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Chapter 1 : Panoramic imaging based e-laboratory construction - University of Huddersfield Repository

E Engineering and digital enterprise technology are the catalysts and prime enablers for most radical changes in industry since the industrial revolution.

Li, Qing Xiang Yang, G. Resistance spot welding RSW is widely employed in sheet metal fabrication, in particular in automotive bodies and structures. Manufacturers are increasingly demanding reduced design periods with improved safety requirements, which could potentially be achieved through computational simulations. This paper presents an integrated approach combining simulation of the welding process, materials characterisation and mechanical modelling to study the effect of welding parameters on the strength of spot-welded joints. The welding process was simulated and the dimensional attributes were used to build the mechanical models for strength analysis. The constitutive material properties of the base, nugget and the heat-affected-zone HAZ were determined by an inverse FE modelling approach using indentation test data. The predicted deformation of spot-welded joints of a typical automotive steel under tensile-shear load showed a good agreement with experimental results. The validated models were further used to predict effects of welding parameters on the strength and failure behaviour of weld joints. Potential uses of the approach in optimising welding parameters for strength were also discussed. Aiming at the influence law of indenter tip radius to indentation hardness, testing on the hardness of single-crystal silicon was carried out based on nanoindentation technique. Two kinds of Berkovich indenter with radius 40nm and 60nm separately were used in this experiment. According to the load-depth curve, the hardness of single-crystal silicon was achieved by Oliver-Pharr method. Experimental results are presented which show that indenter tip radius influence the hardness, the hardness value increases and the indentation size effect becomes obvious with the increasing of tip radius under same indentation depth. In this paper, the temperature distribution is analyzed during ceramic sintering process and the temperature difference variation is compared under the linear sintering curves with different slopes. Then the changes of temperature difference curve are analyzed under both linear sintering curves and step sintering curves with different slopes. The results indicate that: Xian Li Liu, X. Aimed at the characteristic of large video data, handling relative path was brought forward as a method. Practice proved that handling relative path could realize all functions the database needed, and increase system running speed, general management of PCBN tool information under different machining conditions was realized. This article focuses on a case study, described in the following description, concerning a novel design for a hardening shop for universal mill heavy rail. The case offers a comparison between traditional un-structured creativity methods and the systematic process offered by CAI software. And it also described a structured approach for manufacture process equipment innovation. The durability and reliability of these precision products are directly influenced by mechanical behavior of material. If those parts are in micro nano scale such as micro interconnector, micro valve, micro actuator, and micro switch in that case micro nano mechanical properties is an important factor for better performance. This present paper discusses the low energy ECR ion beam irradiation effects on mechanical property of material in micronano scale. To complete this research ion beams were irradiated for different accelerating energy to Si surface. Nano indentations were done for hardness and elasticity measurement. AFM was used for roughness and depth measurement. From data analysis It shows accelerating energy is an important factor to control mechanical property of material during nano scale fabrication by ion beam. Ma, Yu Juan Huang Abstract: This study investigated the model and simulation of dynamic cutting forces for high speed end mills, performed frequency spectrum analysis of dynamic cutting forces, and propounded the model and failure criterion of high speed end mills with indexable inserts. According to results of modal analysis and stress field analysis, the safety prediction and experiment of high speed end mills for machining aluminum alloy were done. Results indicate that more teeth of cutter and greater cutting contact angle make the energy more dispersible, higher cutting speed and greater rake of cutter can depress dynamic cutting forces. The rigidity failure rotational speed is higher the strength failure rotational

speed, the connection strength between cutter body and screw bolt affects directly the safety of cutter. The model of high speed end mills based on spectrum simulation for dynamic cutting forces, and the safety prediction based on finite element analysis should be applied to the development of high speed end mills as an effective means. Machining hardened steels has become an important manufacturing process, particularly in the automotive and bearing industries. Abrasive processes such as grinding have typically been required to machine hardened steels, but advances in machine tools and a new cutting material of polycrystalline cubic boron nitride PCBN have allowed hard turning on modern lathes to seems to gain an ever increasing industrial acceptance as an economically and environmentally friendly alternative to many grinding applications. In this paper, based on large deformation theory and updated Lagrangian procedure, a coupled thermo-mechanical plane strain orthogonal precision cutting model with general finite element analysis software is developed to the influence of cutting edge preparation on the cutting of GCr15 with PCBN tool, such as cutting forces, shear angle, and cutting temperature. The three major designs of cutting edge preparation are used on most commercial cutting inserts: The friction between the tool and the chip is assumed to follow a shear model and the local adaptive remeshing technique is used for the formation of chip. The calculated principle cutting forces are compared with published data and found to be in good agreement. The simulation results can be used as a practical tool both by researchers and toolmakers to design new tools with rational tool edge and to optimize the cutting process. Sun, Ming Chen Abstract: In this paper, finite element method FEM was introduced to study the saw-tooth chip forming process in detail when machining nickel-based superalloy GH By the way of Lagrangian visco-elastic plastic approach, adiabatic shear band ASB was simulated in high speed machining condition by general commercial finite element code, and the mechanism of the adiabatic shearing phenomenon at primary shear zone was analyzed with the help of finite element analysis FEA. The comprehensive comparisons of saw-tooth chip morphology under a wide range of cutting speed were also presented. Taking the three-axle and double-rotating linkage system as an example, the universal mathematical model of polar coordinates is derived.

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Advances ine-Engineering and Digital Enterprise Technology includesinternational papers from experts and practitioners in industry andacademia providing an information exchange on all aspects ofengineering and management.

It is the ideal goal for the realistic visualization to be accomplished for spatial solids with 2D presentation in digital technology. In the consistently parallel system with the viewing angle and the presenting angle, a technical term, the real presentation rate, is put forward with two indexes, clarity and tri- dimension, taken as an initial criterion of the degree to which the real presentation is reached. By using the projecting geometry, the transform matrix of two-dimensional presentation for the solids was obtained with three steps, for simple and convex body. For more intricate geometric body with concave surfaces, the furry pattern discrimination was introduced, proving that the optimum presentation is that by which the normal iso-axial viewing was adopted. An application has shown that the furry pattern discrimination method worked well, and the trend is the same as the best presentation of an object on 2D among a variety of the solutions. This article utilizes the game theory of the complete information condition and incomplete information condition equilibrium as well as the operation research optimization knowledge, carries on the analysis to the technical transaction of optimal contracts design question, under each kind of situation, in view of the different situation, design each kind of different optimal contracts, thus to do business, both sides both can accept them. To reduce the complexity and difficulty of costing of quality of manufactures, a new approach about the costing of quality including the method, structure, system and case study based on the business process rule is proposed in the paper. Comparing with the traditional method, the new idea can improve the performance of the costing of quality at the aspect of generalization, customization, evolution and reconfiguration by establish the mapping among the user application, the business rule and the business process. It is extremely essential to establish financial early-warning system for listed companies in Chinese shipbuilding industry. The numbering system developed includes all of relative public information data such as product order, design, process plan, manufacturing, marketing, consumer servicing and so on. A more favorable condition is created to realize the share of relative information in the different departments of the company and to improve the response to the market. Xie, Gui Xian Zhou, Q. Electronic hubs--Internet-based intermediaries that host electronic marketplaces and mediate transactions among businesses--are generating a lot of interest. This paper provides a blueprint of the E-Hubs arena. Conceptual specification of functional system, comprising the selection of core E-Hubs services and definition of basic hosting platform of the E-Hubs realization business development plan, Conceptual framework for Manufacturing Resource Management System designs based on E-hubs. Network manufacturing, with the development of network economy, is advanced manufacturing mode. The engine manufacturing process of advanced motor company is studied and analyzed in this paper. The network system of engine manufacturing process is designed, which is based on the platform of. The network manufacturing of engine is realized. This paper presents a customer-centric strategy for e-manufacturing in apparel industry. The 3D virtual try-on integration will actually present the exact idolised avatar of the customer virtually dressed. Product family planning has received much attention from both academia and industries. The main challenger for product family planning originates from difficulties in mapping customer needs to product family specifications. This paper intends to develop a method to improve the mapping process by reusing knowledge from purchased products according to the satisfied customer needs. A knowledge discovery model for product family planning is proposed, where clustering is adopted to partition the purchased products so that commonality of product family could be effectively addressed and rough set is employed to extract the more concise decision rules. A case study of air condition is reported to illustrate the feasibility of proposed approach and associated algorithms.

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Engineering, General e-Engineering and digital enterprise technology are becoming the catalysts and prime enablers for the most radical changes in industry since the industrial revolution. They will impose real time transparency on all manner of industrial operations/transactions such as: reducing.