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CONTENTS:

1. GLOBAL STRENGTH ANALYSIS IN HEAD WAVES, BASED ON 3D-FEM MODEL, FOR A LPG CARRIER SHIP

Leonard DOMNISORU^{a,*} and Dumitru DRAGOMIR, *“Naval Architecture Faculty, University “Dunarea de Jos” of Galati, Galati, 800201, Romania*

Abstract. The main topic of this paper is the global strength analysis for a LPG carrier ship, with double hull structure, under the following loads: eigen ship and cargo weight, still water and equivalent quasi-static head wave pressure. There are considered two types of analysis models: the classical equivalent ship 1D-girder and the 3D-FEM-hull model, extended over the whole ship length. In order to obtain the floating and trim equilibrium condition, in vertical plane, we use eigen iterative numerical procedures. There are considered two main loading cases: full cargo and ballast. The numerical results point out the advantages of using 3D-FEM models instead of the 1D-girder models, at the global ship strength analysis.

Keywords: Ship structures, Global strength analysis, Finite element method, LPG carrier ship.

2. DESIGN, MANUFACTURE AND TESTING OF A HIGH SPEED OIL FREE INTEGRATED MOTOR COMPRESSOR SUITABLE FOR UNMANNED / SUBSEA APPLICATIONS

Uwe LAUBER^{a,*} Peter ORTMANN^b and George KLEYNHANS^c,

^a*Head of Division Engineering & Development Compressors; MAN Turbo AG Switzerland*

^b*Manager Product Development MAN Turbo AG Switzerland*

^c*Senior Research Engineer, MAN Turbo AG Switzerland*

Abstract. Based on the existing high-speed oil-free integrated motor-compressor technology MAN TURBO outlined a programme to further develop and qualify the product for unmanned/subsea, wet/sour gas applications.

As an important subject of the development, the motor part has been identified: Make the motor robust and improve the wet/sour gas acceptance of the electrical components. This paper explains the process of engineering and manufacturing of such a motor compressor on basis of an in house development programme. The prototype testing has already been executed and the paper will present the test results showing that the requirements have been met or even have been exceeded.

Keywords: highspeed motors, integrated motor compressor, subsea compression.

3. PREDICTION OF THE CALM LOADING SYSTEM BEHAVIOUR IN REGULAR AND RANDOM WAVES

Daniel PITULICE^{a,*} Alexandru IOAN^b

^a*Department of Ship Structures, “Dunărea de Jos” University of Galati, Romania*

^b*Department of Naval Hydrodynamics, “Dunărea de Jos” University of Galati, Romania*

Abstract. The paper presents a simple, swift and precise method of calculation of dynamic horizontal displacements of a CALM loading system under the action of regular, irregular waves and swell waves. First of all, the dynamic system is described, and then mathematic relations that constitute the calculation algorithm are presented. Checking the method of calculation is performed on a practical numeric example. The results presented lead to conclusions useful to dimensioning or checking the resistance of buoy's anchoring system.

Keywords: buoy, loading tanker, CALM system.

4. ABOUT PORT SECURITY AT PRESENT

Violeta POPESCU,* Hazel MENADIL, *Faculty of Mechanical, Industrial and Maritime Engineering, The Ovidius University of Constanța, Constanța, 8700, Romania*

Abstract. The necessity of increasing ships and ports security has become of utmost importance in time and it has necessitated introducing some international regulations, among which:

- The international convention for protecting human life in sea – SOLAS, which our country adhered in 1979;
- The international ship and port facility security code, ISPS appeared after the events on the 11 September, 2001, elaborated and approved by OMI in 2002, and came into effect on 1 July 2004;
- After Romania's adherence to UE (1 January 2007) other norms has come into force: Regulation CE 725/2004 and Directive 65/2005, applied by The Transport Minister Order 290/2007.

The purpose of this paper is to emphasize the necessity of implementing and observing the ISPS Code in order to increase ships and ports security, its main norms and danger that the intermodal containerized transport represents in this respect. The paper stresses the continual concern of ports and ships to enhance security by introducing new technologies, despite afferent due investments.

Keywords: ISPS Code, ship security, port security, OMI.

5. SIMULATION OF THE CORROSION OF STAINLESS STEELS IN THE WET SECTION OF THE AUTOMOTIVE EXHAUST SYSTEMS

P. GÜMPEL^a, C. HOFFMANN^a, *University of Applied Sciences Konstanz /Germany^a*

Abstract. The special corrosion conditions in the rear section of automotive exhaust systems make high demands on the stainless steels used for these components. Various steel grades are used, ferrites with different contents of chromium and molybdenum as well as austenitic types. For selection of an appropriate material enabling cost-effective constructions the corrosion resistance of different candidate grades has to be rated. To gain more insight into the mechanism of corrosion occurring in exhaust systems and the effect of the different alloying elements investigations simulating the special corrosion conditions in the rear muffler were carried out. They comprised the impact of acidic chloride bearing media and the influence of electrochemical active carbon as well as the effect of alternating wet-dry cycles. Electrochemical investigations dealt with initiation, growth and repassivation of pitting and crevice corrosion.

Keywords: automotive corrosion, pitting corrosion, potentiodynamic polarization.

6. MODELING OF COMBUSTION PHENOMENON IN A DIESEL ENGINE UNDER ADIABATIC CONDITIONS

Deniz ÜNSALAN^a, Kunsel IZET-ÜNSALAN^b

^a *Dokuz Eylül University, Institute of Marine Sciences and Technology
Baku Blv. 100, Inciralti, Izmir, 35340 Türkiye*

^b *Ovidius University of Constanța, Faculty of Mechanical, Industrial and Maritime Engineering, Constanța, Romania*

Abstract. It is well-known that the combustion phenomenon is the key for the analysis, simulation and operation of internal combustion engines. However, no satisfactory theory to model combustion, as well as other engine processes has been modelled so far, mainly due to the complexity of the processes involved and the large number of parameters involved. In order to simplify the problem, an empirical model for the rate of heat release due to combustion for a Diesel engine has been adopted and the differential equation obtained from the first law of thermodynamics for modelling the pressure, volume and temperature for a given Diesel engine under adiabatic conditions has been solved numerically. Compression up to the start of combustion and expansion after the end of combustion has been assumed to be isentropic, while exhaust was assumed to be made under constant volume conditions, like the air-standard cycle. It is believed that this model shall be a useful tool for the parametric analysis and combustion of Diesel engines, as well as studying the effects of fuel, air-fuel ratio and injection timing changes.

Keywords: Diesel engine, combustion, first law of thermodynamics, isentropic compression/expansion.

7. IMPROVEMENT AND COST REDUCTION OF AUTOMATED MANUAL TRANSMISSIONS (AMT) IN PARALLEL HYBRID VEHICLES

Michael G. BUTSCH^a *

^a*Department of Mechanical Engineering,, University of Applied Sciences, Konstanz, Germany*

Abstract. Vehicles having a hybrid power-train will have a large stake in market in the next years. In this paper the possibility of using the electric motor in order to improve the comfort of automated manual transmissions (AMT) will be presented. With the advantageous use of the electric motor the spread of the AMT can be enlarged and an additional reduction of fuel consumption can be achieved. As well possibilities of reducing costs will be shown.

Keywords: Hybrid, Parallel Hybrid, Automated Manual Transmission, AMT, comfort of shifting.

8. SOME PRODUCTION IMPLICATIONS OF AUTOMOTIVE COMPONENTS IN GLOBALIZATION PROCESS RELATED WITH DURABILITY OF VEHICLES UNDER HEREDITY RELIABILITY CONCEPT

Daniel DRAGOMIR^{a,*}, Gheorghe BOBESCU^b, Natalia FILIP^b and Adriana MANEA^c

^a *Candidate for a doctors degree at Transilvania University Brasov*

^b *Ph. D Engineer Transilvania University Brasov.*

^c *Ph. D Engineer Ovidius University Constanta*

Abstract. The present paper is intended as an analysis of the globalization in automobile industry and of the technological factors which influence the reliability hereditary.

Keywords: Globalisation and trends, automotive, reliability heredity.

9. MIXED ROAD AND NAVAL SYSTEM FOR SWIFT INTERVENTION AT FLOODS

Mihail PRICOP, Vergil CHIȚAC^a, Laurentiu MANEA^b, Victor COSTENCUC^c, Nicolae NEAGU^d

^a *Naval Academy “Mircea cel Batran” of Constanta, Merchant Marine Faculty, Romania*

^b *Ovidius University, Romania*

^c *National Institute for Marine Research and Development “Grigore Antipa”, Constanta, Romania*

^d*Santierul Naval Buta&Co SA*

Abstract. This paper present a mixed swift intervention system MIXTRA, at natural calamities made of a specialized tractor vehicle and a multifunctional boat which can transport in the affected area one another, by land and by water. Due to a large specter of equipment and materials this system can be used in case of inundation for people, life stock and goods evacuation; first aid, fire fighting, aquatic ecological disasters, by day or by night and in areas accessible by water. The base solutions have a very large flexibility for different options and innovations.

Keywords: rescue boat, fiber glass, multifunctional boats, emergency intervention, fire boat.

10. THE STATISTICAL MIXTURE DESIGN OF RICE POLISHING CYLINDER

Suramong BANGPHAN^{a,*}, Sukangkana LEE^a, and Sermkiat JOMJUNYONG^b

^a*Department of Industrial Engineering Ubon Ratchathani University, 34190, Thailand*

^b*Department of Industrial Engineering Chiang Mai University, 50200, Thailand*

Abstract. This study presents the application of the mixture design technique in generating the optimal mixture for the rice mill cylinder when using the new materials. The three new materials; Quartz were chosen from the northern part of Thailand in order to compare with the imported materials; Emery. Quartz used in this study are natural stone and found in Thoen district (Lampang province), Bophloi district (Kanchanaburi province) and from Wiang Pa Pao district (Chiangrai province) respectively.

Design of Experiment (DOE) was used as a tool in order to generate the suitable mixture. 10 mixtures were generated by the Simplex Centroid Design technique with Special Cubic type. by ANOVA and Regression was used for analysis. In this model, three control factors: X_1 , X_2 , X_3 representing Quartz no.16, no.18 and reused silicon carbide no.18, respectively. The process variables were temperature (Z_1) and paddy moisture content (Z_2). The rice milling tests were conducted on kow dauk mali 105 rice. After milling, the percentage of good rice and the wear rate of polishing cylinder were calculated and analyzed using Regression analysis and Analysis of Variance (ANOVA). At a significant level $\alpha = 0.05$, the values of Regression coefficient, $R^2_{(adj)}$ were 78.62 % and $R^2_{(adj)}$ were 70.67 %. The Optimal mixture for percentage of good rice was 92.136 % and the wear rate of the polishing stone materials was 1.887 g/hr. The response optimization for quartz were materials from Thoen district.

Keywords: Abrasive Materials, Rice Polishing Cylinder, Mixture Design, Design of Experiment.

11. LAGRANGIAN AND HAMILTONIAN APPROACH IN (INCOMPRESSIBLE) HYDRAULICS

Cem CIVELEK*

Deniz Bilimleri ve Teknolojisi Enstitüsü (Institute of Marine Sciences Technology) Dokuz Eylül, Universitesi Bakü Haydar Aliyev Bulvarı No: 32, 35340 Inciralti-Izmir, Türkiye

Abstract. The study is concerned with the application of Lagrangian and Hamiltonian approach in (incompressible) hydraulics using analogy between the classical elements of mechanics and hydraulic elements.

Keywords: Lagrangian and Hamiltonian approach in (incompressible) hydraulics, hydraulic systems and elements.

12. DIGITAL PID SELF-TUNING CONTROLLERS USED WITH DIFFERENT STRUCTURES OF THE CONTROL LOOPS

Viorel DUGAN^a, Adrian DAN^a, Clara IONESCU^b, Mirela COTRUMBA^c

^a*„Dunarea de Jos” University of Galati*

^b*University of Ghent, Belgium, EeSA Department*

Abstract. This paper investigates the behavior of digital PID self-tuning controllers (STC) in different structures of the control loops used in adaptive systems. In the two phases of this type of systems which use a STC-PID, the first phase, i.e. the task of recursive identification of the plant model parameters, is used a regression (ARX) model with the recursive least squares method. Because the quality of process model depends on the order of the ARX model and of the sample period (T_s), the digital PID parameters are functions of these variables and, supplementary, of continuous-time PID parameters and of the control loop structures used in the adaptive system (although, not so largely as the firstly three variables). To see the latter influence, in this paper are considered two control loop block diagram, and for simulations - three different processes (stable; with no minimum phase; unstable), and some simulations with different T_s, ω_n, ξ . The PID controller design method used to obtain the specs desired for control loop dynamic behavior was the pole assignment method of the loop.

Keywords: STC- PID adaptive systems, different feedback loop structures, simulation, specs comparison.

13. HYDRAULIC SERVOMECHANISMS INSTALLED IN IDEAL AND REAL CONDITIONS – MATHEMATICAL MODELING AND NUMERICAL SIMULATION

Olivia FLOREA*

Department of Algebra, Geometry and Differentail Equation, Faculty of mathematics – Informatics, Transilvania University of Brasov

Abstract. The main objective of the study of dynamical behavior for the hydraulic servomechanisms installed in ideal conditions is the theoretical determination of the quantitative influence of the construction parameters over the precision and stability. The paper deals with determining the transfer function and the stability conditions as well as the study of the numerical simulation of the servomechanisms response to the standard signal. It is studied the influence of some typical nonlinearities over the stability and the precision of the servomechanisms by using the numerical simulation. The numerical analysis of the behavior is accomplished with the help of the Simulink environment for Matlab.

Keywords: hydraulic pump, transfer function, numerical simulation

14. A STUDY OF UNITUBULAR TUBE AND TUBESHEET ASSEMBLY

Bogdan RĂDOIU

Department of Mechanical Engineering, Ovidius University of Constanța, Constanța, 900527, Romania

Abstract. This paper present a theoretical approach to unitubular tube and tubeshhet assembly study, useful in tubular heat exchanger strength calculus.

Keywords: stress, strain, pressure, mathematical model.

15. INFOGRAPHICS IN THE DESIGN OF TRANSMISSIONS ELEMENTS

Ionel SIMION^{a,*}, Andreea SIMION^b

^a *Faculty of Aerospace Engineering, Department of Descriptive Geometry and Engineering Graphics, POLITEHNICA University of Bucharest, Bucharest, Romania*

^b *Faculty of Communication and Public Relations “David Ogilvy”, National School of Political Science and Public Administration, Bucharest, Romania*

Abstract. The paper presents the original software TRANSEL, for automate representation of the transmission elements in engineering graphics. The TRANSEL program can be used also for computer aided instruction. Starting from the learning of the basics elements concerning engineering graphics, ending to the practical solutions, the program can be used in design or instruction computer assisted activities. The user can learn to select and apply transmission elements to meet design needs, but also to properly represent the transmission elements applications. The paper also describes the graphic library including transmission elements and transmission groups.

Keywords: design tools, Computer Aided Engineering, transmission elements, engineering graphics.

16. ADAPTIVE SCHEDULING MODEL FOR FLOW MATERIAL IN PROCESSING STAGE

Lucia Violeta MELNIC^a, Cristian DOICIN^b, Constantin ILIE^a

^a*Ovidius University of Constanta, 124 Mamaia Ave., Constanta, Romania*

^b*Polytechnical University of Bucharest, 36 Splaiul Independentei Str., Bucharest, Romania*

Abstract: The problem of materials flow optimizing in processing state is a mixed problem of programming the production tasks and of allocating the necessary resources. This problem is little approached in the specialty literature and due to this fact it has not been performed an integral mathematic model which can render the adaptively dynamic evolution of the materials flow from the semifabricat to the of output finite product. This paper presents an optimization model of the materials flow which relies on the formal representation of the materials flow and also on two dynamic adaptive laws which are the base for solving the model. The logic of the formalizing elements of the materials flow underlying the optimization model is obvious and consequently; it enables the adaptive dynamic modelling of the materials flow which constitutes the basic premise of the production optimization in the workshop.

Keywords: materials flow, fundamental law of the materials flow, flow matrix, the low of material flow continuity (LMFC).

17. MODEL FOR SHARING OF CRITICAL RESOURCES

C. NEAGU^a, M. MANGIRIDIS^b, M. CATANĂ^a, C. ILIE^c

^a*Dept. of Manufacturing, University POLITEHNICA of Bucharest, Romania*

^b*Assist. Lecturer, University of Kozani, Greece*

^c*Department of Mechanical Engineering, Ovidius University of Constanta, Romania*

Abstract. Sharing of critical resources results in combinatorial optimization problems, in which the number of alternatives to consider increases exponentially with the number of critical resources and of resources consumers. Therefore, a procedure that enumerates and analyses all the possible solutions of the problem is not advisable. A more reasonable approach is to find in the search space and take in consideration only those alternatives that converge rapidly towards a good but not always optimal solution of the problem. Some production management writings are addressing to the problem of sharing critical resources by using an agent-based modeling approach of the manufacturing systems. However, the proposed case studies are dealing with some simple problems, which involve a few consumers and critical resources. The sharing method presented in this paper is based on the development of some formalization and heuristic optimization models for the production projects that imply numerous consumers and critical resources subjected to multiple constraints.

Keywords: model, critical resources, combinatorial optimization, scheduling.

18. ASPECTS OF RESEARCHES UPON OBTAINING ALUMINUM - CARBON FIBERS COMPOSITE MATERIALS

Petru COBZARU^a, Dumitru NEDELICU^b, Lucian TABACARU^b, Vasile MERTICARU^b

^a*The Technical University "Stefan cel Mare" of Suceava, Suceava, Romania*

^b*The Technical University "Gh. Asachi" of Iasi, Iasi, Romania*

Abstract. The aim of the paper is to establish the technology to obtain the sample of composite material Aluminum-Carbon fiber. In general the methodology consists in: the pre-mould of a rectangular metallic support on which we shall align the uniformly tensioned carbon fibers; the pre-mould will be introduced in the steel mould and the whole assembly will be heated in an inert atmosphere of Argon; the inner surfaces will be protected with refractory paint based on aluminum oxide; the contact surfaces between the mould-piston will be covered with a refractory paint; after removing the slag, the liquid matrix is poured over the pre-mould from the mould and the piston goes down; the solidification; the electrolytic polishing and finishing of surfaces; half of the batch of the test bars broken by traction will be boiled in caustic soda; accurately measurements on the electron-scan microscope; calculations the thickness of the aluminum carbide layer.

Keywords: mould, composite, aluminum-carbon fiber.

19. MATH-BASED MODELING OF SHEET METAL FORMING WITH APPLICATIONS

Raghu ECHEMPATI

Mechanical Engineering Department, Kettering University, Flint, MI – 48504

Abstract. Metal forming industry is a multi-billion dollar investment involving procurement of materials and manufacture of die-sets. Usually, 3 to 6 die-sets are needed before finished stamping components can be produced. Typical metal stamping parts for automobile, rail or marine applications used to be simple in terms of geometric surfaces, curvature and features. Production of such components depended mostly on the artistic experience and skills of the die engineers who have the technical skills and intrinsic visualization of the metal flow in to die cavity as it is being formed. This enabled them to intuitively predict any major stamping defects such as thinning, splitting and wrinkling. However, such issues used to be addressed and resolved only after the stamping die sets have been manufactured and tested. As the time progressed and modern manufacturing processes evolved, this 'build, test and repair' (trial and error) technology became time-consuming, prohibitively expensive and obsolete. Also, as the size and geometric shape of the surfaces of the stamping parts became complicated it became difficult for a stamping industry to depend on only the art and skills of the experienced die engineers. Finally, it became even more difficult to capture the artistic knowledge of such die designers as they eventually retire from service. Thus the need for math-based technology for metal forming became evident and important. Besides metal forming, the other major applications of large deformation process modeling are vehicular crash (both automotive and railcars) and detonation of explosives, etc.

The present talk addresses general introduction to some of the basic concepts of metal forming processes, advanced simulation technologies and an introduction to the idea of optimal forming methodology using the DOE and RSM statistical procedures.

Keywords: Sheet Metal Forming, Design of Experiments

20. EXPERIMENTAL RESEARCHES CONCERNING FRICTION-WELDED JOINTS HARDNESS MADE BY HEAT-RESISTING STEELS, AFTER DIFFERENT HEAT-TREATMENTS

Gabriela IANCULESCU^{a,*}, Melat BORMAMBET^a

^a*Mechanical, Industrial and Maritime Engineering Faculty, Ovidius University of Constanta, 900527, Romania*

Abstract. Paper presents experimental researches concerning friction-welded joints hardness made by 20VNiMoCr120 steel, of $\phi 24$ diameter round bars, after different heat-treatments. The purpose is to obtain acceptable hardness values, in order to increase machinability of heat-treatment engine parts made by heat-resisting steels used in thermo-energetic installations working at high pressures and temperatures.

Keywords: friction-welding, hardness, tempering, dead-soft annealing, normalizing.

21. PARTICULARITIES OF THE SURFACE TREATMENT OF TITANIUM DENTAL IMPLANTS

Maria MARIS^a, Dan MARIS^a, Marius MARIS^b, Anamaria BECHIR^a, Florentin STOICU^c, Eugen VASILE^d

^a School of Dentistry, "Ovidius" University of Constanța, 124 Mamaia Blvd. 900527, Romania

^b Resident doctor, doctoral candidate, 57, Pescarilor, 900581, Constanta, Romania

^c INCDMNR-IMNR, 102, Biruintei, 077145, Pantelimon, Bucuresti, Romania

^d METAV-CERCETARE DEZVOLTARE S. A. 31, C. A. Rosetti 020015, Bucuresti, Romania

Abstract. Dental implants' coarse surfaces enable a better reticulation and bone-implant integration, which are important phenomena during the immediate postoperative stage in terms of blood cruor deposits and organisation on the implant surface.

Our study attempts to obtain positive results in the surface treatment of titanium implants by means of a combined method: acid etching and mechanical sandblasting of titanium implants. This method attempts to obtain a **morphological mimesis**, on the surface, for dental implants, which can thus achieve the external architecture of titanium implants close to the architecture of the bone support.

Keywords: titanium, superficial texture, acid etching, sandblasting.

22. THE ANALYSIS OF SANDBLASTED SURFACE TREATMENT OF TITANIUM IMPLANTS USING AN ELECTRON-SCAN MICROSCOPE

Marius MARIS^a, Dan MARIS^b, Maria MARIS^b, Anamaria BECHIR^b, Eugen VASILE^c

^b Resident doctor, doctoral candidate, 57, Pescarilor, 900581, Constanta, Romania

^a School of Dentistry, "Ovidius" University of Constanța, 124 Mamaia Blvd. 900527, Romania

^c METAV-CERCETARE DEZVOLTARE S.A. 31, C.A. Rosetti 020015, Bucharest, Romania

Abstract. To achieve optimum histointegration for each dental implant inserted into the jaw bone, researchers' studies focus on the surface treatment of titanium implants. Our study performs the qualitative analysis of micro-grooves achieved on the surface of titanium implants by sandblasting with alumina, by means of the electron-scan microscope. Following the processing of samples after sandblasting, examination under an electron-scan microscope highlighted coarse surfaces of various values, which show impurities of the alumina stuck into titanium for all of the analysed samples. The irregular, sharp, low-coarseness surface, as well as the alumina impurities in titanium will negatively influence all biological processes of histointegrating the titanium dental implants.

Keywords: dental implants, coarse surface, osseointegration.

23. PROCESS FUNCTIONS IN ELECTRICAL DISCHARGE MACHINING OF STRUCTURAL COMPOSITE CERAMICS

Constantin C. OPRAN^{a,*}, Mihaiela M. ILIESCU^a,

^a Manufacturing Department, "POLITEHNICA" University of Bucharest, 060042, Romania

Abstract. Composite ceramics materials are widely used in various important fields of industry, because of their high important characteristics. A very important category of these materials is that of electro-conductive ceramic composites ($\text{Al}_2\text{O}_3/\text{TiC}$), conventionally called $\text{CC}_s\text{E}_c-\text{Al}_2\text{O}_3/\text{TiC}$. Machining the composite ceramics has proved not to be so easy but, an efficient procedure is electrical discharge machining with massive electrode, by shape copying, conventionally called $\text{PPE-E}_m\text{C}_o$. This paper presents some process functions and indices determined in order to optimize the $\text{PPE-E}_m\text{C}_o$ process, while machining $\text{CC}_s\text{E}_c-\text{Al}_2\text{O}_3/\text{TiC}$.

Keywords: structural composite ceramics, electrical discharge machining, process function, indices.

24. NANOSTRUCURED MATERIALS OBTAINED BY CHEMICAL METHODS

Gabriela A. PLĂIAȘU*

Faculty of Mechanics and Tehnology, Universty of Pitesti, Romania

Abstract. New chemical methods such as hydrolyze, sol-gel process, hydrochemical synthesis or process in gaseous phase have been developed to synthesize nanostructured materials. The classical routes for synthesis nanomaterials base on the solid state reactions at high temperature has many disadvantages due to the large diffusion distances. This paper deals with nanopowders synthesized by hydrolyze and hydrothermal route.

Keywords: nanostructured materials, hydrolyze, hydrothermal process, ZnO, nanopodwers.

25. STUDIES CONCERNING THE POSSIBILITY OF HARDENING THROUGH THERMIC ISOTHERMAL TREATMENT OF THE CASTING ALLOYS OF ALUMINUM

Maria STOICĂNESCU^a, Mihaela SMADEA^b, Ioan GIACOMELLI^a

^a*Department of Materials Science and Engineering, "Transilvania" University, Brasov, Romania*

^b*"Henry Coanda" Military Academy, Brasov, Romania*

Abstract. The studies undertaken have the objective of proving the property of a hardening aluminium alloys through warm oil-quenchings. Mentainig in the stair of the temperature intermediary between one of heating and one environment he had the same influence with the one the agening realized after accustomed hardening. In this kindthere are coupled two distinct operations of thermic treatment in only one.

Keywords: quenching, hardening, aluminium alloys

26. DESIGNING AN ENGLISH COURSE FOR ADULT ENGINEERING STUDENTS IN LONG-LIFE LEARNING EDUCATION

Iuliana LUNGU

Faculty of Psychology and Educational Sciences, "Ovidius" University of Constanta, Constanta, Romania

Abstract. This article will describe briefly some of the language needs of the undergraduate students doing mechanical engineering within long-life learning education at "Ovidius" University and the programme which is being developed to satisfy these needs. Many of these students have considerable language problems during their first year, despite the fact that they have studied English for about four or eight years at secondary school and high school.

The main initial need of these students is to be able to follow lectures and take notes, to be able to understand a wide variety of text including diagrams, tables, graphs, course brochures and job advertisements, to be able to write simple descriptions and explanations of components and processes, to write study-and work-related letters, and last but not least, to communicate about engineering topics.

Keywords: Needs analysis, objectives setting, placement tests, authentic language, materials evaluation, textbook design, communicative approach.

27. EARLY ASPECTS INFLUENCING TECHNOLOGICAL EDUCATION

Valentina POMAZAN^{a,*}, Doina MIHALASCU^a, Lucian C. PETCU^a, Mihai GIRTU^a
Ovidius University of Constanța, Romania

Abstract. The paper reports correlation analyses performed on a data base built from a questionnaire given to determine the factors that led the young generation to choose a career in science, engineering or technology (SET). The research, aimed at finding the main factors that lead young people towards SET studies and was triggered by the alarming decline in the number of students interested in scientific or engineering professions evidenced in the past years in Romania and throughout Europe. Based on extensive analyses we could sketch a set of conclusions targeting the need for curriculum change in the benefit of more attractive approach in SET disciplines during the secondary education stage.

Keywords: technological education, curriculum, statistical correlation analysis.

28. EXPERIMENT-BASED E-LEARNING FOR ENGINEERING IN A TRANSNATIONAL NETWORK

Florin D. SANDU, Sorin I. MORARU, Mihai M.ROMANCA

Faculty of Electrical Engineering and Computer Science, Transylvania University, Brasov, Romania

Abstract. In universities there is an increased tendency to extend e-Learning in technical fields. The challenge in distance learning is the experimental part – local (then only emulated) or real (then remote) – which is a must in engineering. If emulation is resource-intensive, it can also be remote (in client-server architectures). There is an evident need to integrate these complex and/or resource-intensive approaches in transnational networks (for best-practice share and/or increased use-value, respectively). There are important constraints for the modern educational process: time (too short), space (too few), students (too many) and equipment (too expensive). It became obvious that efficient e-Learning tools that should enable remote-experiment-based courses and virtual & real remote laboratory work, need to be distilled, integrated and disseminated. The paper details on objectives, activities and forecasted results of a project aiming to create a transnational network in the domain of virtual & remote experiments for e-Learning.

Keywords: e-Learning network, virtual & real remote experiments, web-services, resource integration.

29. USING MIXED REALITIES IN ENGINEERING TRAINING CURRICULA

Norina POPOVICI^a, Irena MUNTEANU^a, Ronan Querrec^b, Remus ZAGAN^c

^a*Department of Economics, The Ovidius University of Constanta, 900000, Romania*

^b*European Virtual Reality Center, UBO, 29200, Brest, France*

^c*Department of Technologies and Economical Engineering, The Ovidius University of Constanta, Constanta, 900527, Romania*

Abstract. New regulations established by ISO TC135 and ISO 9712 type programs regarding the personnel qualification determine changes in the current training schemes. OVIDIUS University is engaged in this direction and has started implementation processes in different areas (medicine, biology, engineering, etc.) using virtual environment setups as integrated modules. Our objective is to improve the quality of education in order to help and motivate students to rapidly integrate due their performance. In this paper we present EngView, a new education

environment used for training students and operators for certification in Non Destructive Testing (NDT). Based on virtual reality technologies, EngView extends the real NDT setup in order to provide a flexible training environment. By offering greater access to the experimental data it decreases the educational cost for institution and increase the quality of educational processes itself.

Keywords: Education, Non Destructive Testing, Virtual Reality, Educational Virtual Environment.

30. CONCERNING THE POTENTIAL OF THE MIXED ENVIRONMENTS FOR LEARNING

Norina POPOVICI^{a*}, Irena MUNTEANU^a, Ronan QUERREC^b, Dorin-Mircea POPOVICI^c

^a*Department of Economics, The Ovidius University of Constanta, 900000, Romania*

^b*European Virtual Reality Center, UBO, 29200, Brest, France*

^c*Department of Computer Sciences and Numerical Methods, The Ovidius University of Constanța, Constanța, 900527, Romania*

Abstract. Over the last years the educational environments have gone through some major changes. New methods and metaphors were involved in order to satisfy the expectations of the direct users of these environments, learners and teachers in order to obtain better results. Due to the significant motivational dimension the new technologies may offer within an educational virtual environment, we are considering these technologies as part of our current educational/training processes. From this new perspective, all the involved actors, learners and teachers, will play an active role in the educational process, taking into account the current economical context.

Keywords: Education, learning, mixed realities.
