ADVANCES IN MANUFACTURING TECHNOLOGY XV pdf

1: Advances in manufacturing technology XV: national conference on manufacturing research - CORE

In manufacturing, staying up to date with the newest technology has a direct impact on the bottom line. To this end, Advances in Manufacturing Technology XV provides an invaluable resource: papers presented at the 15th National Conference on Manufacturing Research, highlighting the latest findings and ongoing work of the world's leading labs.

Globalization of the micro manufacturing technology has become a trend. This technology has been widely used in many fields, especially in aerospace field and biological medicine. The electrolytic PVC mask of micro-hole array is difficult to machine because of the high positional accuracy of the micro-hole array, small diameter of the holes and the high requirement of machining quality. This paper studied the influence of workpiece property, optimization of machining parameters, and chips removing in machining of the electrolytic PVC mask using micromechanical drilling. A feasible method with high efficiency is presented. The influence of different surface machining states on the porous gas bearing inclination and its cause are studied in this paper. A loading experiment on the porous gas bearings of different surface processing states is conducted. The presence of tilt of the gas bearing during the working has been ascertained. The uneven distribution characteristics of the porous material permeability after surface processing are analyzed through the porous material partition experiment, thus explaining the gas bearings tilt phenomenon. The influence of milling and grinding on the inclination of the porous gas bearing is mainly studied. Burrs generated in micro-milling operation have a significant impact on the surface quality and operational performance of the finished microstructures. In order to gain a better recognition of burr generation process, 3-dimensional double-edged micro-flat end milling operation FEM models on Ti6Al4V have been established. Burrs occurred in simulation can be classified into three types: Their formation processes and causes are well investigated and analyzed, moreover, a series of experiments are conducted to validate the burr morphologies which are received in simulation. At last, the effect of cutting parameters on top burr size is studied through orthogonal experiment on Ti6Al4V, it can be concluded that the axial depth of cut has the greatest effect on top burr size, and the effect of spindle speed on top burr size is the least. However, the optimization is much more complicated as there are more design variables. Numerical simulation is carried out and the optimal geometrical parameters are obtained with an objective of H norm. Abrasive jet technology is widely used with the advantages of environmental protection, with better energy concentration and processing quality, free from any tool passivation, heat affected zone, spark, or any changing in physical or chemical properties of workpiece. Due to the fact that jet characteristics are the main reasons which influence processing quality, numerical analysis is used as the major method of researching currently. The existing research of jet characteristics of abrasive jet by numerical simulation methods is discussed in the paper, including jet fluidizing and mixing process simulation, jet formation process simulation and jet erosion workpiece simulation. Finally the key problems of the simulation on the jet characteristic are given. An investigation is reported of the effect of grinding speed on energy partition for grinding of Inconel with virtrified CBN wheels. Temperature was measured in the ground surface of Inconel with semi-natural thermalcouple. The energy partition and heat flux distribution within the grinding zone were estimated and analyzed. A micro-displacement, strain and stress measurement method based on electronic speckle pattern interferometry ESPI technique is proposed, and the measuring device is designed. Two symmetric laser beams are illuminated on the optical rough surface of a steel cantilever beam, and then speckle images are photographed by CCD. A series of filtering processing is carried out for subtracted images and FEM analysis is performed. Using the speckle fringe patterns finally achieved, displacement, strain and stress can be calculated. By comparing displacement, strain and stress measured by this method with simulation results, feasibility and engineering application value of this method have been proved. Based on the application of elliptical vibration cutting method to precision machining of hard and brittle materials and material softening technology through laser heating, a novel composite cutting technique, laser heating and ultrasonic elliptical vibration assisted cutting, is applied to process sintered tungsten carbide. The simulation of the orthogonal cutting process and the effect of frequency and amplitude of vibration and laser heating temperature on cutting force are discussed

by using FEA method. Research results have revealed that the main peak of the transient force components increase with the increase of vibration frequency, decrease with the increase of vibration amplitude and laser heating temperature. Moreover, the friction reversal phenomenon is improved with the increase of vibration frequency and amplitude, resulting in the decrease of average cutting force. Compared to common cutting and traditional one-dimensional ultrasonic vibration cutting, the composite cutting technology put forward in this paper has unique cutting force characteristics for such super hard material because of combined action of friction reversal and intermittence cutting for ultrasonic elliptical vibration and material softening for laser heating. The research in the paper has provided a practical reference for the further experiments of laser and ultrasonic assisted cutting. This study aims to investigate the wear of coated end mills when milling Carbon fiber reinforced polymer CFRP composites. Four different types of end mills are used in the milling experiments to identify the influence of tool geometry and material on tool wear. Cutting forces and wear mechanisms of coated mills are also discussed. Through the contrast experiment, diamond coated multitooth router shows the best performance with the smallest cutting force and the least wear extent under the same cutting parameter. The major failure mechanisms of coated tools are breakthrough of coating, coating flaking and abrasive wear of substrate. The SSFUT is composed of a sandwich piezoelectric ultrasonic transducer and a bending vibration spherical shell. The consistency of finite element simulation results and experimental results was verified by testing. The research provides a theoretical basis for implementation and application of the new focused ultrasonic technology.

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2: Advances in Manufacturing | Aviation Week

"Advances in Manufacturing Technology XV" contains over 80 papers divided into 11 sections. The first section contains three Keynote Papers which discuss "Forming Processes and Simulation", "Rapid Manufacturing" and "UK Manufacturing - we can make it better: the report and findings of the Foresight Manufacturing Panel".

These are positive advances that can produce better products while creating less waste, align the supply chain more closely with demand, and keep employees safer than they have ever been. Digital Manufacturing Advances Pure digital manufacturing involves the development of prototypes, the planning, and the customizing of production processes using virtual techniques that are entirely automated, or nearly so. Automated control ensures that production runs generate only the quantity of product desired, without overruns, so the manufacturing process is leaner and more responsive to actual demand. This approach supports a build-to-order production strategy, rather than a build-to-stock strategy. Product generally travels through this kind of build process at a quicker rate, because unnecessary steps have been designed out, which in turn allows goods to reach the consumer in a more timely fashion. From a safety perspective, automated design methods contribute to a safer work environment through a refinement of the process and greater virtual testing that can be accomplished to check ergonomics, physical requirements as well as other factors that can lead to injury if not properly evaluated. Global Manufacturing Advances Global manufacturing is undergoing considerable transformation, which has resulted in significant cutting-edge advances for industry. Advances have occurred in the form of collaborative engineering of automation software, cloud-enabled services on physically remote platforms, and collaborative architectural design. The practical uses of such technology are currently being tested and evaluated in several locations such as RMIT University in Melbourne, Australia. At RMIT, a global laboratory has been set up to link industrial entities to universities at locations around the world. This connectivity was established to provide a collaborative space for experimental design and testing of physical systems managed by automated means. An initial test was arranged in to connect remote automated equipment, operators, testers, software developers and researchers to ensure that proper control would be maintained. And, most importantly, this new level of collaboration sought to unlock new ways to approach safety issues â€” helping to keep our manufacturing work environments as safe as ever! With the tremendous success of that initial test, the network of partners in the program has been broadened as more companies seek to obtain the benefits of this new manufacturing technology. More inter-connectedness between multiple organizations within and external to companies offers the opportunity for greater sharing of safety best practices. In short, the manufacturing process is becoming much more collaborative and collective. Impacts on Safety Each of these activities is having a huge impact on safety and safety training in the advanced workplace of today. With parts of the build process handled by automation, there are fewer actual persons involved on assembly lines and workstations, so many of the safety concerns from assembly are anticipated to be reduced or eliminated. Another very noticeable impact has been in the creation of an entirely new position in companies that make use of digital and or global manufacturing methods â€” the safety engineer. This person is charged with having an intimate knowledge of several engineering disciplines, for instance controls, mechanics, and electronics. They must also have a deep understanding of safety requirements and regulations. Responsibilities include the creation of a harmonious connection between cutting edge technology, design requirements, and necessary safety practices. Safety methods and training for those specific safety methods will now have to take on a greater awareness â€” of remote locations, and of the operations personnel involved in those remote processes. It will not be enough to practice good safety locally, because the process will no longer be entirely local. This greater awareness should be seen as a very good thing though, because after all, the key to safety in the workplace is having the awareness of good safety practices in the first place.

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3: Advanced Manufacturing - MIT Technology Review

Description: Advances in Manufacturing Technology contains papers presented at the 17th National Conference on manufacturing Research. These prestigious meetings have become established as a national forum for the dissemination of leading academic and industrial research in the areas of manufacturing engineering and management.

An experimental study on wear and fracture of ball-end milling cutter in high speed machining martensitic stainless steel 0Cr13Ni4Mo is studied in this work. Through the SEM micrographs and energy spectrum analysis of the wear pattern of the rake face, severe coating spalling is found near the main cutting edge. Fracture is seen on the entire cutting edge, in which micro-chipping occurs on the both ends of the cutting edge, and chipping occurs in the middle of the cutting edge and is the conchoidal spalling on the rake face. Combined with the high-speed photography of the milling process, the fracture area is consistent with the chip-adhesion area. External thread turning is a complex 3-D process in which the cutting conditions vary over the thread cutter profile. There are a lot of factors that affect the thread precision. This paper focuses on the influences of the lubrication method, cutting speed and the number of passes on the thread precision. Several stainless steel turning tests were conducted. The results showed that lubrication method was the most important factor that affected the thread precision, while the number of passes was the least important one. MQL Minimum Quantity Lubrication could reach the effect corresponding to wet cutting at specific cutting parameters and showed great potential to replace traditional lubrication method. Shi Hui Ma Abstract: Grinding ball is grinding body of ore, cement, coal and other solid materials in the ball mill grinding and is one of the biggest consumption in wearable element of powder industry. In this paper, using the principle of transformation induced plasticity, reinforcement, toughening, according to the new design ideas, a kind of TRIP steel is designed in order to improve wear-resisting property of the grinding ball. Most fatigue failures in aeronautical structures occur at fastened joints due to stress concentration SC. Since more and more advanced composites are applied in aircrafts instead of conventional alloys, SC in CFRP composite plates with zigzag-arranged multiple holes has been investigated by finite element method in this paper. It is found that the static SC factor SCF of CFRP plates varies with the dimensionless bore and zigzag angle by a greater change than isotropic plates, and that the dynamic response amplitude and frequency of the SCF depend on the dimensionless bore and the dimensionless wave number related with material properties and the exciting frequency. Femtosecond laser micromachining technology shows abroad application background in the field of micro manufacturing due to its unique advantages, especially for micromachining of ultrahard materials such as Silicon carbide SiC ceramic. The femtosecond laser micromachining system was set up, by using the system, effects of scanning velocity and laser pulse energy on quality of micromachined features were evaluated. Thus femtosecond laser micromachining technology is an effective method for hard and brittle materials precision processing. The objective of this work is to model the cutting temperature generated during dry turning with micro-graphite internal lubricating tool. The machining performance was assessed in terms of the cutting temperature. Results show that the cutting temperature with the micro-graphite internal lubricating textured tools was reduced compared to the conventional tool. As the inductance of magnetic cores is the most important parameter for their service performance. Four coupling models of EE-type ferrite cores are established to analyze the relationship between surface quality and the inductance of ferrite cores. The results show that the surface quality has a direct influence on the service performance of ferrite devices. In this paper, plunge grinding experiment was conducted on 20CrMnTi with monolayer brazed cubic boron nitride CBN wheel. Surface integrity was evaluated through morphology observing and roughness testing. It is found that surface roughness Ra is lower than 0. Grinding forces were measured and the effects of process parameters i. The changing regulation of specific grinding energy with the increase of equivalent chip thickness was revealed. The result shows that both grinding force and specific energy are lower comparing with white fused alumina WA wheels. High-speed turning tests were performed on vol. The results showed that the carbide tool was not suit for the machining of TMC. Tool life of PCD was confined to 12 min for all the cutting conditions. PCD tool mainly took place chipping, peeling, abrasive wear and adhesive wear at the rake face and flank. The

cutting temperatures of carbide were about 1. When using the worn tool, the cutting forces significantly decreased with the increasing cutting speed especially for the peripheral force component.

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To this end, Advances in Manufacturing Technology XV provides an invaluable resource: papers presented at the 15th National Conference on Manufacturing Research, highlighting the latest findings and ongoing work of the world's leading labs.

5: Advances in Materials Manufacturing Science and Technology XV

The papers in this special volume represent the latest development in the field of materials manufacturing technology, spanning from the fundamentals to new technology and applications.

6: How Advancements in Manufacturing Have (Positively) Impacted Safety | MT Blog

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