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Properties of Briquettes from Paper Waste

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Worldwide increasing energy demand is today permanently covered by a majority of non-renewable energy sources, namely by coal, crude oil and natural gas. This causes the rapid decline of their reserves and the time gets near when they will be run out. Therefore in last years the exploitation of renewable energy sources is permanently preferred. One of alternative fuel forms is the fuel on the basis of paper waste. In this paper the results of tests are published, which were carried out using five sorts of paper waste, pressed in form of briquettes. During the tests following briquettes parameters were watched: moisture content, ash amount, length and diameter, weight, density, rupture force and mechanical durability. The results are presented in form of tables and graphs. It was proved that briquettes made from recovered paper and board are compared with briquettes from wood waste of high density, high mechanical durability and for their rupture the relatively high force is necessary. But at the same time they have high ash amount and low combustion heat.

Keywords: renewable energy sources, recovered paper and board, briquetting, properties of briquettes, mechanical durability

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Hard Machinable Machining of Cobalt-based Superalloy

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The main aim is testing the basic properties of cobalt super alloys, under its own brand name HAYNES, marking No. 188, at machining and propose the most suitable cutting materials and machining parameters. The superalloys are developed for elevation of temperature service where relatively severe mechanical stressing is encountered and high surface stability is frequently required. The cobalt-based alloys have been in use for several decades in the manufacturing of various components. Although technology development rises in chipless machining such as moulding, precision casting and other manufacturing methods, the machining is still number one, at piece production which is typical for energy and chemical engineering. The driving force for their development still has been requirement of higher operating temperatures for many manufacturing fields in industry area.

Keywords: geometric accuracy, testing, milling machine, tool wear, superalloy

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CRM as a competitive advantage

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In order to increase their own competitiveness, companies have to adapt to market conditions and factors that directly affect them - suppliers, competitors, customers. In particular, at present - in a society of excess, the issue of competitiveness is growing. Enterprises have only a limited amount of resources to serve them as a competitive advantage, and it is essential that they invest as efficiently as possible. The companies can implement this only if there is a full understanding of customer needs and the environment in which they carry out their business. Products are converging by their quality and characteristics, and no one can achieve a competitive advantage only by the physical characteristics of products and prices. To have a successful business, it is vital to be able to identify valuable customers, and build a mutually beneficial relationship with them based on customer satisfaction, loyalty and trust. In this respect, the strategy for Customer Relationship Management (CRM) is being conductive. The strategy is based on individual customer care, identifying their needs and creating mutually beneficial relationships between enterprise and customer and creating value for customers.

Keywords: Customer relationship management, differentiated approach to customers, customer value, competitiveness of companies.

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Nondestructive micromagnetic evaluation of surface damage after grinding

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This paper deals with investigation of surface damage induced by grinding operation as a result of dry grinding through micromagnetic technique based on Barkhausen noise. This study presents information about wet and dry grinding and associated surface integrity expressed in such term as residual stresses, structure alterations beneath the ground surface and corresponding magnetoelastic responses. Lack of coolant or insufficient coolant supply can be found as a reason of surface burn during grinding. Therefore, this paper compare magnetoelastic responses of surface obtained during wet and dry grinding. Results of experiment indicate that properly suggested monitoring system can reliably detect surface burn induced by thermal overload of ground surface.

Key words: Barkhausen noise, grinding, coolant

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Postprocessing of CL Data in CAD/CAM system Edgecam using the Constructor of postprocessors

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Introduction into problems - the present CAD/CAM systems integrate part modelling and engineering design, proposal of technological documentation in the form of NC programs and operational management of production within a one computer system. Their utilization allows the programmer to create machining technology, to define the tool paths and to generate NC programs for very complex shape parts [7]. Final product of CAM system is CL Data files, which include all the steps of toolpaths and technological process. If we want to connect the information produced by the CAM system with the concrete CNC machine, we need to use NC postprocessor. Generator of postprocessors to help users faster creates the specific postprocessor. Universal postprocessor does not exist. Unfortunately, it is necessary to create and to program it for each machine separately. This paper presents a use of the software tool “Constructor of postprocessors”, by the creation of postprocessor in CAD/CAM system Edgecam. Postprocessor was developed for turning machine EMCO Concept Turn 55 with control system SIEMENS 840D at the Department of Automation and Production Systems (DAPS) Faculty of Mechanical Engineering.

Keywords: and lower case, normal, justified into block

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Application of Electron Scanning Microscope in the Analysis of the Structure of Casting Non-Conformities Aimed at Optimization of Technological Process Parameters

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The structural content of castings and non-conformities that might occur in pressure die casting is mainly connected with technological parameters. Analysis of the casting structure helps identify a group of causes of non-conformities which are connected with improper choice of technological parameters. The non-conformities identified in the pressure die castings discussed in the paper were analysed by means of metallographic examinations. An electron scanning microscope was used in the study for the analysis of the structure of casts. This analysis allowed for identification of the causes of e.g. shrinkage depressions or misruns. The analysis of the structure of a casting in the location of the depression revealed insufficient cooling time used for this casting.

Keywords: pressure die casting, non-conformities, AlSi alloys

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Increasing the accuracy of the effect of processing materials and cutting tool wear on the ploughing force values

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The determination of the ploughing forces is necessary for wear monitoring of the cutting tool in micro cutting. The extrapolation method on zero cut chip thickness is used very often to determine the ploughing forces. But there are many opponents of the extrapolation method on zero uncut thickness. The aim of this research was to increase the accuracy of determination of the ploughing force and to investigate the effect of processing materials and cutting tool wear on the ploughing force values. To achieve this aim was used the method comparing total forces at different flank levels of wear to determine the ploughing forces. The experiments were performed by cutting of aluminum alloys, structural steels and stainless steel with different cutting tool wear.

Keywords: machining, ploughing force, micro cutting

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The GIST of Thermal Stresses of Cast Iron Castings

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This paper deals with problems concerning to the lifetime of thermal-stressed castings used in general practice. It is necessary to know in details the purport of thermal-stress of cast iron as well as conditions of the thermal-stress (the level of operational temperature, or its fluctuations, i.e. thermal duty cycle) for the right choice of chemical composition and structure (macro and micro) of a material. The successful solution of this problem is now provided by means of computer (simulation programs), including optimization of construction of components (castings). It requires comprehensive theoretical analysis of the purport of the thermal stress i.e. impact of various physical parameters to its origin, course and size.

Keywords: cast iron, heat stress

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Possibilities of prediction of service life of forming tools

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The paper deals with stress of forming dies in complex conditions of concrete processes during their service life. Possibilities of assessment and prediction of tool service life based on comparative analysis of dynamic fatigue and abrasive wear are presented. Classical solution of dynamic fatigue is complemented by analysis of the situation of cyclic contact of rotating instruments. In this case super-position of cyclic pressure effect dominates, as well as abrasion on the surface of the functional surfaces of the rotating forming tool. Specific in this case is the different speed in the contact line and also the dynamics of development of size, shape and localisation of the surface exposed to wear by cyclic compressive stress. The solution is demonstrated on examples of different forms of wear of forging and rolling tools. The results of a comprehensive predictive analysis can be applied at designing of technological chains of forming operations.

Key words: estimation of tool service life, analysis of dynamic fatigue, abrasive wear, contact pressure

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Welding of Normalized Heat Treated Steels S355NL Large Thicknesses by Method FCAW

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Welding of thick plates of heat treated steels present difficulties, because of decrease of mechanical properties caused by welding heat input. At Welding Department of FME of CTU in Prague experiments researching influence of use cored wire on FCAW welding of thick plate welding was done. Plate of fine grained structural steel S355NL of thickness 50 mm used for crane fabrication was subjected to FCAW welding. Double-V butt joint was welded using flux cored wire (Coreweld 46 LS) as filler metal. The welded crane structure needs WPS certification, so WPQR tests were done. The paper presents welding procedures and results of non-destructive (visual, magnetic and radiographic testing) and destructive (tensile test, Charpy impact test, metallography, hardness measurement and bending test) tests of weld joint.

Keywords: FCAW, fine grained steel, S355 NL, X-rays, visual testing

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Surface Integrity in Notches Machining

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Precision machining and especially hard machining is a topic of high interest at present. Surface integrity requirements increase. Precision machining (mostly turning and milling) may substitute some abrasive operations. There are some advantages of precision machining over the abrasive machining. Abrasive machining has traditionally performed the finishing process of hardened steel. But, the availability of hard and super hard cutting tools enable the machine tools to reach surface quality of hard machining like to those obtained in grinding processes. But, precision machining is possible to apply also in machining common materials, not only hard materials. A surface is not only a geometric entity but also a layer with its own structure and properties. These properties are affected by many factors, e. g. by cutting temperatures, friction, deformations in the primary deformation zone and the surface layer of the transient (machined) surface, by cutting tool geometry, work hardening, cutting environment, etc.

Key words: surface integrity, precision machining, residual stresses, notches

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Artificial Neural Network Application for Surface Roughness Prediction when Drilling Nickel Based Alloy

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Article deals with design of appropriate artificial neural network for prediction of surface roughness as one of the very important indicators of machined surface quality. The drilling of nickel based super alloy UDIMET 720, was applied as test material. This type of material is most frequently used for jet engines components such as discs etc. Experimental data collected from tests were used as input parameters into neural network to identify the sensitivity among cutting conditions, tool wear and monitoring parameters and surface roughness. Selected parameters were used to design a suitable algorithm for control and monitoring of the drilling process with respect on surface roughness. The accuracy of predicted and measured values are compared and discussed.

Keywords: artificial neural network, surface roughness prediction, nickel based alloy Udimet 720

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Influence of surface geometry and structure after non-conventional methods of parting on the following milling operations

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This investigates influence of non-conventional methods of parting of steel 11 373.0 on structure transformations and associated geometry. Wire electro discharge machining (WEDM), plasma and laser cutting methods were used and compared as competitive methods from the point of view of structure transformations, associated geometry of a part and associated cutting forces produced during the following milling process. Results of this study indicate that significant differences can be found among the mentioned technology since the different thermal load of machined surface. Furthermore, structure and geometry alteration occurring after parting strongly affect cutting forces during the following milling operations.

Keywords: laser, plasma, WEDM, milling, cutting forces

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Comparison of variables influence on adhesive bonds strength calculations

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In the sphere of the metal sheet bonding namely single overlapped adhesive bonds are used. Their production costs less and they confirm strength requirements in many cases. The great part of the single overlapped adhesive bonds research was focused on a geometrical setting of adhesive bonds, an adhesive layer thickness and on mechanical properties of adherents. The analysis of the adhesive bonds strength calculations is ignored. The calculations stated according to the standards are often simplified and they do not take into the regard an adhesive bonded material and an adhesive layer thickness. The aim of the research is to define if the adhesive bond strength calculated according to the standard ČSN EN 1465 is the same as the reduced strength according to Mohr's and Guest state of stress theory regarding the adherent deformation and the adhesive layer thickness in the calculation. The issue is solved by the experimental research and statistical testing.

Keywords: adhesive layer thickness, bonding material, reduced tensile shear strength, tensile shear strength

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Differences at the Surface Roughness by the ELID and Grinding Technology

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This paper deals with surface roughness and surface profile in high precision methods of materials finishing. One of them is ELID grinding process and the second method is fine grinding. There is surface profile and roughness compared of the three materials samples – carbide steel and two aluminium alloys. In the paper are shown the principle of the ELID grinding and fine grinding, results of surface measurement between ELID and ground surface. Both methods are very precision in the focus on surface roughness – measured units in nano scale. The paper shows also real topology of the surfaces and visible tool marks especially by the fine grinding method. Next we can see new possibilities in finishing methods for different areas of the production, automotive, aerospace, medicine and cosmic industry.

Keywords: ELID, Fine Grinding, Roughness, Tool Marks, Surface profile

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Using of the Virtual Reality Application with the Scanning Device Kinect for Manufacturing Processes Planning

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Introduction into problems – This article is focused on the area of virtual reality, in the concrete to the creation of application and its using. The applications are usually used with the expensive display devices and expensive motion tracking devices. For the application of virtual reality technology is currently available the several motion tracking devices, which have different prices. This contribution describes the using of application with the Kinect device, which is affordably priced. Kinect is a device that needn't for control any physical controller, because uses only the user's movements, which are transferred to the application. By using of virtual reality technology is very simply to compare the different versions of a solution and simply eliminate the found mistakes. And if the whole product design is proposed, controlled and simulated by using VR, in the production process should be no bigger problems.

Keywords: virtual reality, Kinect, motion tracking.

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Selected Experimental Tests of Materials Used in Rapid Prototyping Area

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Introduction into problems – Rapid Prototyping (RP) presents the automatic production of physical parts using by additive manufacturing technology. The start techniques for Rapid Prototyping became available in the late 1980s and were used to produce models and prototype parts. Today they are used for a much wider range of applications and are even used to manufacture production-quality parts in relatively small numbers. Rapid Prototyping is widely used in the automotive, aerospace, medical, and consumer products industries. In this paper are presented selected experimental test of materials used in different Rapid Prototyping Technologies. Main part of the paper is oriented on presentation of materials test of Fused Deposition Technology realized by authors on Department of Manufacturing Technology of Faculty of Manufacturing Technology in Presov (Slovakia).

Key words: Rapid Prototyping, Fused Deposition Modelling, materials, experimental testing

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Development and applications of a rotating turning tool

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Technical literature presents numerous experiments with rotary turning tools application. Their advantages include extremely high durability, better quality of the machined surface as well as good chip shaping. Their wider industrial utilization was prevented due to the fact that a bearing is extremely dynamically stressed by a cutting force. Antifriction bearings have to big sizes and cause oscillation in the system, while sliding bearings manifested short durability and slackness inside. The authors of the paper tried to solve the mentioned problem by the application of an adjustable tapered roller bearing, ensuring a stable machining process. The paper contains the design as well as the results of the experimental verification obtained by the application of this improved tool.

Keywords: machined surface, durability, chip shaping, roller bearing

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Tool Wear and Machinability of Wood-based Materials during Machining Process

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The article is focused on the machinability classification of wood-based materials resulting from experimental work targeted on the wear procedure of cutting edge. These types of materials are not currently classified into groups of machinability. Two representatives of the materials - laminated chipboard (DTD-L) and medium density fibreboard (MDF) were tested in the project. The process of material classification from the view point of machinability is well processed in engineering materials contrary to materials from wood processing. Experimental measurements were based on the determination of the radial tool wear. Tested materials were included according to achieved results in the material groups and their relevant classes. One of the most important classification indicators was the index of kinetic machinability K_v . Material DTD-L has been selected as a reference sample - standard as the material most often used in woodworking industry.

Key words: machinability, tool wear, life-time, class of machinability.

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The surface quality of materials after cutting by abrasive water jet evaluated by selected methods

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Surface roughness is assessed on the basis of various criteria either qualitative or quantitative. The principle of qualitative methods is a subjective comparison of machined surface with the model (the standards) of the surface. The standard board is used, which corresponds to the type of surface technology, the type of an instrument, i.e. the way in which the surface was created. Its accuracy is not sufficient. Methods for expressing roughness numerically based on the defined parameters of roughness are classified as qualitative. Contact or non-contact measurement equipment is used here. Cutting material by abrasive water jet (AWJM) is one of the non-convention production technologies. The AWJ as "tool" leaves visible waviness on the machined surface. It is largely determined by the choice of the abrasive water jet feeding speed. Most of the research work qualifies the state of surface after AWJM according to roughness parameters depending on the cutting parameters. According to this knowledge the surface roughness varies linearly with increasing the cut depth. If we take feed speed as one of the quality assessment of the cutting AWJ parameters, we can watch its influence on changes the relief, (topography) of the cutting area.

Key words: qualitative and quantitative methods, hydro abrasive machining, roughness, surface waviness, profilometer

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Polyurethane resins filled with inorganic waste particles

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Polyurethane resins belong to a group of polymers which can be easily filled with inorganic particles. Filling of the polymeric materials, either with particles or fibres, influences resulted properties of the arisen material – composite. The particle fillers can improve a wear resistance, they can optimize tensile characteristics and reduce the polymer price. The paper describes the polyurethane resin as a material recycling bearer of the waste inorganic particles of the corundum, the artificial garnet and the silicon carbide. The experiment results certified that the mutual interaction of stated phases creates the wear resistant material which can be used owing to the polyurethane elasticity in the sphere of a cementing or at creating the material surface layers.

Keywords: abrasive wear, deformation, hardness, recycling

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Analysis of geometric accuracy of turned workpieces

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Each construction of cutting machine tool activates geometric inaccuracies of the workpieces as a result of different stiffness of its joints. The acting of cutting force and the moving of its position leads to the deformation of the elastic joints of cutting machine tool and the elastic deformation of the workpiece appears. The aim is to maintain geometric modifications of the workpiece in required tolerances. The paper tries to identify these inaccuracies for case of a centre lathe.

Keywords: turning, tool, lathe, measurement, accuracy

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