajutorul metodei celor mai mici pătrate, precum și cu ajutorul ecuațiilor de regresie. Lotul experimental studiat a fost reprezentat din benzi silicioase cu graunți neorientați cu grosimea de 0.50 mm și un conținut de carbon cuprins între [0.028 to 0.032]% C. Au fost determinate pierderile magnetice înainte și după îmbatrânire, realizându-se o modelare matematică în ceea ce privește relația dintre pierderile magnetice și conținutul de carbon al benzilor electrotehnice analizate. După determinarea pierderilor magnetice, s-au obținut ecuații de regresie între magnetice specifice la 1,0T respectiv 1.5T înainte și după îmbatrânire. Pentru benzile laminate de 0.5 mm, s-au obținut coeficienți de corelație foarte buni. Totodată au fost obținuți coeficienți de corelație semnificativi și pentru valorile inducției magnetice înainte și după îmbatrânire.

### **STRUCTURA SILUMURILOR EUTECTICE PROCESATE DIN DESEURI**

Mirela DRAGOIU, Prof. Dr. Ing. Bela VARGA  
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**Abstract.** Lucrarea se dorește a fi un studiu privind structura unui aliaj de aluminiu Al-Si de compoziție eutectică, elaborat din deseuri și turnat în forme ce asigură viteze diferite de solidificare. Pentru analizele structurale s-au prelevat probe din aliajul turnat: sub forma de lingou, în amestec de formare; în cochila și sub presiune. Deși aliajul este de compoziție eutectică, structurile obținute prezintă și morfologie hipoeutectică atât datorită condițiilor diferite de răcire cât

și datorită compoziției lor complexe. În același timp, metoda de turnare influențează în mod semnificativ atât granulatia fazelor principale cât și dimensiunile și modul de repartizare a compusilor intermetalici ce apar datorită compoziției complexe a aliajelor elaborate din deseuri.

### **RESEARCH ON CHROME PLATING OF THE STEEL BARS**

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**Abstract.** The main objective of this work was to achieve for steel bars according to EN 10083 C45E, a uniform thickness of the layer of chromium deposited on them after hard chrome plating process. Chrome plating was occurred by electrochemical and chromium layer deposited. This deposited on the steel bars, must ensure increased corrosion resistance, low friction coefficient, high hardness and high wear resistance. Also following treatment hardening (HI – hardening by induction using medium frequency, induction currents 3400-10.000Hz at a temperature 950 0C) bars, were determined HV 01 hardness, HRC hardened layer depending on its depth. They are shown in graphs of correlations between hardened layer and the depth of the measurement its. On the surface induction hardened material has high hardness, as we get it drops layer.

### **STUDY ABOUT COIL SET OF STAINLESS STEEL STRIPS**

Georgian Mihail NICOLESCU<sup>1</sup>, Ionut Lucian PRICEPUTU<sup>2</sup>, Zorica BACINSCHI<sup>1</sup>  
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**Abstract.** This paper refers to coil set defect of very thin stainless steel strips. There are a lot of shape defects, simple or complex. The study and researches are very useful in clarifying the notion, finding the causes and some proposals in order to avoid and correction of the defect. Generally, the waviness of the strips causes a lot of problems for final products which are obtained by stamping and drawing. Difficulties are encountered both in the guiding phase and the cold plastic deformation itself. The precision requirements for semi-finished or finished products have exponentially increased, so the shape defects including coil set became an important research objective.

### **GAMMA RADIATION ACTION ON POLYMERS FOR MEDICAL APPLICATIONS**

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**Abstract.** This paper presents the results of research conducted in the IFA-IFIN Magurele, to the action of gamma rays on the behavior of polymers, polypropylene predilection, which is a polymer used in the preparation of various medical devices such as single use syringes. Were performed initial characterization and characterization after exposure to different doses of gamma radiation of test specimens obtained from each type of plastic material taken in the study, point of view of some physical and mechanical properties and determining effectiveness of sterilization with gamma radiation. The research results were intended project to implement the irradiation technology center IRASM Magurele, Romania, whose activity has started in 2000.

### **ESTIMATED FERRITE CONTENT IN 10TNC180 AUSTENITIC STAINLESS STEEL**

Florina Violeta ANGHELINA, Vasile BRATU, Elena Valentina STOIAN, Ileana Nicoleta POPESCU, Dan Nicolae  
UNGUREANU  
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**Abstract.** Method for estimation of ferrite content presented in this paper is based on comparing the integrated intensity of the selected (hkl) reflections for ferrite and austenite to. The elements are determined after analysis by X-ray diffraction of some austenitic stainless steel samples, 10TNC180 mark.



**STUDY OF MECHANICAL PROPERTIES AFTER AGING IN 5% NaCl AQUEOUS SOLUTION OF  
NATURAL FIBER / UNSATURATED POLYESTER RESIN COMPOSITE**

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[coterliciradufrancisc@yahoo.com](mailto:coterliciradufrancisc@yahoo.com)

**Abstract.** In the present research paper, some aspects about the mechanical properties after immersion in with 5 % NaCl aqueous solution for 3 months at room temperature of cotton tissue and unsaturated polyester resin composites. Three point bending test were performed for some aspects concerning the characteristics of the untreated and treated composites.

**ASPECTS REGARDING THE QUALITY OF SURFACES OBTAINED BY USING THE SELECTIVE  
LASER SINTERING TECHNOLOGY**

Veronica DESPA<sup>1</sup>; Gheorghe GHEORGHE<sup>1,2</sup>; Liliana-Laura BADITA<sup>2</sup>

<sup>1</sup> Valahia University Targoviste; <sup>2</sup> INCDMTM - National Institute of Research and Development for Mechatronics and Measurement Technique - Bucharest  
[dumiver@yahoo.com](mailto:dumiver@yahoo.com)

**Abstract.** Selective Laser Sintering (SLS) is a rapid prototyping technology useful to provide pieces, assemblies and subassemblies with any geometric complexity, unachievable by other processing methods. The present paper intends to present some aspects regarding the quality of surfaces obtained by this technology. Using methods and techniques of investigation focused on analysis by atomic force microscopy (AFM), the study of two pieces structure made by SLS was realized. These tests have allowed obtaining some qualitative data on porosity as well as some microstructural information of the analyzed areas.

**SUSTAINABLE GROWTH AREAS WITH MICRO AND NONOMETER COATED THROUGH  
MECHATRONIC INTELLIGENT METHODES BY APPLYING HIGH-TECH TECHNOLOGIES**

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**Abstract.** The materials with micro and nano scale structures covered through mechatronic intelligent methods have their destination also in biomedical applications like implants (dental prostheses, orthopaedic, etc.) and micro sensors. It exists an entire high-tech industry for material deposition, micro and nanostructured, following the general trend of miniaturization of products with increasing of the reliability. Making micro sensors for biomedical applications is to achieve high-tech timing, because the world goes fierce competition for acquiring the priority in the field. The techniques for manufacturing of the products with biomedical applications are involving thin layers deposition techniques, anisotropic etching, LIGA techniques, etc. The equipment and methods used in the characterization of the surface offers the opportunity to make an topographically map of the thin layers, to verify the physical and mechanical characteristics of the layers (micro hardness, electrical characteristics, thermal, magnetic, adhesion, etc.) and structurally characterize thin films deposited

**OBTAINING AND CHARACTERIZATION OF IRON BASED COMPOSITES**

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**Abstract** We obtained by powder metallurgy (P/M) route the sintered iron based composites with non-polluting compositions, with stable and high friction coefficient and high durability/life in service. The structure of obtained composites were analysed by ESEM, EDS elemental analysis and compo-images of iron based composites. Due to the combined influences of powder mixtures components, it is not possible to determine precisely the influence of each component on the basic structure. The chosen composition and proportion of these components ensured good physical and mechanical characteristics.

### ADVANCED MATERIALS WITH STABLE CRYSTALLINE STRUCTURE

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**Abstract.** In recent years, metallic phthalocyanines have received a special attention mainly because they are the starting point in obtaining functionalized materials that are important for many scientific areas such as gas detection sensors, solar cells with dyes, devices for nonlinear optics, pigments with excellent tinctorial properties or fotosensitizers for photodynamic therapy. Some of the metallic phthalocyanines are characterized by the polymorphism phenomena, their crystalline forms presenting different applied characteristics that are sometimes not suited for the desired applications. Copper phthalocyanine is included among these ftalocyanines, characterized by 5 crystalline forms ( $\alpha, \beta, \gamma, \delta, \epsilon$ ) with  $\alpha$  and  $\beta$  forms showing interest in paint and varnish industry.

This paper presents results obtained from the experimental studies of the synthesis and physical-chemical characterization of  $\alpha$ -stable crystalline form for copper phthalocyanine, a pigmentary material obtained by means of embedding chloromethylated copper phthalocyanine in raw phthalocyanine,  $\alpha$ -unstable form. The resulted materials were characterized by IR and UV-VIS spectrometry, X-ray diffraction, thermogravimetry and solvents resistance.

### TEMPERATURE EFFECT ON IRON OXIDES PHASES INTO “CORE-SHELL”NANOCOMPOSITES

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**Abstract.** Nanocomposites of iron oxide–polypyrrole were prepared by simultaneous gelation and polymerization process with varying amounts of pyrrole. Transmission electron microscopy(TEM) was performed using JEM 2000 EX TEM. Thermal studies on these nanocomposites were carried out using DSC Perkin Elmer-10 in the temperature range 25–500 °C and in presence of constant nitrogen pressure. The heating rate was 100C/min. The TG-DTA studies were performed using Dupont 951 model and the FTIR studies were carried out with the help of Nicolet 510 P spectrophotometer. Distinct thermal transitions have been observed on iron oxide–polypyrrole nanocomposites. The transition behavior for various iron oxide–polypyrrole compositions was investigated with the help of differential scanning calorimetry. It has been observed that the samples show a magnetic to nonmagnetic transition at 410 °C. The presence of exothermic peak at 410 °C is a strong indication of magnetic transition corresponding to  $\gamma$ -Fe<sub>2</sub>O<sub>3</sub> phase of iron oxide to a nonmagnetic  $\alpha$ -Fe<sub>2</sub>O<sub>3</sub> phase in these nanocomposites. This transition was not observed in nanocomposites with lower concentrations of pyrrole. A shift transition temperature to lower values was observed with increase in the annealing temperatures. The increase in annealing temperature helped in increasing the conjugation length of polypyrrole in the nanocomposite

### CERCETARI PRIVIND STAREA SUPRAFETEI PLACII BIPOLARE PEM DIN MATERIAL COMPOZIT BACHELIT – GRAFIT

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**Abstract.** Lucrarea are ca scop caracterizarea suprafetei materialului compozit bachelit – grafit din punct de vedere morfologic si structural cu ajutorul microscopiei electronice SEM si difractiei de raze X. În urma investigatiilor a rezultat ca distributia particulelor de grafit din materialul compozit este uniforma si ordonata, proprietate importanta în conductivitatea electrica superficiala a materialului.

**ANALYSIS OF THE TOPOGRAPHY AND ROUGHNESS OF MICROPROCESSED SOLAR CELLS  
COMPARED TO THE TOPOGRAPHY AND ROUGHNESS OF UNPROCESSED SOLAR CELLS**

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**Abstract.** Photovoltaic conversion systems are one of the most interesting technical solutions to the energy supply problem. The purpose of the research performed for this paper is to develop an experimental model of solar cell with an improved efficiency of solar energy conversion using surface micro processing and antireflection coating deposition techniques in order to enhance the optical absorption properties of the material. Comparative analyses have been performed on micro processed and unprocessed solar cells, using optical microscopy techniques; the electrical conversion performances of the cells have been tested and the results have been interpreted.

**EXPERIMENTAL RESEARCH ON THE REFINING SYSTEM LF-VD STEELS**

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**Abstract.** The paper presents the main features of the system LF-VD used in experimental research, the results of trials conducted in the facility LF-VD with established technology and the results obtained after treatment of steel in a vacuum, given mainly gas content and harmful elements which are small, compared to only steel making electric arc furnace.

**EXPERIMENTAL RESEARCH ON DEVELOPING AND REFINING STEELS IN EAF**

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**Abstract.** The paper presents the main characteristics of the EAF used to experimental research, the results of trials conducted in CEA established technology, having regard primarily to decrease gas content and harmful elements.

**RESEARCH ON OBTAINING SPECIAL PURPOSE STEELS AND SPECIAL PROPERTIES**

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**Abstract.** This paper presents results of research on replacement in rapid tool steels of expensive alloying elements with others cheaper, being the main asset of the research presented in this paper. Economic alloying resulted in obtaining steels with W-Mo base alloy or Mo which may be alloyed with Si and highlighted deliver cutting tools with properties in exploitation close to those of known high speed steel.

**MODELS USED REFINING PROCESS MADE OF STEEL TREATED CLAY AND INSERT GAS**

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**Abstract:** This paper presents issues related to the use in steel refining of specific computational models used in synthetic slag process. Thus, specific sizes have different views and different parameters that determine the effectiveness of secondary metallurgy operations, based on factors predictable flow patterns.

## **SECȚIUNEA**

# **INGINERIE MECANICĂ, MECATRONICĂ, ROBOTICĂ ȘI MICROROBOTICĂ**

### **DIMENSIONING ACTUATORS FOR TRUNNION BALL VALVES**

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**Abstract.** Ball valves are used in various industrial equipment, often in severe regime determined by the properties of the working fluid, pressure in the system and / or operating temperature. Featured smaller hydrodynamic resistance and reduced installation space has the advantage of ensuring a sealing component fluids containing gas and, at the same time, ensures sealing in accidental fires. This article examines the stages of actuator trunnion ball valves sizing , size optimization of seats for ensuring the normal simultaneously seal and fire safety functions , plus eventual discharge into line overpressure valve body (important requirement for environmental protection).

### **FINITE ELEMENT ANALYSIS OF BALL VALVES**

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**Abstract.** Finite Element Analysis is accepted in international standardization, as an alternative method of designing pressure vessels (including valves). Valves are frequently subject to repeated mechanical and thermal load. When the maximum load varies between yield load and plastic collapse load the valves body can deforms plastically. What happens depends on the load and geometry. Is necessary to integrated FEA into a design cycle as part to improvements to safety, quality, reliability and cost effectiveness. This article give methodology of ball valve design by using CAD design and FEA verification at maximum loading pressure. The main purpose is structural analysis to be carried out of determining stress and strains developed in the valve body and other elements.

### **MODERN MECHATRONICS EQUIPMENTS FOR THE INTELLIGENT CALIBRATION OF TACTILE SENSORS USED IN HUMAN WALKING ANALYSIS AND THE COMPUTERIZED PROCESSING OF MULTI VARIABLES**

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**Abstract.** This article shows the main design considerations order to find the best solution for the experimental model of the system for the human walking analysis, measurement and the computerized processing of two variables of a technological process - as well a ground reaction force calibration sensors.

### **NEW ASPECTS ON KOENIG’S THEOREM FOR ANGULAR MOMENTUM**

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**Abstract.** The paper presents the study of angular momentum variation in relation to point of reduction. Thus, it is demonstrated the formula with which one can determine the angular momentum of the rigid body relatively to any point of its if we know the angular momentum of the rigid body relatively to a random point. Based on this formula are deduced Koenig’s theorem for angular momentum and the mathematical expression of Steiner’s theorem.

### **NEW ASPECTS ON KOENIG’S THEOREM FOR KINETIC ENERGY**

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**Abstract.** The paper presents a method of deduction of the kinetic energy computing relationship for the rigid solid in general motion and from this is deduced the mathematical relation of the Koenig’s theorem for kinetic energy. Further on, is presented a demonstration of the Steiner’s theorem which is based on the mathematical expression of Koenig’s theorem.

**PRESENT THEORETICAL ASPECTS, TESTS AND PROPOSALS FOR FLOW CALCULATION ON  
ROLLER SLANT BELT CONVEYORS**

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**Abstract.** The paper contains a theoretical analysis and a series of experiments on the factors that the performance of the slantbelt conveyors depend on, as well as experimentally verified suggestions for improving the performance of these machines.

**SOLVING PROBLEMS FOR IMPROVING THE PRODUCTION FLUX USING QUALITY  
MANAGEMENT SYSTEM (1)**

Ph. D. Lecturer Ancuta BALTEANU, Ph. D. Lecturer Monica BÂLDEA, Prof. PhD. Alexandru BOROIU, Ph. D.  
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**Abstract.** ORQC is a quality management system which aims customer satisfaction through immediate action. The subject proposed will be developed over two parts. The first written work – respectively this - will presented initial situation within a production flow that is sensed in the appearance of defects and nonconformities in obtain the final products. In this second paper we will show the use of this method in a situation that requires elimination of a technological problem appeared in the production flux and in relieving its positive consequence.

**SOLVING PROBLEMS FOR IMPROVING THE PRODUCTION FLUX USING QUALITY  
MANAGEMENT SYSTEM (2)**

Ph. D. Lecturer Monica BÂLDEA, Ph. D. Lecturer Ancuta BALTEANU, Ph. D. Lecturer Grigore JAN, Prof. PhD.  
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**Abstract.** The subject proposed was developed over two parts. In the first written work it was presented the initial situation within a production flow that is sensed in the appearance of defects and nonconformities in obtain the final products. In this second paper - respectively this - we will show the use of this method in a situation that requires elimination of a technological problem appeared in the production flux and in relieving its positive consequence.

**POSSIBILITIES TO WEIGHTING THE GLOBAL INDICATORS OF QUALITY DETERMINED WITH  
THE QUALITY ASSURANCE MATRIX**

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**Abstract.** The paper presents the possibilities that offer the use of Matrix of Quality Assurance to provide largest protection against nonconformities in the manufacturing process. Are presented the two indicators that highlight the level of protection provided: the overall quality of workplace (preventing the passage of nonconforming product downstream) and the overall quality of the factory (preventing irregular delivery of final products outside plant). So, the matrix allows assessing the level of protection (against non-quality) of an internal customer and external customer. But it highlights a shortcoming in the calculation of the two global indicators: no differentiation is made between failures according to their gravity. To take this into account and in this way to have a more realistic appreciation of the protection of the customer, it is proposed to weighting these indicators: new relationships take into account the gravity weight faults.

**LIKES THE CALCULATION OF A METAL FRAME BUILT RESISTANT MATERIALS WITH  
DIFFERENT SECTIONS, CALLED BENDING**

Ph. D. Lecturer Grigore JAN, Prof. PhD. Alexandru BOROIU, Ph. D. Lecturer Monica BALDEA, Ph. D. Lecturer  
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**Abstract.** The subject proposed was developed based on a real situation. This paper aims at developing an evaluation method, the calculation of frame-strength steel structures, used in industrial and reinforcing possibilities of these structures.

**MICROSCOPIC ENCLOSURES MODELLING DESIGNATED FOR BIOMEDICAL APPLICATIONS  
OF CELLULAR MANIPULATION TYPE IN LIQUID ENVIRONMENT**

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**Abstract.** Cellular manipulation and single cell manipulation especially, created a strong focalisation of biomedical researching world around of this direction. Today we can find out a great diversity of manipulation methods, but our researching collective conceived an innovative one, that involved a special designing session for obtaining an optimal enclosure. The manufacturing process needs a simple, robust and economical technology. In this work we present a technical solution that includes all remembered attributes. Finally we present the experimental model achieved following the concept idea.

**IMPROVEMENT OF THE DYNAMIC CNC LATHE BEHAVIOR WITH THE VIBRO-ACOUSTIC  
DIAGNOSIS OF GEARBOX**

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**Abstract** Vibration diagnosis of machine tools in operation is a practice that is known and applied in industry. This is based on the fact that in the energy transfer process, typical to the operation of machine tools, their different components can be mechanically excited, the result being their entering in vibration. The force fluctuation, specific to the operation, that is transmitted to the outside through the components, moving and fixed parts in a mechanical system, is most often presented as a vibration and it is measured either as a relative motion, either as an absolute motion of the components. For a CNC lathe, the assembly with high speed moving parts is the gearbox. Therefore, improvement of the dynamic machine tool behavior is determined by reducing the level of vibrations and noises for this complex assembly. The gearbox of a CNC lathe is a mechanical assembly, where the moving parts are shafts, bearings and gears. To improve its dynamic behavior, it is important to reach a compromise between the technical conditions belonging to a manufacturing of these components at higher classes and related cost prices that must be acceptable. Simultaneous satisfaction of the two criteria requires the search of an optimal solution, which can be more securely found by combining the design criteria aimed at reducing dynamic phenomena, with the inspection and the correction of the vibration behavior on real models. In this paper, it is presented an application related to the vibro-acoustic diagnosis of a CNC lathe gearbox, as a method to improve the dynamic machine tool behavior in order to increase its machining accuracy and reliability.

**PRESENT THEORETICAL ASPECTS, TESTS AND PROPOSALS FOR FLOW CALCULATION ON  
ROLLER HORIZONTAL BELT CONVEYORS**

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**Abstract.** The paper contains a theoretical analysis and a series of experiments on the factors that the performance of the horizontal belt conveyors depend on, as well as experimentally verified suggestions for improving the performance of these machines.

**3D ENGINEERING APPLICATIONS FOR HUMAN SKELETON TAILORED IMPLANTS BUILD ON  
SELECTIVE LASER SINTERING SYSTEMS**

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**Abstract.** Materialise's Interactive Medical Image Control System (MIMICS) is an image-processing package that interfaces between 2D image data (CT, MRI, Technical scanner,...) and 3D engineering applications. Applications include: anatomical measurements, 3D analysis, Finite Element Analysis (FEA), patient-specific implant or device design, additive manufacturing (also called rapid prototyping or 3D printing) and surgical planning or simulation. By using image segmentation in Mimics, users can select a specific region of interest from the collected medical data and have the results calculated into an accurate 3D surface model. Additional modules are available for Mimics that provide an interface with different applications. This means that Mimics can easily be adapted to the needs of users.

**EDUCATION IN ADAPTIVE ADAPTRONICS - SUPPORT OF ADVANCED RESEARCH ON TELE-  
MONITORING, TELE-SERVICE, TELE-CONFIGURATION, TELE-MAINTENANCE AND TELE-  
CONTROL OF INTELLIGENT TECHNICAL AND TECHNOLOGICAL EQUIPMENT FOR  
INTEGRATED CONTROL**

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**Abstract.** The scientific paper treats the new concepts on engineers' education in intelligent specialized field of Adaptive Adaptronics regarding their integration into advanced research and development activities of new professional skills for the future. Also, the concepts are treated the concepts of tele-monitoring, tele-service, tele-configuration, tele-maintenance and integrated tele-control.

**THE INFLUENCE OF DIFFERENT PARAMETERS ON COUPLINGS WORKING WITH SMALL  
VELOCITIES SLIDING MOTION**

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**Abstract.** The working of friction couplings in case of small sliding velocities and in case of amixedor limit lubrication comes along with an unevenness of motion characterized by abruptness or by fits and starts. This phenomenon is known as stick-slip. The occurrence of this phenomenon in numerous technical applications has always aroused an increased scientific interest because of its unwanted implications on the machining precision in machine-tools and not only. The present paper proposes an analysis on the influence of different parameters that may come between the couplings working where stick-slip occurs.

**NEW MEMS & NEMS SOLUTIONS FOR INTELLIGENT MECHATRONICS MICROSYSTEMS USED  
FOR ULTRAPRECISE MEASUREMENTS**

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**Abstract.** The scientific paper will research and consider new solutions MEMS & NEMS for intelligent mechatronics microsystems used for ultraprecise measurement, linear and angular, describing the structural architecture, including hardware and their software. There are realized experimental research laboratory where they are studied metrology and functional parameters, highlighting the quality and intelligent control of the whole industrial process.



**HIGH-TECH MECHATRONICAL ADAPTABLE EQUIPMENT FOR INTEGRATED DIMENSIONAL  
CONTROL OF COMPONENTS FROM AUTOMOTIVE INDUSTRY**

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**Abstract** The problem of intelligent measurement and integrated dimensional control is that they need to ensure the quality of the product or of the industrial manufacturing process, regardless of the field, being required by the dimensional stability assurance in performing any intelligent industrial process. During the development of intelligent manufacturing techniques and technologies, with increasing demands for quality assurance have been created, designed and developed, in evolutionary systems, different high-tech mechatronic systems for measurement and intelligent dimensional control, nationally and internationally accepted. In this regard, new techniques, technologies and constructions on dimensional control systems integrating the new requirements of the development stage of society, were realized and developed by specialized companies. The creativity of human being correlated with the requirements of permanent increase of the living standard, constitutes the basis of society development. In a perfect world or in an integrant production environment, the 3D measurement systems, by providing the quality control integrated in the production line would be able to measure all the necessary parameters in a single step, without errors and render the results in the same way to the manufacturing networks with computers, in formats useful for CNC machines control and processes management.

**SOME THEORETIC AND PRACTICAL ASPECTS REGARDING PASSIVE AND SEMI ACTIVE  
VIBRATION CONTROL**

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**Abstract.** The vibrations most often leads to undesirable effects such as mechanical failure, costly maintenance of machines, worsening positioning performance of machines tools and also human discomfort. Theoretically, the vibrations can sometimes be eliminated. However, due to the high manufacturing equipment cost that may be involved in eliminating or reduction of vibration, we need a compromise between an acceptable level of vibration and the supplementary manufacturing cost of devices. In this paper have been presented some classical techniques of passive and semiactive vibration control in order to reduction the vibration level, the control of natural frequencies through damping modification, using of different isolators and absorbers systems.

**SOME PRACTICAL ASPECTS REGARDING ACTIVE VIBRATION CONTROL**

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**Abstract.** An active control of vibration for a mechanical system involves the introduction an external source to perform its function to reduce vibration and noise level, such as for example, use of hybrid absorbers with controlled force to reduce the influence of seismic waves or wind power on buildings or mechanical structures, noise reduction in the cabin of an aircraft by reducing vibration of the large panels and thin metal forming booth walls; reduction of vibrations level using piezoelectric or electromagnetic devices mounted on the trailing edge of helicopter blades, devices tuning cars, etc. In this paper we are presented main active vibration control techniques currently employed to control of natural frequency in aim to reduce the effects of vibration by changing damping, stiffness or inertia of the system.

**ON THE DYNAMICS OF THE ROBOT STRUCTURES**

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**Abstract.** The wide variety of areas where industrial robots are used led to the development of studies on the stability of robotic structures as well as their movements. These studies are based on the introduction of motion equations which define the dynamic behavior of the movement. The resistance of the robotic structure can be affected by an overload due to improper travel speeds and accelerations during the task. Choosing optimal solutions which result from the system

solutions offered by the equations of motion must comply with kinematic constraints imposed by the required capabilities of the robot, the workspace configuration and the load characteristics to be performed. The solution to such a problem leads to the simultaneous determination within the same process of calculating the kinematics of movement and optimal active efforts to create movement as well as the possibility of preventing inconveniences caused by overloading the joints and robots' elements. Computer simulation is used to control the values of constrained functions and changing the input parameters in order to obtain the desired results.

### **TRENDS IN THE DEVELOPMENT OF NEW INTELLIGENT MECHATRONIC EQUIPMENTS WITH APPLICATIONS IN AUTOMOTIVE INDUSTRY**

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**Abstract.** The scientific paper deals with trends in development of intelligent mechatronic equipments with applications in automotive industry. Also, the scientific paper deals with aspects related to the concepts of approach in design of main modules constituting the intelligent mechatronic equipments, being presented a wide range of the achievement intelligent mechatronic equipments.

### **IMPROVING THE PERFORMANCES OF AN INTERNAL COMBUSTION ENGINE USING OXY-HYDROGEN**

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**Abstract.** This paper is presenting a technical solution to produce and use oxy-hydrogen (HHO) as a fuel supplement. Using appropriate equipment, oxy-hydrogen is produced by water electrolysis and immediately transmitted to the engine. The introduction of hydrogen into the combustion chamber increases the efficiency of the combustion process and, therefore, reduces the fuel consumption and the polluting emissions, increasing the power and performance of the engine.

### **ERORI RELATIVE IN CALCULUL ARIEI DEFASURATEI SFEREI OBTINUTA PRIN METODE COMPUTERIZATE SI METODE NUMERICE**

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**Abstract.** Sfera este o suprafață nedefășurabilă. Suprafața sferei poate fi defășurată prin metode aproximative. În această lucrare se prezintă o paralelă între calculul ariei suprafeței defășuratei sferei obținută cu ajutorul programului AutoCad și cea obținută prin metode numerice. În primul caz s-a folosit metoda fuselor sferice, obținându-se automat aria defășuratei sferei. În cazul calculului defășuratei sferei prin metode numerice s-a folosit cuadratura Newton-Cotes, prin 9 puncte și prin 3 puncte. În toate cele 3 cazuri s-a calculat eroarea relativă

### **MATHEMATICS METHOD TO DEVELOP A SPHERE**

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**Abstract.** The sphere is an undeveloped area. The surface of the sphere can be developed by approximate methods. This paper presents a parallel between the spherical spindles method and an mathematical calculation program of the developing of a sphere. This case is a general case for a sphere of radius "r" and a number of plans "n". The specific case is presented for a sphere of radius  $r = 25$  mm and a number of plans  $n = 12$ .