

ABSTRACTS OF PAPERS IN ENGLISH

THE STUDY OF PRECIPITATION HARDENING OF AN ALUMINIUM - SiC_p COMPOSITE

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ABSTRACT

It is now well established that precipitation kinetics in MMC on age hardenable aluminium alloys are different from those of the unreinforced matrix and that the precipitation of semi coherent phases is accelerated by the presence of the reinforcement. An experimental method is described to follow the evolution of the precipitation phenomena in the metal-matrix composites. The influence of the reinforcement on the precipitation kinetics is studied for the case of an aluminium 6061 - SiC_p composites. The precipitation kinetics are accelerated in the case of reinforced composite with respect to the unreinforced matrix. The aging temperature are 175°C (β'' phase range) and 250°C (β' phase range).

STUDY OF PWHT CRACKING OF NICKEL BASE SUPER ALLOY (UDIMET 520) IN GTAW METHOD

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ABSTRACT

In this paper, the mechanism and the cause and the ways for eliminating the decrease of PWHT cracking in welding of Nickel base super alloy (UDIMET 520) in GTAW method has been studied. For this study, XRD machine and quantometry has been used. Increasing of Al, Ti percentage and residual stress are the main causes of cracking PWHT. The results from quantometry tests demonstrate that decreasing tendency to PWHT cracking is due to the decrease of Al, Ti percentage of welding. Result of XRD tests show the tendency toward increasing of PWHT cracking for existing of strengthened residual stresses. Finally, it is illustrated that alloy welding Udimet 520 in TiG method is not sensitive to PWHT cracking.

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**MATERIALS - PROPERTIES
 RELATIONSHIP IN CERAMIC
 VARIOSTORS**

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ABSTRACT

Zinc oxide based varistors are electrical ceramics with VDR properties, which can be used in various applications. Different materials are being added to zinc oxide in order to control the I-V behavior of the system. In this research, a based varistor was manufactured via ceramic route. It was sintered from 1150°C to 1400°C. The resultant microstructure and properties were studied and their relationship was evaluated by measuring the electrical properties as well as the resultant phases and microstructures. The microstructural analysis shows predicted grain and grain boundary phases, in which zinc oxide particles are being surrounded by low temperature grain boundary phases. Most of the B₂O₃ containing and other phases are concentrated within the boundary layer. According to the designed composition in this research, I-V curve was evaluated and α component was measured which is in good agreement with other research data. The results indicate that the segregation of some elements to grain boundary can affect the electrical behavior of the system.

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**MICROSTRUCTURE PROPERTIES
 RELATIONSHIP IN TRANSIENT LIQUID
 PHASE DIFFUSION BONDS MADE IN
 MA 758 SUPERALLOY**

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ABSTRACT

Transient liquid phase diffusion bonding procedure (TLP) was used to join an ODS MA758 superalloy in two

conditions, wrought fine grains, and recrystallised grains. An Ni-Cr-B-Si alloy was used as an interlayer. Bonding was carried out at 1100°C for bonding hold times of 15,30, and 60 minutes under vacuum of 6×10^{-4} torr. Bonded samples were homogenized at 1360°C for one hour and then cooled with a rate of 15° C/min. Shear and fatigue strengths of bonds were determined. The results showed that there is no effect of bonding hold times on shear strength after bonding hold time of 30 minutes. At a given bonding hold time, the shear strength of bonds made in the recrystallized condition was greater than the shear strength of bonds made in the fine grain condition. The same was true for fatigue strength at a given cycle to fracture. TLP bonding was also carried out under pressure of 0.1 Mpa under the same temperature and bonding hold time for fine grain material. Microstructure studies of bonds made under pressure showed no effects of pressure on bond region grain size. Shear tests results also demonstrate little effects of pressure on shear strength of bonds.

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**RAPID TOOLING FOR PLASTIC
 INJECTION MOLDING THROUGH
 LASER SINTERING OF STEEL
 POWDERS**

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ABSTRACT

In this paper, a new steel powder and a novel method for rapid manufacturing of plastic injection mold inserts using laser sintering process were developed. In this process, the 3D-CAD models of parts are converted to triangulated surface models in the standard STL format. The computer process slices the standard STL format to thin horizontal layers, e.g. 50 μ m, demonstrating the part as a stack of thin slices. The data preparation step is followed by the laser sintering process in which the loose powder bed is sintered layer by layer to form a dense body. The processed parts can be post-sintered in order to improve the density and to decrease the porosity. This

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**DESIGN OF TOTAL ACCOUNTING
 SYSTEM AS A KEY TOOL IN
 MANAGEMENT INFORMATION
 SYSTEM**

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ABSTRACT

Information is one of the main sources of power in our era; hence it is called the age of information. Alongside, the strengthening of the role of information, the management - recently referred to as the art of recognition of the environment and resources - has witnessed ever-increasing development. Since an accounting system consists of the major part of information and is a vital tool of exercising management, is of mutual importance. As the companies grow and their financial activities, increases the managers need to receive a large sum of financial reports, prepared carefully, rightly and in time. No doubt, the traditional manual methods of accounting cannot meet the new informational requirements, and there is no other choice than new computerized accounting systems. The aim of present research is to provide a total accounting system to be used in any company with any scale and kind of activity. Moreover, it is devised in such a manner to be able to absorb all the former financial information of the due company. This package uses Access 2000 and runs under Windows 98 and above, as the operating system.

The report has first introduced the principles of the databases and then has described the methodology of System Development Life Cycle (SDLC). Then, the accounting system is designed so far as to present the final table structures. And accordingly it is implemented to provide the due accounting package. Finally, through a short review of the research, a few suggestions for future development of the package are presented.

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**DESIGNING A MULTIVARIATE
 QUALITY CONTROL SYSTEM IN
 MULTISTAGE PRODUCTION
 PROCESSES**

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ABSTRACT

In most manufacturing environments, when a product is made in sequential stages, not only the quality characteristics of the product in different stages are not independent of each other, but they are not independent in each of these stages either. In this paper, a new procedure based on event-space partitioning method is presented to determine the out-of-control stage(s) of the production. Furthermore, in order to specify the out-of-control factor(s) in the out-of-control stage(s), a new technique based on the principal components and discriminant analysis is developed.

article presents the sintering behavior, mechanical properties, and microstructural features of the laser sintered steel powder. A case study has been conducted to prove the applicability of the material for rapid tooling.

EFFECT OF AGITATION ON MORPHOLOGY OF TIN PLATE FROM ACID BATHS

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ABSTRACT

The corrosion resistance of tin in foodstuffs and its non-toxicity results in extensive use of tin in packaging of foods and tin plate cans. Among different types of bath of tin electroplating, sulfate bath with respect to throwing power, cathodic efficiency and easy working is the best. In this research by selecting sulfate bath, and changing current density and agitation, the morphology and structure of coatings have been studied. It was found that the morphology of coating is related to current density and agitation, which in low current densities, the structure of grains is equiaxial and flattened, but in high current densities dendritic structure has been observed. XRD analysis also illustrates that the growth direction of crystals drastically depends on current density.

STACK DESIGN FOR SOLID POLYMER ELECTROLYTE FUEL CELL

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ABSTRACT

A fuel cell consists of several parts including a fuel (hydrogen), oxidant (air of pure oxygen), Membrane - Electrode Assembly (MEA) and several different

controllers. In this research, design and construction of a stack of solid polymer electrolyte fuel cell with one kilo Watt capacity which includes bipolar, mono-polar and end plates, as well as cooling plates and sealing gaskets is considered. Furthermore, necessary calculations for construction of these materials are presented. It is shown that sixteen bipolar plates each with 8 mm thickness, two mono-polar plates each with 8 mm thickness and two end plates each with 2 mm thickness are required. In addition, eight cooling plates each with 10 mm thickness and forty four Teflon sealing gaskets each with 2mm thickness are needed. All these plates have dimensions of $23 \times 17 \text{ cm}^2$ and include slits for mixing or cooling of the operating fluids. Ultimately, seventeen stacks of MEA with thickness of 2.2 mm are determined to be needed for this 1KW fuel cell. The overall length of this stack is 30 cm while its volume is 9720 cm^3 and its mass is calculated to be 45 Kg.

A STUDY OF DIRECT PHOTOCATALYTIC CONVERSION OF METHANE INTO METHANOL FOR DMFC USAGE

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ABSTRACT

Rapid growth of Iran methanol consumption in the first decade of the this century requires development of direct methanol fuel cell (DMFC) technology in the future. In this investigation, the important role of methanol in the development of chemical processes, in particular DMFC technology, will be reviewed. Various methanol production methods are discussed with emphasis on the photocatalytic conversion of methane into methanol process. Structure and electrochemical reactions of DMFC have been described. The effective operational parameters of this type of fuel cell with their limiting values has been determined. Finally, new applications of DMFC are reviewed.

FUEL CELL ATTRACTIVENESS FOR IRAN CAR INDUSTRY VERSUS ITS ALTERNATIVE TECHNOLOGIES

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ABSTRACT

Today, efficient use of non-regenerative energy (Fossil Fuel) and environment protection are two major challenges of all societies. The nonpolluting and other advantages of fuel cell such as its application in different sectors and industries make this technology an ideal choice for overcoming energy and environmental crises. This paper evaluates the attractiveness of fuel cell technology for Iran car industry in comparison with other current and emerging technologies in the next decade. Fuel cell and its alternative technologies have been compared based on technical, economical, environmental, technological, social, cultural and political criteria. For this purpose, the Analytic Hierarchy Process (AHP) methodology is used. The comparison of alternative technologies has revealed that fuel cell is the most attractive technology from consumer, car manufacturer and government point of view.

EFFECT OF LOADING RATE AND ENVIRONMENTAL CONDITIONS ON BIOLOGICAL REMOVAL OF TOLUENE IN AN ANAEROBIC SYSTEM

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ABSTRACT

One of the most important hazardous compound are

aromatic hydrocarbons (e.g.,toluene) which due to low biodegradability can penetrate into subsurface and underground water and contaminate these sources. Toluene can be utilized in many industries such as petrochemical and is one of the most hazardous compounds with high solubility in water, which causes pollution. Toluene removal in liquid condition by the biotechnological method under aerobic and anaerobic conditions is possible. In this investigation, toluene removal from wastewater was effected by a biological aerobic system (RBC) due to its high advantage related to other methods such as activated sludge. The results demonstrate that increasing the inlet toluene concentration, does not highly affect COD removal, but less toluene is removed. Maximum inlet toluene concentration was 40mg/l, which under this concentration only 66% was removed. Organic load has a positive effect on COD removal, but increases COD concentration in the outlet.

HAZARDOUS SOLID WASTES AND ITS POSITION IN TEHRAN

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ABSTRACT

One of the most difficulties of human life is attacking global ecosystem as well as production and removal of solid waste from the cities, industries and agricultural activities. Many of industrial countries are saturated with waste removal sites. Since 1980, investigation and control of hazardous solid waste is one of the most environmental problems. In Tehran there is no special management on hazardous and industrial solid waste. Investigation shows 16 to 149 thousands tons per year of hazardous solid waste in Tehran, which in due to untrustable information and must be more inspected. In Tehran there are 24400 ton/year of commercial hazardous waste, 18355 ton/year of hospital waste and 2763 ton/year of hazardous domestic refuse considering these information, it is very important to legalize our country for correct removal of this kind of waste.