## ABSTRACTS

**Łukasz Czerech**
*Selection of Optimal Machining Strategy in the Manufacture of Elements Bounded by Curvilinear Surfaces*

Increasing machining accuracy realized on CNC machine tools causes that the more frequently surfaces machined with this technique are not subject to further finishing processing and directly affects on the final quality of the product. Achieving geometric accuracy established by the constructor is the problem that modern technologists and CAD/CAM programmers have to faced with. The paper presents the influence of toolpath tolerance and machining strategy available in CAD/CAM software on the constituting process of technological surface layer for elements limited with curvilinear surfaces. The impact of the above mentioned parameters on the location and direction of geometrical deviations were also analyzed. Following article is part of research of the impact of selected technological parameters on the freeform surfaces geometric structure manufactured on CNC machines.

**Artur Handke**
*Simpliefied Collision Detection in 4r Serial Manipulators*

This paper concerns the problem of designating criteria for assessing the possibility of a collision between the elements of serial manipulators with three rotary joints allowing to flex the segments in common plane oriented by rotating the fourth connection. The issue of contactless and efficient functioning of described group of manipulators has been considered in the spatial system. Equations were derived determining the possibility of a collision between selected segments of both manipulators. Collision detection model isn't based on the information from the tactile sensors, but only on the relative position between the segments of manipulators. Based on the parameters defining the collision, the search for method of impossible collision was set on designing level, in order to minimize the time needed to examine all possible scenarios of collisions between segments. The results were included in development of methods and algorithms for planning and controlling movements of finger modules in anthropomorphic manipulator during grasping objects of indeterminate shape.

**Radovan Hudák, Martin Šarik, Róbert Dadej, Jozef Živčák, Daniela Harachová**
*Material and Thermal Analysis of Laser Sintered Products*

Thermal analysis of laser processes can be used to predict thermal stresses and consequently deformation in a completed part. Analysis of temperature is also the basic for feedback of laser processing parameters in manufacturing. The quality of laser sintered parts greatly depends on proper selection of the input processing parameters, material properties and support creation. In order to relatively big heat stress in the built part during sintering process, the thermal simulation and thermal analysis, which could help better understand and solve the issue of parts d formations is very important. Main aim of presented work is to prepare input parameters for thermal simulations by the use of RadTherm software (Thermoanalytics Inc., USA), directly during the sintering process and after the process and find out the impact of the heat stress on a final shape and size of the prototype. Subsequently, an annealing process of constructed products after DMLS could be simulated and specified.

**Natália Jasminská, Tomáš Brestovič, Mária Čarnogurská**
*The Effect of Temperature Pyrolysis Process of Used Tires on the Quality of Output Products*

Pyrolysis together with gasification and combustion create a group of so called thermic processes. Unlike the combustion it is based on thermic decomposition of organic materials without any access of oxidative media. Within the pyrolytic process, three main fractions are created: solid residue, pyrolytic gas and organic liquid product – pyrolytic oil. The presented article examines the effects of pyrolysis operational conditions (above all, temperature) on gas products, solid residues and liquid fractions.

**Tadeusz Kaczorek**
*Singular Fractional Continuous-Time and Discrete-Time Linear Systems*

New classes of singular fractional continuous-time and discrete-time linear systems are introduced. Electrical circuits are example of singular fractional continuous-time systems. Using the Caputo definition of the fractional derivative, the Weierstrass regular pencil decomposition and Laplace transformation the solution to the state equation of singular fractional linear systems is derived. It is shown that every electrical circuit is a singular fractional systems if it contains at least one mesh consisting of branches with only ideal supercondensators and voltage sources or at least one node with branches with supercoils. Using the Weierstrass regular pencil decomposition the solution to the state equation of singular fractional discrete-time linear systems is derived. The considerations are illustrated by numerical examples.

**Marián Lázár, Natalia Jasminská, Marta Lengyelová**
*Experiment of Gasification of the Synthetically Mixed Sample of Waste in Nitrogen Atmosphere*

The article presents results of gasification of the synthetically mixed sample of waste in a 30 kVA transferred DC plasma reactor with a hollow graphite electrode. The subject of the research is a sample of waste consisting of components normally found in a municipal waste. The experimental test of waste gasification with a high level of organic fraction was implemented due to the verification of previously mentioned technology application also in the area of waste disposal at the current construction design of the reactor. Gasification took place in the inert atmosphere at the average temperature of 1578 °C. The goal of the experiment was the verification of possible synthesis gas production applicable in the energetic applications and focus of the possible usage of the energetic potential of, up to now not often used, secondary energy sources such as wastes.

**Zbigniew Oksiuta, Ewa Och**
*Corrosion Resistance of Mechanically Alloyed 14% Cr ODS Ferritic Steel*

The paper presents results of the corrosion resistance of mechanically alloyed oxide dispersion strengthened 14% Cr ferritic stainless. The oxide dispersion strengthened steel was prepared by means of the powder metallurgy route that consists of mechanical alloying of a pre-alloyed argon atomized steel powder (Fe-14Cr-2W-0.3Ti) with 0.3 Y2O3 (wt%), followed by HIPping at 1150°C and annealing at 850°C for 1 h. The density of ODS ferritic steel after consolidation was about 99.0% of theoretical alloy density. The potentiodynamic corrosion tests were performed for 1h and 24 h of material exposure in a physiological saline solution. For comparison the 316 LV austenitic stainless steel was also examined. The obtained results revealed that both materials were in a passive stage, however the lower current corrosion density was measured for 316 LV steel. On the contrary, the austenitic stainless steel exhibited unstable chemical processes at the passive region. On the surface of both materials localized pitting corrosion was observed with different morphology of the cavities. A broken oxide scale with poor adhesion to the ferritic steel matrix with large number of density of localized corrosion attack was observed on the surface of the ODS steel.

**Łukasz Sajewski**
*Positive Minimal Realization of Continuous-Discrete Linear Systems with All-Pole and All-Zero Transfer Function*

The positive and minimal realization problem for continuous-discrete linear single-input and single-outputs (SISO) systems is formulated. Two special case of the continuous-discrete systems are given. Method based on the state variable diagram for finding a positive and minimal realization of a given proper transfer function is proposed. Sufficient conditions for the existence of a positive minimal realization of a given proper transfer function of all-pole and all-zero systems are established. Two procedures for computation of a positive minimal realization are proposed and illustrated by a numerical examples.

**Heorhiy Sulym, Iaroslav Pasternak, Serhiy Kutsyk, Wojciech Grodzki**
*Doubly Periodic Sets of Thin Branched Inclusions in the Elastic Medium: Stress Concentration and Effective Properties*

This paper considers the doubly periodic problem of elasticity for anisotropic solids containing regular sets of thin branched in-clusions. A coupling principle for continua of different dimension is utilized for modeling of thin inhomogeneities and the boundary element technique is adopted for numerical solution of the problem. The branches of the inclusion can interact both inside the representative volume element and at the interface of neighbor representative elements. A particular example of the elastic medium reinforced by a doubly periodic set of I-beams is considered. Stress intensity and stress concentration inside and outside thin inclusions are determined. The dependence of the effective mechanical properties of the reinforced composite material on the volume fraction of the filament and its rigidity is obtained.

**Ihor Turchyn, Olga Turchyn**
*Transient Plane Waves in Multilayered Half-Space*

Considered the dynamic problem of the theory of elasticity for multilayered half-space. Boundary surface of inhomogeneous half-space loaded with normal load, and the boundaries of separation layers are in conditions of ideal mechanical contact. The formulation involves non-classical separation of equations of motion using two functions with a particular mechanical meaning volumetric expansion and function of acceleration of the shift. In terms of these functions obtained two wave equation, written boundary conditions and the conditions of ideal mechanical contact of layers. Using the Laguerre and Fourier integral transformations was obtained the solution of the formulated problem. The results of the calcu-lation of the stress-strain state in the half-space with a coating for a local impact loading are presented.

**Grzegorz Żywica**
*The Dynamic Performance Analysis of the Foil Bearing Struture*

Foil bearings are a variety of slide bearings in which an additional set of foils is applied between journal and bush, in order to improve the se-lected static and dynamic properties. Engineers and researchers from all over the world investigate bearings of this type since many years – both from numerical as well as experimental point of view. Due to the complexity of construction, the reliable simulation models are all the time being searched for. This paper discusses the important stages of elaboration of the structural supporting layer numerical model of the foil bearing as well as results of verification tests. The main goal of the conducted study was assessment of reliability of the elaborated numerical model, in scope of dynamic properties. In the near future it will be used for elaboration of the numerical model of the entire foil bearing, which will take into account also phenomena in fluid-film layer. Those models will be used together to describe bearing system in operation.