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Content

Optimization of Adhesive Layer Thickness at Metal Bonding Using Quick-Setting Adhesives

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In the contribution the results of bonded joints laboratory tests are published. For bonding of test samples five different types of quick-setting adhesives were used. The determination of the tensile lap-shear strength of rigid-to-rigid bonded assemblies according to the standard CSN EN 1465 (66 8510) was the aim of carried out tests. The samples were made from steel and duralumin sheets. Ahead of bonding the surfaces of all samples were blasted using corundum grit and degreased. Bonded joints of different adhesive layer thickness were tested. The layer thickness was secured using two copper wires of the appropriate diameter, which were placed between the bonded surfaces. By the test results evaluation the optimum adhesive layer thicknesses were determined, when the concrete bonded joint strength is the highest.

Keywords: adhesive bonding, quick-setting adhesives, technological properties of adhesives, testing of bonded joints

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An Experimental Assessment of Special Metal Castings in Reducing Abrasive Wear

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In both the engineering and the agricultural industries, components that are no longer considered entirely fit for purpose are already being exchanged for new parts that have a longer operating life. Today's fast developing industrial sectors are making higher demands on standards for the quality of their components. Such components and their lifetimes are very closely linked to the discovery of new materials which will better meet the requirements of the individual industries. This paper describes the experimental assessment of special castings from the viewpoint of their durability in the face of abrasive wear and friction, density, hardness and their metallurgical structure. In laboratory tests, ten experimental samples were prepared containing increasing amounts of carbon and chromium, whilst the other chemical elements remained constant. Durability in the face of abrasive wear was evaluated on grinding plates with various sizes of abrasive parts. Hardness was determined according to the Vickers method. The results of the experiments confirm the hypothesis of a proportionate increase in resistance to abrasive wear with the increase in carbon and chromium.

Keywords: special castings, abrasive wear, density, hardness, metallography

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Studying of Cutting Zone When Finishing Titanium Alloy by Application of Multifunction Measuring System

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With the development of the automotive and aerospace industry and also biomedicine, exotic alloys are more and more used from all machined materials, especially titanium and nickel alloys, but which are hard-machined materials. Therefore it is necessary to know their behavior when machining, thoroughly. Processes occurring in the cutting zone when machining, are so complicated and dynamic, that their definition is carried out by certain specified models. Because the models have errors and deviations, it is needed to improve their observation so, that these deviations will manifest minimally or not. Based on the scientific research of the cutting zone, the multifunction measuring system was designed, which allows simultaneous measuring of components force of cutting, heat distribution and deformation processes in cutting zone during machining without its interruption.

Keywords: multifunction measuring system, cutting zone, high-speed movie, titanium alloys

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The Methodology of Quality Matrix in Manufacturing Quality Process Improvement

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In each industrial entrepreneur organization around the globe a three dimensional objective well known under the abbreviation QCD (Quality, Costs, and Delivery) is examined, pursued, and evaluated on daily basis. The nowadays crucial philosophy pertaining to process improvement in terms of quality assurance and significant cost reduction is that: "The quality must be manufactured and not controlled up". In order to be successful on the market place it is necessary to orchestrate, implement and carry out an advanced production quality assurance system with appropriate tools of course accompanying with previously precisely organized prototype and pre-serial stages of production. The article deals with a proposal of adequate methodology and the experimental implementation of quality matrix into manufacturing process assurance in order to improve a quality level and the whole QCD.

Keywords: process improvement, quality assurance, quality tools, quality matrix

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Manufacturing of Femoral Heads from Ti-6Al-4V Alloy with High Speed Machining: 3D Finite Element Modelling and Experimental Validation

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Titanium alloys are used for the manufacturing of femoral heads for orthopaedic implants. Poor machinability of these materials, especially at high speeds, creates the need for more detailed investigations on this subject. The at hand study analyzes the construction of 3D Finite Element Method (FEM) models pertaining to the manufacturing of femoral heads made from Ti-6Al-4V. For this purpose a commercial FEM programme is employed, specialising in machining modelling, namely AdvantEdge. The validation of the model is provided through experiments on actual femoral heads cut in a CNC lathe at high cutting speeds. Comparison between experimental and numerical results on cutting forces and chip morphology exhibits a good agreement, indicating the success of the proposed models. These 3D models can be used for realistically estimating the influence of cutting conditions on the final product, without performing time and money consuming experiments.

Keywords: Femoral Heads, High Speed Machining, Titanium alloys, FEM Modelling, Chip Morphology

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The Test Stand Load Modulus Implementation for the Realistic Railway Operation in the Laboratory Conditions

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The aim of the article is to present the necessity of completion of the test stand of brake components of railway vehicles with the equivalent railway operation load simulator for the research of the wheel wear on it. The other aim of presented research needs is to perform the analysis of the equivalent conicity as a parameter for the rail vehicles in operation ride properties prediction. The sub aims are the change of frame, wheel, braking forces load via SIMRAIL simulator program load collection performance.

Keywords: test stand, railway operation, laboratory conditions, wheel tread wear, equivalent conicity

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Developing Superplasticity in A AZ91 Magnesium Alloy Through a Combination of Rolling, ARB and ECAP

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The paper summarises results of experiments aimed at development of structure of modified Mg-Al-Zn alloys at hot deformation. Methods ARB and ECAP were used in the described experiment. It was proved that hardly forming materials could achieve very high plastics properties. After making plastics deformation, the using materials of alloy AZ91 analysed superplastics behaviour, it was certified by obtaining results, when ductility to rupture of alloy AZ91 was 418 %, it is demostrated at conclusion of the article. The experiment proved big influence of previous plastics deformation to ending values of mechanical properties. It was verified that better results are at rolling in more steps compared to rolling in one pass. The low submission temperature at last pass through die ,it causes obtaining higher final properties. It was obtained the material about grain size d ≈ 0.7 μm during using the technology of ECAP. Abreast of it the technology ARB enabled to get material of grain size in interval d ≈ 1-10 μm. The sekond technology brings higher strength properties. Only 3 cycles were sufficient to lower original grain size under limit 10 μm.

Keywords: magnesium alloys, ECAP, microstructure, mechanical properties, superplasticity

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Optimization of the Solution Annealing Treatment of the AlSi10Mg(Cu) Alloy

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This paper presents an analysis of phase compositions and micro-hardness of AlSi10Mg(Cu) alloy. The EDX analysis was used for determination of various intermetallic phases in separately prepared cast samples with different solution annealing treatment. It was found that copper does not take part in precipitation strengthening process of the matrix. Furthermore, the theoretical and practical experiments confirmed that the solution annealing 60-minute holding time at 530 °C is sufficient to dissolve the intermetallic phases via the hardening element - magnesium. Industrial practice is very far from this fact.

Keywords: AlSi10Mg(Cu) alloy, anneling, optimizationReferences

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Evaluation of Machining Strategies for Production of Free Form Surfaces Using 3-Axle Milling

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The components with formed surfaces are being an important category of the machine parts. They are applied in the most of industrial branches. In order to produce such type of machine parts it is necessary to harmonise the contradictory requirements, e.g. the minimal production time, the required precision of dimensions and the surface quality. A relevant role is playing the chosen machining strategy specified for the above-mentioned demands, namely during the finishing operations. The most important evaluation criteria for selection of the concrete CAM-system are: the disposable machining strategies, visualisation level of the proposed process and recognition of the virtually machined surface. The term "machining strategy" represents the pre-defined (and in the CAM-system also the available) tool trajectories that are optimised for machining of the variable formed surfaces so that the work-piece could be machined most effectively. A projection and evaluation of the cutting trajectories is not a simple process. There are at disposal many professional articles, which started to be published after occurrence of the first software solutions created as a support of the NC-software development. A development of the new strategies, i.e. the projection and optimisation of the new methods for control of the tool movement on the machined surface, is a multidisciplinary area, which requires knowledge from the theory of machining, descriptive geometry, informatics and also mathematics. The standard machining applications are such strategies, for example, that are able to optimise the cutting conditions in order to achieve a constant loading of the tool and in this way they enable prolongation of the tool durability as well as improving of the manufactured surface quality. Another important area is also evaluation and comparison of the existing strategies because the proper choice of them can help to reduce the machining times and the tool wear-out due to a shortened length of the tool operational path. This fact has a relevant impact on the production efficiency. The main topic of this paper is a description of the quality analysis focused on a surface area, which was machined by means of the various milling strategies and at the same time there were monitored deviations of the machined surface in comparison to the original 3D-model of the free-form surface area. This matters is analysed in [1], [2], [3], [4].

Keywords: free-form surface, three-axis CNC milling, CAD/CAM/CNC, cutter path strategies, scallop height

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The Influence of Process Fluids on the Properties of the Surface Layer of Machined Components

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MicroScan 600-1 is a digital Barkhausen noise analyzer. It is designed for fast nondestructive surface quality control and subsurface layers of machine parts from ferromagnetic materials and for evaluating of defects which are caused by changes of residual stresses. By the instrument based on an analysis of the Barkhausen noise is determined the value of magnetoelastic parameter. Experiments which evaluated the influence of different types of process fluids to the machining process and technological properties of the machined parts from constructional steel 16MnCr (ČSN 14 220) were carried out in the laboratory of the Department of Machining and Assembly at TU in Liberec. Turned, milled and grinded test samples by using five different types of process fluids were evaluated using the analyzer. For The comparison was machining carried out also without inlet process fluid, i.e. "dry" and with the process fluid - water. Measurements of magnetoelastic parameter were performed repeatedly and measured values were statistically processed. The paper presents the resulting values of this parameter showing the influence of process fluids on the properties of the surface layer of the machined parts.

Keywords: machining, process fluids, surface integrity, magnetoelastic parameter

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The Machinability of Duplex Stainless Steel – Solutions in Practice

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In production practice, it is important to know the machinability of new constructional materials. This is related to the selection of adequate cutting tools and machining conditions. One of such relatively new materials is Duplex Stainless Steel (DSS). Manufacturing machine parts of hard-to-machine material is very troublesome. It is still more difficult when high quality requirements are to be met. Duplex stainless steel is used in applications for very severe working conditions, e.g. for modern deep-well pump bodies for mining industry or the shafts of electric mixer motors in food industry. This paper discusses the effect of cutting conditions on the machinability of DSS. The advantages and disadvantages of various tool materials with regard to machining of DSS are highlighted. Problems associated with the machining of DSS as well as tool wear and the mechanisms responsible for tool failure are identified and discussed. However, the machinability of DSS is an area that needs to be studied more deeply to cut the production cost.

Keywords: Duplex Stainless Steel, machining, machinability

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Utilization of Advanced Simulation Methods for Solving of Assembly Processes Automation Partial Tasks

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Projecting and designing of automated assembly cells/lines is very complicated process. The rising demand on an assembly high quality, precision, effectiveness and shorter time to market. Puts the high requirements on the all active devices which act at the automated workplace. Assembly robot with its effector influences the effectiveness of the proposed assembly automation very significantly. Design or choice of the assembly robot and its robotic gripper namely is very important step of the automated assembly cells/lines projecting. Secure and stable holding of an assembly object by robotic gripper is one of significant conditions for trouble-less execution of the object automatic implementation into assembly joint. This article presents our experiences with utilization of advanced simulation methods for the specialized robotic gripper grasping ability exploration for purposes to evaluate a safe and stable grasping of different objects. Virtual reality tools - eon reality and haptic device with glove and finger actuators (CyberForce) were applied for simulation experiments realization too.

Keywords: automated assembly, object grasping, simulation model, CAD/CAE systems, virtual reality

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The FASTSIM Method Modification to Speed up the Calculation of Tangential Contact Stresses between Wheel and Rail

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The articles deals with the way of calculation of tangential stresses over non-elliptical contact patch, where is possible to utilize with advantage the Kalker's simplified method FASTSIM. This method named FASTSTRIP is adapted for non-elliptical contact area calculated by means of the Strip method. This method is almost quick as FASTSIM and the results are similar to the CONTACT results. This method may be useful for rail vehicles in track dynamics computation.

Keywords: tangential contact, strip method, FASTSIM, contact patch, Kalker method, FASTSTRIP

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Application of Taguchi Method and Surface Response Methodology to Evaluate Of Mathematical Models to Chip Deformation when Drilling With Coated and Uncoated Twist Drills

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The paper deals with the methodology and suitability of mathematical models applying analysis of the signal-to-noise (S/N) ratio as well as analysis of variance (ANOVA) and surface response methodology (RSM) on effect of TiAlN coating on chip ratio when drilling with HSS Co5 twist drill with diameter of 8 mm. Experimental work was performed according to design of experiment (DoE) Taguchi method. Cutting speed v_c (m/min) and feed f (mm/rev) were selected as control factors in three levels and chip ratio K was used as a response variable. The main aim of this study is to establish relevant methodology for short term testing and find adequate mathematical model for chip ratio parameter $K = f(v_c, f)$ as a function of cutting condition when drilling with PVD coated and uncoated tool. Statistical software Minitab 14 was employed to process and evaluate of experimental data. The effect of feed and cutting speed on chip ratio was investigated through analysis of the signal-to-noise (S/N) ratio and analysis of variance. Equations for chip ratio K as a function of control factors were developed.

Keywords: chip ratio, drilling, Taguchi method, RSM, ANOVA, mathematical models

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Cutting Forces by Turning of Inconel 718 with Inserts from Different Materials

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This paper presents achieved results by measuring of force load tool by turning of nickel alloy Inconel 718 with sintered carbide with progressive chip breaker designed by Pramet Tools Ltd. Company and with cutting ceramics inserts produced by Greenleaf Company. Authors deal with studying of force load which is exposed the cutting tool by conditions, when are achieved limit values in view of tool wear. In the end it is carried out a comparison of intensity of components of cutting force for these limit conditions. Very interesting is finding that by machining with worst cutting conditions the force load on insert cutting edge is smaller than by machining with best cutting parameters. This fact can be reasoned by the fact that at higher cutting conditions we are getting into the area of HSC machining for Inconel 718 and therefore the cutting forces are smaller. There is more heat produced in cutting zone. This influence undesirably sintered carbide during cutting process. Vice versa, high temperature influences positive cutting with cutting ceramics, as show simultaneously carrying experiments.

Keywords: turning, Inconel 718, cutting ceramics, sintered carbide, force load

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Research of Renovation Possibility of Machine Tools Damage by Adhesive Bonding Technology

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Nowadays, there is a huge number of machine tools of various damage degree all over the world and it is necessary to renovate them. Some parts can be renovated by the adhesive bonding technology. However, it is necessary to quantify the degradation process. The aim of experiments was to set the influence of cutting fluid on the strength changes of adhesive bonds. In cases of satisfactory results it is possible to use with success the adhesive bonding technology for the renovation of damaged parts of machine tools. On the basis of the performed experiments it can be said that the resultant strength of adhesive bonds decreases during the time at simultaneous acting of the cutting fluid. From the experiments results the same influence on the degradation process of various adhesives was not proved. It came to a stagnation of the adhesive bond strength decrease after 75 days on the average.

Keywords: adhesive bonding technology, cutting fluid, degradation, failure area, renovation

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Influence Ceramic Powder SiC Moisture during Green Machining

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This article describes the principle of Green Machining technologies and experimental tracking of moisture of ceramic granulate during the drying process. Green machining involves the machining of metal or ceramic bodies in the "green" state prior to sintering. Typically these bodies are comprised of ceramic or metal powder held together by an organic binder. In this state they are far easier to machine than monolithic blocks of the corresponding metal and ceramic. One of the materials that can be used in the green machining is silicon carbide. This material is produced in the process of spraying the emulsion in drying kiln. This process is very important considering the quality of ceramic powder with respect to its further use. One of the most important parameters to be monitored during the spraying is the moisture of the ceramic powder (granulate). [8][2]

Keywords: spraying, moisture, ceramic powder, green machining

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Utilization of Multibody Simulations at the Trolleybus Development

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ŠKODA VÝZKUM s.r.o. (now Výzkumný a zkušební ústav Plzeň s.r.o.) cooperated on the development of the NEOPLAN DMA low-floor articulated trolleybus intended for the Boston city (the United States). Multibody models and finite element models of the trolleybus were utilized in the stage of the vehicle design. The multibody models of the trolleybus were created in the Alaska simulation tool and the simulations (running over a large road unevenness, start, braking and driving through a bend) were aimed at determining forces acting in the trolleybus suspension elements and radius rods. Time histories of the forces calculated using multibody models were used as the input data of the trolleybus finite element models. Utilizing the finite element models the critical places of the trolleybus body structure from the point of view of high stresses were determined. At the measurement with the real trolleybus prototype these places were provided with strain gauges.

Keywords: trolleybus, multibody model, dynamics, constructional design

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The Affect of Input Factors on the Optimisation of Cutting Conditions and Production Costs in Turning with Cutting Inserts

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In this paper the effect of factors entering into the optimisation of cutting conditions and affecting production costs in turning is analysed. Optimisation of cutting conditions affects every manufacturing company in the field of machining, and represents an important area of the economy these enterprises. The aim of the research was to determine the size of the influence of input factors on the results of the calculation of the optimisation of cutting conditions using inserts in turning. Each constant is moving at a definite recommended range of values depending on various conditions. If we find out what the most important input factors most affecting the calculation of the optimisation of cutting conditions, we are able to focus primarily on the following factors. Influences of selected factors on costs are presented in graphs showing their interdependence. The influences of the input factors received from overall analysis were categorized by importance and created a list containing three groups significance of individual factors. According to the created groups a company can more easily focus on the parameters that most affecting the cost of turning, thereby improving the selection of specific technical, economic or time values in the company.

Keywords: optimisation, cutting conditions, production costs, inserts, turning

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Influence of Laser Welding Aluminium Alloy on Mechanical Properties of Welded Joints

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Paper deals with the analysis of aluminium alloy welded joints produced by disk laser. Naturally hardenable Al alloy type AW 7075, 2.5 mm in thickness was suggested as welded material. Welded joints were produced by use of disk laser type TruDisk 4002 with 1.03 µm wavelength and maximum power P = 2.0 kW. Welded joints were fabricated with different parameters. Laser power varied within interval from 1.6 to 1.7 kW and welding speed was invariable 30 mm/s. Welding was performed without the use of filler metal. Laser light cable in diameter Ø 400 µm (spot diameter Ø 748 µm) was used. Welding was performed with Ar shielding gas with 10 l/min flow rate. Also root protection was provided with an inert gas (Ar). The focal length was f = 200 mm. Laser beam was focused under the surface of welded material. Evaluation of fabricated welds was carried out by use of light microscopy, microhardness measurement across the boundary of welded joints and static tensile test.

Keywords: laser welding, disk laser, aluminium alloy AW 7075, natural aging, quality control of welds

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Passive Seat Suspension With a Vibration Absorber

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The paper deals with modelling and optimization of a working machine seat suspension system parameters. Experimental work in the past shown that it is possible to replace even more complicated, for example parallelogram or scissor mechanisms, with simpler dynamic models of 1 or 1.5 degree of freedom (Zener model). The optimization of stiffness and damping parameters is realized using multiobjective function. The first component of the function expresses the acceleration of the seat squab, this points on the comfort of the seat, the second one expresses the relative displacement of the seat squab in regard to the working machine cabin, points on the better operator's sightedness and safe handling of the machine. This optimization process allows to propose so called „soft", „medium", or „hard" seat suspensions according to the value of the weighting coefficient. The paper also points on the possibility of improving the dynamic characteritics of the seat with the use of a vibration absorber. The expediency of its application is especially in working machines without significant changes in the seat excitation frequency spectrum.

Keywords: passive seat suspension, vibration absorber, modelling, optimization, frequency spectrum

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Semiactive Seat Suspension With a Vibration Absorber

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The paper deals with modelling and optimization of dynamic characteristics of a semiactive suspension of the working machine seat with a vibration absorber. The suspension is composed of a spring paralelly ordered with a semiactive damper controled by the sky-hook control algorithm. For the improvement of the dynamic characteritics of the semiactive suspension there is also analysed the effect of a vibration absorber. The dynamic characteritics of the suspensions are optimized by the multiobjective optimization, where besides the component respecting the effect of the effective accleration of the seat also the effect of the effective relative displacement between the seat and fhe floor of the working machine cabin is considered.

Keywords: semiactive seat suspension, sky-hook control, vibration absorber, modelling, optimization

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Using of Barkhausen Noise Analysis and X-Ray Diffraction for Evaluation Of Surface Integrity

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This paper presents results of study of grinded gears in order to describes surface integrity and verify the correlation between Barkhausen noise analysis and X-ray diffraction. Gears are used in the wind power plant and made of case-hardened steel 18CrNiMo7-6. Barkhausen noise analysis and X-ray diffraction was used for measurement. Barkhausen analysis method is one of the fast nondestructive methods used to assess the integrity of surface. For comparison of grinding processes were used different cutting speeds and numbers of material removal. X-ray diffraction method was used also for measurement of residual stresses. Due to correlation between measured values the optimization of grinding process of gears will be done.

Keywords: Barkhausen noise, x-ray diffraction, grinding of gears, surface integrity

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Simulation of Liquid Flow in Pipe

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The paper deals with the mathematic modeling of the liquid turbulent flow in the pipe with circular cross-section. The aim is to compare two methods of solution for various geometries and Reynolds numbers. One of the methods is simulation of the system in the commercial software ANSYS Fluent, the second one is analytical solution for simple geometry by equation usually applied in the common design process. The work arises from the requirement to design the computational model based on the FVM, which enables to simulate the various physical phenomena which appear at liquid flow. The solved problem is quite range and therefore the work is only the first part of the systematic investigation. This basic part is important for the decision of the suitable software tools, turbulent model, etc. The investigation of the heat transfer on the cross flow over the tube placed in the bounded surrounding.

Keywords: fluid flow, turbulence, Reynolds number, circular tube

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Methods of Measuring of Residual Stresses and Evaluation of Residual State of Functional Surfaces by X-Ray Diffractometric Methods

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Objectives of the paper are intended to implement system solutions to nondestructive evaluation of technologies associated with verification of equipment, preparation of samples with different types of functional properties and their subsequent evaluation of various scientific methods. The main objective of experiments is to transform new knowledge of non-destructive technologies into industrial practice in the evaluation of functional properties of the surface and subsurface layers of these technologies. The aim is to increase the level of cooperation R & D institutions with social and economic practices through knowledge and technology transfer, and thus contribute to increased economic growth of the regions in Slovakia. This work is related to the project with the University of Zilina OPVaV-2009/2.2/04-SORO number (26220220101). Its name is Intelligent System for Nondestructive Technologies to evaluation of functional properties of parts of X-ray-diffractometry. The main objective of the project is to transform new nondestructive technology for knowledge transfer to industry for evaluation of functional parts in surface and subsurface layers of non-destructive techniques.

Keywords: residual stress, X - ray diffractometry, machining

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Dynamic Measurement of Four-Axle Railway Wagon

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This article describes the determination of geometric, mass and stiffness parameters of the individual part of plateau wagon. After measurements were taken the position change of the chassis of the vehicle body and wheel when driving the vehicle over obstacles was observed. The obstacles were formed by wedges. Experimental detection of parameter has been used in the analytical investigation of kinematically excited system of three-body space flexibly stored and linked.

Keywords: railway vehicles, dynamic measurements, vertical oscillation, unbalance

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Verification of Numeric Solution by Experiment for Examination Vertical Oscillation of a Mechanical System

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The paper dealt with the influence of geometric asymmetry on the vertical vibration of symmetrically or asymmetrically loaded mechanical system. The system is composed of rigid flexibly linked elements. Kinematic excitation was carried out by a unit jump (jump of the springs), excitation of system was symmetric and asymmetric. The system of elements was examined experimentally and numerically. The numerical model was verified by experimental solution. Numerical solutions were carried out by finite element method (FEM) applied to model that respected the design and conditions of the laboratory model for experimental investigations. The aim of the work was to create a numerical model based on the finite element method and to verify the results of the model. The obtained results can be applied to flexible storage machines.

Keywords: mechanical system, oscillation, unbalance, excitation

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Changes of Polyurethane Mechanical Properties Filled with Glass Powder

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Polyurethanes belong to a wide group of polymers which are applied in many industrial branches. Some polyurethanes can be filled with various types of fillers which optimize their properties for given application. In the paper there are described basic mechanical properties of a constructional two-component polyurethane resin which was filled with microparticles of a glass powder. The aim of the experiment is to define a resulted hardness, a tensile strength and a shear strength of the filled polyurethane resin and set its utility properties further to an application usage of a company PSP Izoterm Ltd. From the measured values 14% increase of the hardness of the filled systems compared with the unfilled resin is visible, the shear strength of the filled systems did not differ statistically significantly from the unfilled polyurethane, the tensile strength of the polyurethane filled with 5% of the glass powder was statistically the same with the strength of the unfilled polyurethane.

Keywords: hardness, shear strength, tensile strength

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Realistic Dependence T-v_c for Recent Cutting Materials

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Cutting property of tool materials is classically considered on the base of durability tests, the result of which is dependence of tool durability on cutting speed known as T-v_c dependence. It was first developed by Taylor in 1906 to evalueate the durability of high-speed steel [1]. This relation, which is interpoled by a line in double logarithmic coordinate system, has been used also for the observation of the durability of sintered carbids and cutting tools made of ceramics. As the experiments show, T-v_c dependence for such cutting materials is considerably different from the dependence for hig-speed steel. However, they have not been examined thoroughly yet because they require complex experimental tests. In the strive to make the tests simpler, ISO 3685 standard was formed: Tool-life testing with single-point turning tools [2], which, however, prescribes to evaluate durability only in limited range of cutting speeds. The aim of this paper is a suggestion of the evalueation of tool durability by the dependence of the size of tool wear on cutting speed ($VB = f(v_c)$ for constant machining time (τ_s). The dependence has the same predication value as T-v_c dependence and considerably shorter time is necessary for its formation [3].

Keywords: machining, cutting speed, tool durability

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New Technological Knowledge of the Rotary Turning Tool

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In the previous paper [12], a design of location and construction of a rotating turning tool has been documented. Sporadically, this tool has appeared in literature [1], [2], [3], [4] in different applications. So far its operational characteristics, mainly its considerable influence on machined surface quality, exceptional durability and possibility to be used to turn hard machinable materials have not been appreciated. Some of its priorities are verified in the paper.

Keywords: rotating tool, tool durability, machined surface quality

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Compacting of Aluminium Alloys Prepared by Melt Spinning Method

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Aluminium alloys prepared by rapid solidification (RS) are characterized by very fine microstructure, increased hardness and thermal stability, which determine these alloys to be used especially in an automotive or aerospace industry. However, there is no practical use for rapidly solidified alloys in the form of thin ribbons and further processing of the material is necessary. Compacting of rapidly solidified alloys can be realized by hot extrusion or hot pressing. The aim of this work was to prepare a metallic powder from RS alloys by cryogenic milling and to compact the powder into a bulk material by hot pressing. Both microstructure and phase composition of hot pressed products were studied and compared. Alloys of chemical composition Al-Fe-X, where X means transition metal Cr or Ni, were studied.

Keywords: rapid solidification, aluminium alloys, hot pressing, microstructure, transition metals

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The Influence of Human Motivation Factors on the Successful Implementation of Product Life Cycle Management Tools: Explorative Findings and Managerial Implications

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For technology firms it is crucial to integrate progressive product design methods such as Product Lifecycle Management (PLM) tools in their daily routines to improve the quality of the product development process. However, in practice one problem arises: research and development (R&D) employees show little motivation to implement these tools in their work. This paper aims at determining human factors for successful implementation of PLM by studying the motivation of R&D employees. Based on a literature study, face-to-face interviews with 16 R&D experts were performed. Furthermore, a survey study with 22 participants using online questionnaires was conducted. Based on the results of the data analysis, a list of critical human success factors which help managers to implement PLM tools in R&D departments of technology firms successfully is presented.

Keywords: product lifecycle management tools, human factors, motivation, research and development

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