

## ABSTRACTS “INNOVATIVE TECHNOLOGY” 3-4 / 2012

### ANALYTICAL STUDY OF PRESSURE VARIATION AT DENTAL CONTACT INTERFACE

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*Any two bodies in contact determine at the interface a pressure, which will create inside the bodies a stress state. This pressure varies depending on contact normal load  $Q$ , geometrical configuration, dental material and interface body nature. Teeth come into contact when the mouth closes, so that they can be considered biomechanical bodies which are subjected to the physics laws. The purpose of this research was theoretical computation of pressure in the dental contacts, using a simplified model of the hertzian contact. The equations were solved using the Mathcad applications, for different materials, dimensions, loads etc. For a chewing force of 600 N between molar teeth, results a contact pressure of 4.68 GPa. We identified that pressure depends greatly on surface geometry, i.e. tooth cusp dimensions. When the cusp radii have values over 1mm, the pressure is minimal and the overall risks of biomechanical failure are lower.*

### DENTAL BIOCONTACTS MODELING

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*The tooth structure dilapidates itself due to bacterial pathogens (dental caries, periodontitis) and to mechanical factors. Food or gum chewing, tooth grinding or clenching are events in which upper and lower tooth come together. Dental contacts are loaded with forces of different intensity (based on muscle development, eating habits etc.) and through out the time deteriorate by wear and fracture. To prevent and diminish the harmful effects of abnormal dental loading, one must determine the stress state and strains which appear at different moments. For this purpose it is necessary to develop models of the dental biocontacts. In practical terms this is very difficult to achieve, therefore the most frequent used*

*are numerical models, which take advantage of the principles and equations from the different fields of mechanics. Thus one can use the hertzian contact concept, finite element method, combined with various aspects of tribology. None the less, new theories, principles and equations must be developed to reunite all the models so to be as close as possible to the real tooth anatomy and oral dynamic conditions.*

### MODELLING AND TESTING OF AN ADHESIVE BONDED JOINT

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*This paper presents a simulation of a single lap bonded joint and experimental results on the same geometry of adhesive joint, after being tested in traction. The model of the adhesive joint was run taking into account an elastic behavior of all involved materials and the obtained results were in agreement with the results obtained from traction tests. There were identified the failure mechanisms of the single lap bonded joints tested in traction. The simulation of the bonded joint gives good results in agreement with the results obtained from the traction tests.*

*Assemblies obtained by adhesive joint of fragile materials are characterized by larger spread ranges of the mechanical properties. Except Young modulus that exhibits a narrow range for traction tests, the other properties are spread  $\pm 30\%$  around the average values. For this assembly, the mechanical characteristics are lower as compared to each of the involved materials, but complex shapes may be obtained.*

### CERCETĂRI PRIVIND UN NOU TIP DE MOTOCOMPRESOR

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*The aim of this paper is to present a new type of motor air-compressor, namely the direct drive motor air-compressor; this is an original, patent-based solution.*

*The constructive solution and the functioning principle of the motor air-compressor are presented. Both power of the spark-ignition engine and the power needed for driving the compressor are calculated.*

*An energy analysis regarding the functioning of the motor air-compressor is elaborated and the experimental plant is presented; the advantages of the new type of motor air-compressor with respect to construction and to functioning are marked out.*

### **ELECTROHYDRAULIC SYSTEMS FOR CONTROLLING THE FLOW DIRECTION OF WIND TURBINES**

**Ioan Lepadatu, Liliana Dumitrescu**

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*In wind turbines with horizontal spindle which operate according to the principle of "wind-determined direction" there is a must that, according to the wind speed, the turbine should change position under various angles considering the wind direction. For a "wind-determined position" of the wind turbine, the authors of this paper have chosen hydraulic drive due to its advantages: high power density, accurate control over position etc.*

*The paper presents in brief three conceptual models of electro-hydraulic systems to control and actuate wind-determined direction of wind turbines:*

- *open loop electro-hydraulic system with proportional components;*
- *closed loop electro-hydraulic system with proportional components;*
- *open loop electro-hydraulic system with conventional components.*

### **MODERN TECHNOLOGIES OF MAINTENANCE, REPAIR AND TESTING FOR HYDRAULIC EQUIPMENTS**

**Cătălin Dumitrescu, Corneliu Cristescu**

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*The paper presents certain considerations regarding the activity of maintenance of the fluid power equipments and systems, including the equipment required for performing tests for checking and retesting the performance levels of the fluid power equipments, after they have been subjected to improvements or repairs.*

*It is also presented a case study, where, after an important technical intervention at a hydrostatic pump, it was required to be performed tests on the stand, both for checking and attesting performances*

*after repair and for its adjustment, followed by the presentation of the scientific results achieved.*

### **ENERGY EFFICIENCY OF THE HYDRAULIC PLATFORM OF THE ELEVATION - DESCENT FOR PEOPLE BY PROMOTING ENERGY RECOVERY**

**Catalin Dumitrescu, Corneliu Cristescu, Florin Georgescu, Liliana Dumitrescu**

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*The article presents a technical solution for recovery of potential energy, with industrial application for electro-driven lifting platforms which are used for lifting persons with disabilities. We know that a load (weight) elevated to a certain height, involves the use of a form of energy, which in most cases is not recovered, not even partially, but it is dissipated into the environment. The basic idea of the solution presented is the recovery of potential energy from the descent load (weight), its conversion and storage, followed by its use in lifting phase of load.*

### **THE MECHATRONIC DEVICES FOR HYDRAULIC SYSTEMS**

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*Hydraulic axis is a typical mechatronic system that combines fine mechanics, fluid power, electronics and computing. Modern devices embed all their control electronics components into mechanical body for increased reliability, cable reduction or elimination and global miniaturization. Together with specialists from Technical University Bucharest, our team from Research Institute for Hydraulics and Pneumatics started design of an integrated electronic module for hydraulic axis control based on 16-bit system on chip device. Extensive testing is performed in laboratory and on test bench to adapt control algorithm to mechanical subsystem specific aspects.*

### **MECHATRONIC CONTROL OF PRESSURE USING A PIEZOELECTRIC CONVERTOR**

**G.Matache, I. Dutu**

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*The paper presents the results of the mathematic model of the pilot stage of a piezoelectric pressure regulator, validated experimentally in the Laboratory of the Hydraulics and Pneumatics Institute from*

*Bucharest. The paper also presents original selection software for a piezoelectric actuator that is the basic component of the pressure regulator.*

### **RESEARCHES REGARDING MOVEMENT SYNCHRONIZATION OF TWO HYDRAULIC CYLINDERS FOR LIFTING APPLICATIONS**

**Radu Radoi, Gabriela Matache**

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*Machinery used in various fields such as construction, industry, agriculture and logging are the different mechanisms that must be operated simultaneously by two hydraulic cylinders which operate synchronously. The article presents some methods to synchronize hydraulic cylinders by using flow dividers and control elements, as well as the scheme with electro hydraulic proportional directional valves and hydraulic cylinders for lifting LVDT provided with the platform. Schemes can be applied for driving rigs a crane arm, a cross pressures and different mechanisms for the woodworking industry.*

### **CERCETĂRI DE MARKETING PRIVIND SATISFACEREA CLIENȚILOR UNUI DEALER AUTO AUTORIZAT**

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*Marketing research is a powerful management tool that can be used for risk management and decision making, to increase the turnover of a company. Defining and setting goals is the first step in making a successful marketing research. For carmaker, the main objective is to achieve maximum customer satisfaction considering the car bought. Regarding the authorized car dealer, the main objective is to become market leader in his exclusively holding, relying on customer focus, innovation and quality. The purpose of this paper is to study the customer satisfaction of a company car, setting guest satisfaction through authorized car dealer and how to place a marketing research in the field.*

### **MANAGEMENTUL RESURSELOR DE TIMP SI FINANCIARE**

**Tulea Claudia Oana, Alexandru Radulescu**

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*This paper presents the time and financial resources management to achieve a grain grinder. There were presented for this achievement three possible variants of making the project and it was chosen the best in terms of cost of the project.*