

**ȘTEFAN CEL MARE UNIVERSITY of SUCEAVA**  
**FACULTY of MECHANICAL ENGINEERING, MECHATRONICS AND**  
**MANAGEMENT**  
**DEPARTMENT of TECHNOLOGY AND MANAGEMENT**

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# TEHNOMUS

*NEW TECHNOLOGIES AND PRODUCTS IN MACHINE MANUFACTURING TECHNOLOGIES*

Journal

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FACULTY of MECHANICAL ENGINEERING, MECHATRONICS AND MANAGEMENT  
ȘTEFAN CEL MARE UNIVERSITY of SUCEAVA



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## **A TEST RIG FOR EVALUATION OF CONTACT FATIGUE OF GEARS**

Lubomir DIMITROV - Technical University of Sofia, Sofia 1000, Bulgaria

**Abstract:** This paper represents a test rig for evaluation of contact fatigue of gears. In the design of the rig, the “four-square principle” is applied. The results of the tests with four different groups of gears are presented: a) unhardened, thermally not treated, not shot peened gear teeth; b) thermally treated, not shot peened gear teeth; c) unhardened, shot peened gear teeth; d) thermally treated, shot peened gear teeth. As a result of the tests, S-N curves for the above mentioned groups were obtained.

## **THE ANALYSIS ON HOW THE MATERIAL FROM A STEAM BOILER’S ECONOMIZER DEALS AT HIGH TEMPERATURE**

**Amalia Ana DASCĂL**, Faculty of Engineering Hunedoara  
**Camelia PINCA-BRETOTEAN**, Faculty of Engineering Hunedoara  
**Tiberiu Dimitrie BABEU**, University POLITEHNICA Timișoara

**Abstract:** The paper presents the results of experimental research on OLT 45K steel, in two alternatives of utilization. Thus, drive testing at heat has been done on strip test-bars, drawn from a steam boiler’s economizer and on test-bars drawn from an unused tube, which was about to be assembled in the boiler. The obtained experimental results allow the establishment of the drive mechanical characteristics, at different high temperature, adherent to the operational temperature, for the analyzed type of steel. They can be brought into practice in order to establish the life length of the parts that work in thermal-energetic installations and not only.

## **THE INFLUENCE OF THE THERMOMAGNETIC TREATMENTS ON THE HARDNESS NUMBER OF STEELS AND THE SUPERFICIAL LAYERS NITRIDED DURABILITY**

**Carmen-Penelopi PAPADATU** –“Dunarea de Jos” University of Galati  
**PCARMEN-PENELOPI@email.ro**

**Abstract:** Two types of steels subjected to a nitriding thermo-chemical treatment after thermomagnetic treatments. The structural aspects into superficial layer of these steels are studied during friction process by using of an Amsler machine, taking two sliding degrees, different contact pressures and testing time. I tried to determine the durability of these materials, the surface structure evolution at different tests after thermomagnetic treatments.

## **A SYSTEM FOR INTRA-OPERATIVE MANUFACTURING AND STABILITY TESTING OF HIP PROSTHESES**

**Leonard PASTRAV**, Katholieke Universiteit Leuven (K.U.Leuven), Belgium  
Siegfried JAECQUES, K.U.Leuven, Belgium  
**Guy DELOGE**, Advanced Custom Made Implants S.A./N.V., Leuven, Belgium  
**Michiel MULIER**, K.U.Leuven, Dept. of Orthopaedic Surgery, Pellenberg, Belgium  
**Georges VAN DER PERRE**, K.U.Leuven, Belgium

**Abstract:** The intra-operatively manufactured prosthesis (IMP) is intended to give orthopaedic surgeons the possibility to develop a customised prosthesis for any individual patient. The individual prosthetic stem is produced during the surgical procedure of total hip replacement (THR) by using the measurements of the mould of the femur cavity. Objective assessment of the primary stability of the IMP and of cementless hip systems in general, remains a challenge. Vibration analysis is proposed as a diagnostic method for the monitoring of hip implant fixation.

## **THE INFLUENCE OF NON-MONOTONIC LOADING ON PLASTICITY DURING THE PROCESS OF RADIAL EXTRUSION WITH CONTOUR UPSETTING**

**Yu.A. Burennikov**, Vinnytsia National Technical University  
**I.O.Sivak**, Vinnytsia National Technical University  
**K.I Kotsubivska**, Vinnytsia National Technical University  
**S.Z. Yablonska**, Vinnytsia National Technical University

**Abstract:** Non-monotonic loading influence on the plasticity during the process of radial extrusion with contour upsetting is considered. The evaluation criterion of metal deformability during non-monotonic plastic deformation process is proposed. It was estimated how the main parameters of the radial extrusion with contour upsetting influence the plasticity of metal being deformed. Methods for the strained state evaluation in the non-monotonic loading conditions have been improved.



## **STUDIES AND EXPERIMENTAL RESEARCH ON THE ATTEMPT OF HARDNESS AT HIGH TEMPERATURE**

**Amalia Ana DASCĂL - University POLITEHNICA Timișoara,  
Faculty of Engineering Hunedoara,**

**Abstract:** The paper presents the theoretical studies and experimental results obtained from the mechanical attempts of hardness at heat, made on a Brinell hardnessmeter, using original heating precincts of the test-bars. Thermal-resistant steel types had been used for testing, which practically are submitted at high functional temperatures. Therefore, the precincts and the annex elements as well as the obtained results are shown. They can be applied practically in order to determine the life length of component parts made of this steel.

## **AN OVERVIEW OF PRODUCTION OPTIMIZATION NEEDS AND DIFFICULTIES RELATED TO THE INJECTION MOULDING PROCESS**

**Marc JUWET, Katholieke Hogeschool Sint-Lieven, Ghent, Belgium  
Filip DE BAL, Katholieke Hogeschool Sint-Lieven, Ghent, Belgium  
Ilias SARAFIS, Technological Educational Institute of Kavala, Greece**

**Abstract:** Basic injection moulding machines provided minimum requirements for injection moulding production. Modern technology provides technical possibilities for faster, more accurate and more stable production. Using the full capacity of this technology requires different approaches in machine setting. Hence the machine operator needs technical help.

## **ADVANCED RESEARCH ON NANOMATERIALS CHEMISTRY**

**Rodica-Mariana ION - Valahia University Târgoviște, ICECHIM București  
Dragoș-Viorel BREZOI - Valahia University Târgoviște**

**Abstract:** In the nanotechnology age, molecular designing of materials studies are opening wide possibilities of using molecular systems in electronic and photonic devices for technological applications based on molecular switching or molecular recognition. Several molecular based materials, derived from inorganic and metal-organic compounds are focused on this article, with emphasis on new supramolecular porphyrins complexes. Such systems are also discussed in terms of their applications in catalysis, sensors and molecular devices.

## **THERMAL FIELDS AND PRESSURE IN DESIGNS WITH COMPOSITION COVERINGS**

**V. I. SAVULYAK, Vinnitsa National Technical University**  
**A. V. GUBANOF, Vinnitsa National Technical University**

**Abstract:** On work capacity of pairs a friction with composition coverings habits of extending of heat and formation of non-stationary thermal fields and pressure here the sources, the raised friction or the second factors have significant agency. While in service in conditions of a friction, there are thermal and power streams, which heterogeneities in conditions composition metal-carbides coverings essentially non-uniform. In details investigated composite materials with eutectic structure and with disperse strengthening and a metal matrix.

## **HEAT MEASUREMENT IN FUSION WELDING PROCESSES**

**Laurentiu Dan GHENGHEA, cat. TCM, Universitatea Tehnica din Iasi**  
**Gavril MUSCA, cat. TCM, Universitatea Tehnica din Iasi**  
**Gabriela CIOBANU, Fac.Chimie, Universitatea Tehnica din Iasi**  
**Bogdan BEIU, stud. UTS, Universitatea Tehnica din Iasi**

**Abstract:** Thermal cycle induced by welding source in base material is an important fact responsible for change in internal structure of base material used in welding joints manufacturing. Paper presents some formulae for peak temperature derivation that could be used to estimate the change in mechanical properties of base material situated in heat affected zone. Experimental data will be presented for shielded metal arc welding process.

## **EXPERIMENTAL RESEARCHES CONCERNING THE INFLUENCE OF THE DESIGN PARAMETERS ABOUT ON THE CHARACTERISTIC ERROR OF CYLINDRICAL SPIRAL SPRINGS WITH CONSTANT STEP**

**Florin DASCĂLU - Grupul Școlar Industrial Negrești-Vaslui**  
**Vasile BRAHA - Universitatea Tehnică "Gh. Asachi" Iași**

**Abstract:** The paper analyses the influence of the design parameters of cylindrical spiral springs with constant step about on the characteristic error when these springs are solicited statically at torsion, with the view of transmitting torque moments in the measurement equipments. The characteristic error of the torsion spiral springs is found. Using Taguchi experiments, the levels at which we have to place the analysed factors are determined, for obtaining a small characteristic error.

**Key words:** spiral spring, torque, characteristic error, design parameters

## **THE DETERMINATION OF UNHARMONICAL EFFECTS IN SOLID SOLUTIONS CU-ZN, CU-AL AND CU-SN BY X-RAY DIFFRACTOMETRY DATA**

**T.I. Babjuck, Vinnytsa National Technical University**  
**S.G. Avdejev, Vinnytsa National Technical University**  
**P.M. Zuzjak, Vinnytsa National Technical University**

**Abstract:** On a base of experimental data of thermal dependencies for relative integral intensities of x-ray diffraction of Cu-Zn, Cu-Al, Cu-Sn solid solutions in a range of temperatures by the want of 293-023 K are determined coefficients of quasielastic force and unharmonic coefficients of 3-th and 4-th order for these materials. The quantitative analysis of denoted alloys interatomic interaction character was provided.

## **SIMPLE LEARNING AND DEMONSTRATION PURPOSE - HOW TO PLAY TIC-TAC-TOE**

**Mário António RAMALHO, Instituto De Engenharia Mecânica,**  
**Vitor ROCHA, Secção de Sistemas, DEM. Instituto Superior Tecnico**

**Abstract:** In the present paper a robotic application joining together Informatics, Robotics, Artificial Intelligence and Artificial Vision is described. These are based on of the shelf components and a teaching robot producing a demonstrator which has proved to be quite appellative.

## **MODELLING OF THE VARIABLE-DISPLACEMENT PUMP CONTROL SYSTEM USING MATLAB SIMULINK SOFTWARE PACKAGE**

**Juriy Burennikov, Vinnytsia National Technical University**  
**Leonid Kozlov, Vinnytsia National Technical University**  
**Sergey Repinskiy, Vinnytsia National Technical University**  
**Galina Kozlova, Vinnytsia National Technical University**

**Abstract:** Variable-displacement pump control system is considered. The system includes regulator that provides pump operation both in the fixed – power and fixed-delivery modes. Mathematical model of the pump control system in the Matlab Simulink software environment has been developed.

## **ROTARY ACTUATOR COMPARISON**

**Constantin STANESCU**, “Politehnica” of University Bucharest  
**Adriana CARSTOIU**, “Valachia” University of Targoviste  
**Cristian BEBE**, Transport’s College of Bucharest

**Abstract:** A rotary actuator is the most compact device available for producing torque from hydraulic or pneumatic pressure. A self-contained unit, it is usually limited to one revolution or less and can provide oscillating motion as well as high and constant torque.

There are many types of rotary actuators, each with design advantages as well as compromises. The three most commonly used are rack and pinion, vane and helical.

## **EFFICIENT ALGORITHMS FOR THE PLANNING OF SOME INTELLIGENT VEHICLES USED FOR THE DETECTION AND EXTINCTION OF FIRE**

**Valeriu LUPU** - “Ștefan cel Mare” University of Suceava  
**Romeo IONESCU** - “Ștefan cel Mare” University of Suceava  
**Cătălin LUPU** - “Ștefan cel Mare” University of Suceava

**Abstract:** This article presents efficient algorithms for the planning of some vehicles that have the mission to detect and extinct a fire. The machines work in a varied land, with hills and valleys, with holes, cliffs, mined land and with other obstacles they may run into their way (this obstacles are from the beginning in the studied land or they can appear instantly). The machines can depart all at the same moment or they can leave one at a moment. The machines can meet each other on their way but they must avoid the collisions by communicating with the server.