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"ANALYSIS AND OPTIMIZATION OF ENGINE CYLINDER HEAT TRANSFER THROUGH FINS OF VARYING GEOMETRY AND MATERIAL"

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Abstract The Engine cylinder is one of the major automobile components, which is subjected to high temperature variations and thermal stresses. In order to cool the cylinder, fins are provided on the cylinder to increase the rate of heat transfer. By doing thermal analysis on the engine cylinder fins, it is helpful to know the heat dissipation inside the cylinder. The principle implemented in this project is to increase the heat dissipation rate by using the invisible working fluid, air. We know that, by increasing the surface area we can increase the heat dissipation rate. So designing such a large complex engine is very difficult. The main purpose of using these cooling fins is to cool the engine cylinder by air. The main aim of the project is to analyze the thermal properties by varying geometry, material and thickness of cylinder fins. Parametric models of cylinder with fins have been developed to predict the transient thermal behavior. The models are created by varying the geometry, rectangular, circular and curved shaped fins and also by varying thickness of the fins. The 3D modeling software used is Pro/Engineer. Thermal analysis is done on the cylinder fins to determine variation temperature distribution over time. The analysis is done using ANSYS. Transient thermal analysis determine temperatures and other thermal quantities that vary over time. The variation of temperature distribution over time is of interest in many applications such as with cooling. The accurate thermal simulation could permit critical design parameters to be identified for improved life. Presently Material used for manufacturing cylinder fin body is Aluminum Alloy 204which has thermal conductivity of 110-150W/mk. We are analyzing the cylinder fins using this material and also using Aluminum alloy 6061 and Magnesium alloy which have higher thermal conductivities.

Key words: Geometry, Fins, Material, Heat transfer, Effectiveness, Pro-E, ANSYS.

1. INTRODUCTION

Internal Combustion Engine The internal combustion engine is an engine in which the combustion of a fuel (normally a fossil fuel) occurs with an oxidizer (usually air) in a combustion chamber. In an internal combustion engine, the expansion of the high-temperature and -pressure gases produced by combustion applies direct force to some component of the engine, such as pistons, turbine blades, or a nozzle. This force moves the component over a distance, generating useful mechanical energy.

1.1NECESSITY OF COOLING SYSTEM IN IC ENGINES All the heat produced by the combustion of fuel in the engine cylinders is not converted into useful power at the crankshaft. A typical distribution for the fuel energy is given below: Useful work at the crank shaft is25%, Loss to the cylinders walls 30%, Loss in exhaust gases 35%, Loss in friction 10%.

1.2 LITERATURE SURVEY Heat engines generate mechanical power by extracting energy from heat flows, much as a water wheel extracts mechanical power from a flow of mass falling through a distance. Engines are inefficient, so more heat energy enters the engine than comes out as mechanical power; the difference is waste heat which must be removed. Internal combustion engines remove waste heat through cool intake air, hot exhaust gases, and explicit engine cooling .Cooling is also needed because high temperatures damage engine materials and lubricants. Internal-combustion engines burn fuel hotter than the melting temperature of engine materials, and hot enough to set fire to lubricants. Engine cooling removes energy fast enough to keep temperatures low .Most internal combustion engines are fluid cooled using either air (a gaseous fluid) or a liquid coolant run through a heat exchanger (radiator) cooled by air. Marine engines and some stationary engines have ready access to a large volume of water at a suitable temperature. The water may be used directly to cool the engine, but often has sediment, which can clog coolant passages, or chemicals, such as salt, that can chemically damage the engine. Thus, engine coolant may be run through a heat exchanger that is cooled by the body of water, .most of liquid-cooled engines use a mixture of water and chemicals such as antifreeze and rust inhibitors. The industry term for the antifreeze mixture is *engine coolant*. Some antifreezes use no water at all, instead using a liquid with different properties, such as propylene glycol or a combination of propylene glycol and ethylene glycol. Most "air-cooled" engines use some liquid oil cooling, to maintain acceptable temperatures for both critical engine parts and the oil itself. Most "liquid-cooled" engines use some air cooling, with the intake

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Performance of 4S-SingleDiesel Engine Using Jamun Seed Methyl Ester Oil (JSMEO) with different piston Configurerations and injection pressures

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ABSTRACT: Non acceptable oil crops are being grown solely for biodiesel creation. An irregular strategy is to raise a food yield and use the waste material for biodiesel. Jamun Seed oil (JSO) is regular non satisfactory oil that is introduced in dry land nations the examination around there to create as a substitute for petrochemicals in minute. JSO was set up from oil process extraction by using n-hexane. The transesterification strategy for production of Jamun Seed Methyl Ester Oil (JSMEO) has been researched. The assembling of far over the ground quality jamun seed biodiesel achieve from the transestification alongside methanol, KOH go about as impetus. The furthest utilized single chamber 4S fluid cooled unequivocal infusion diesel motor is chosen to test. The testing of JSMEO have been complete on three distinctive cylinder head geometry by shift the motor working boundaries. In this exploratory work, the motor execution are determinate by methods for JSMEO as the essential fuel and diesel has the optional fuel of the motor and the results are seen as the test examination.

KEYWORDS: Transesterification, JSO, Jamun Seed Methyl Ester Oil (JSMEO),

I. INTRODUCTION

The normal Diesel includes an important venture in the evolved economic system of every state. The a ways over the ground power calls for in the enterprise international and ordinary usage of non-renewable electricity resources are usually vital to brisk intake of petroleum spinoff property just as nature corruption. The undignified air distinction to emanations which are primary ominous impact of oil associated energizes. In this angle require steady pursuit and continual improvement in sustainable energy supply initiation which are nature well disposed. Biomass causes, mainly eatable and non palatable oils, have captivated a variety of consideration rather vitality gracefully. In contrast with Diesel, biodiesel have no longer so much outflows but as a substitute greater effective ignitions. Discharges of carbon monoxide and smoke particulate trouble lessen via 45%, hydrocarbon emanations lessens by using 70% besides NOx contaminations marginally increment by using 10% with 100% of B100 as a fuel1. The obsession of carbon dioxide from biodiesel is little contrasted with Diesel gasoline. It indicates biodiesel decreases nursery effect while contrasted with mineral Diesel fuel2,three. Biodiesel has a hit glimmer point, which gives it greater cozy to preserve up. Agarwal et al.4,5 said that biodiesel affords fantastic greasing up homes that may lessen part wear and improve motor life. In excess of more than one explores have parted with, the analysis consequences of B100 residences can be upgraded with the aid of transesterification, and this approach is picked for modern research.

Transesterification is a compound manner of reaction on this liquor responds with the unsaturated fats triglycerides in nearness of an impetus KOH. The liquor responds with triglycerides and structures a glycerol and esters. The jamun seed methyl esters oil transesterification can be catalyzed by means of both homogeneous impetuses and heterogeneous impetuses. Homogeneous impetuses carries antacids and acids. The maximum generally applied salt impetuses are NaOH, KOH, carbonates and the touching on sodium and moreover potassium alkoxides, as an example, sodium methoxide, sodium ethoxide, sodium propoxide and sodium butoxidel 6,10. Freedman et al.7 explored the impact of various obstacles at the immaculateness of biodiesel delivered. Sulfuric corrosive, sulfuric corrosive and hydrochloric corrosive are normally utilized as impetuses in the corrosive

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Experimental Anlysis Of Plasma Spray Technique With Zerconium Oxide Mixture On Ss304 Material As Thermal Barrier Coating

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Abstract: Porosity is vital in most engineering applications in plasma-spray coatings. Porosity has its strengths and demerits based on coating functionality and immediate working conditions. A thorough analysis of pore as is carried out in this work on plasma sprayed coatings. The formation and growth of porosity on plasma sprayed coatings is controlled by defined parameters of spray. Optimized parameters for set spraying were employed to produce the desired coatings with minimal defects. Problems such as porosity are still present with advanced set spray parameters. Here, we are discussing other ability to measure porosity in plasma-spraying coatings with emphasis on atmospheric plasma sprays (mixed with titanium-oxide and carbide) of zirconium oxide. Microstructures with XRD as a part of non- destructive testing methods had been used to check the structural values with thermal impact. A L16 orthogonal array used for optimise the parameters with Taguchi optimal method by segregating parameters for better optimal results.

Key words: Plasma spray, TBC, Zirconium, Taguchi, SS304, SEM

1.0 Introduction

In advanced gas turbines thermal barrier coats (TBCs) are commonly used for shielding the metallic substratum from high temperature gas thermal dehydration [1, 2]. The use of TBCs will increase the efficiency and performance of turbines significantly. A standard TBC system consists of a container load, ceramic top-coat (TC), a metal bond-coat, and the heat oxide (TGO), the thermally developed oxide, forming between TC and BC. Temperature reductions in all TBC's are usually controlled by material and geometry, in particular thermal conductivity and thickness, of the TC layer in a specific work area. [3–9]. The thermal insulation potential of the coating's improvements with the increase in the TC thickness of a given ceramic material. The thermal mismatch stress of the coatings will nevertheless increase at the same time. The thermal insulation capabilities and the thermal stress level are well-recognized. Defining the required TC thickness for the hot components becomes a problem with optimization process.

2.0 LITERATURE REVIEW

The optimal TBC design will enhance the efficiency and performance of the coating with the thickness for gas turbine sheets. It is desirable for the layer design for engineering applications to be usable, easy and effective. Sadly, little work on this matter has been published. The substrate without TBC, for example the failure analysis of the blade [10–12], the simulation of heat transfer [13, 14], etc, or the

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Evolution of Phenolic Formaldehyde Based Hybrid Polymer Matrix Composite (PMC) Reinforced with Silicon Carbide and Fly Ash

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Abstract

Flyash and Silicon carbide reinforced phenolic formaldehyde-based hybrid polymer matrix composites (PMC) were fabricated with various weight ratios such as 8%, 12%, and 16%, respectively followed by their mechanical characterization such as tensile, flexural, density, impact and hardness properties as per the ASTM standards. The hand lay-up method was used to fabricate the PMC. The tensile behavior of PMC has revealed that it is highly dependent on the weight fraction of resin i.e. followed a consistent reduction with the increment in the flyash and silicon carbide contents. Whereas the density, impact and hardness behavior have observed a gradual enhancement upto 12% weight ratio of flyash and silicon carbide but thereafter it has been decreased. Similarly, the flexural behavior of PMC has decreased due to the addition of flyash and silicon carbide. Further, the scanning electron microscopy (SEM) analysis was carried out to study the monography of the fabricated specimens with various weight ratios at varying layers with magnification in the range of 550X to 10kX.

Key words

Flyash, Silicon carbide, SEM, PMC, Density and Flexural

Introduction

Polymer matrix composites (PMCs) are comprised of a variety of short or continuous fiber bound together by an organic polymer matrix. Unlike a ceramic matrix composite (CMC), in which the reinforcement is used primarily to improve the fracture toughness, the reinforcement in aPMC provides high strength and stiffness. The PMC is designed so that the mechanical loads to which the structure is subjected in service are supported by the reinforcement. The function of the matrix is to bond the fiber together and to transfer loads between them.

Polymer matrix composites are often divided into two categories reinforced plastics, and "advanced composites." The distinction is based on the level of mechanical properties (usually strength and stiffness); however, there is no unambiguous line separating the two. Reinforced plastics, which are relatively inexpensive, typically consist of polyester resins reinforced with low-stiffness glass fiber. Advanced composites, which have been in use for only about 15 years, primarily in the aerospace industry, have superior strength and stiffness, and are relatively expensive. Advanced composites are the focus of this assessment. Polymer matrix composites (PMCs) are comprised of a variety of short or continuous fiber bound together by an organic polymer matrix. The PMC is designed so that the mechanical loads to which the structure is subjected in service are supported by the reinforcement.

In this case so many experiments are carried out using that glass fiber reinforced polymer composites are one of the most widely used composite materials. The addition of Coal ash to polymer matrix dramatically increases the overall mechanical strength of the composite material as compared to the polymer composite [1]. In the other study Polymer composite provokes a new alternative material to engineering and domestic application. Polymeric nano composite has been intensively investigated due to the performance improvement when a small amount of nano sized particulates is added to matrix. The distinguished properties of SiC particulates influence to make a polymeric composite. This composite material has many applications such as mechanical, automobile, marine, appliances and packaging [2]. fly ash was added to nylon in 5,10,25,30,35 and 40 % wt/wt ratio and dispersing agent 1.5 %, antioxidant 1%, and heat stabilizer 1 % added,The composite granules prepared by using twin screw extruder. The temperature profile in barrel were 200°C,220°C,230°C and 250°c from the hopper to die it is prepared using an injection modeling machine, The large particle size of fly ash improvement in mechanical properties [3].

Influence of Elevated Temperatures on Flexural Strength of Polysialate Composite

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Abstract: Polysialate composites are a new class of high performance materials due to its excellent inherent high temperature resistance, low density and ease of manufacturing. These properties also suggest that polysialate composites have a high temperature resistance, environmental friendliness, light weight structures for both aerospace and motorsport applications. The foremost important requirements for these applications are a high temperature resistance, low density, good structural properties and ability to form complex geometries at low lead times. The polysialate matrix is based on polymineral resins, it allows manufacturing using conventional polymer composite lay-up, and also it allows for complex geometries to be fabricated. The most and widely used polysialate matrix materials are reinforced with silicon carbide fibres material will be used to study behavior of flexural strength over a representative temperature range. In addition to this, the results also provide the data required for the design of next generation high temperature structures. The three point bending test simulation analyses were performed according to ASTM standard on these polysialate composites. The simulation analysis results revealed that flexural strength of polysialate composites were stable over a representative temperature range 200OC to 600OC.

INTRODUCTION

Polymer matrix composites (PMCs) have traditionally been exploited to produce light weight structures. However they can only withstand maximum operating temperatures up to 300^{0}C. Ceramic matrix composite (CMC) materials are often used in higher temperature applications, as these can withstand elevated temperatures in excess of 1600^{0}C, although concerns still remain regarding their structural performance. The cost, and more specifically processing times, of CMC's can also be prohibitive when considering application in high temperature structures. There is, therefore, a need for materials which bridge this gap to aid in the development of high temperature structures.

Polysialates are ceramics derived from inorganic polymers and processed through a polymerisation chemical activation, rather than the extreme temperature processing synonymous with traditional engineering ceramics. This gives them a number of advantages over typical CMC materials such as low production times, environmental friendliness and low density. The materials used in this study were polysialate-type materials as matrix reinforced with silicon carbide fibre material.

Thermal Degradation Study for Manufacturability of Polyetheretherketone/Hydroxyapatite Bone Implant Composite

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Abstract. Polyetheretherketone (PEEK) is a semi-crystalline, high temperature resistant, FDA approved polymer, attracted many engineering and medical research practitioners due to its excellent mechanical and biological properties. PEEK has comparable mechanical properties to natural bone and its polymeric constituent. PEEK has been identified as one of the high temperature(Tm= 373oC) polymers with excellent thermal, chemical and radiological inertness. High temperature resistance, good Young's modulus and biological inertness of PEEK attract it to be a prominent bone implant material. Metallic bone implants have been surpassed slowly by PEEK composites. However, PEEK is found to be inferior in rigidity to natural bone due to its limited Young's modulus. Hydroxyapatite (Ca10(PO4)6(OH)2), a bone inductive and ceramic reinforcement is extracted from egg shells by thermal processing to strengthen PEEK matrix of the proposed bone composite. Upon several delimiting studies, ceramic constituent is limited to 40% by weight. The combination of constituents being newer, an exhaustive study on thermal stability of the composite has been carried out at ARCI, IICT and KELVN Hyderabad. Thermal gravimetric analysis (TGA), Derivative thermo gravimetric analysis (DTG) and Differential Scanning Calorimetry (DSC) were the sources of analysis. TGA, DTG and DSC have been used to evaluate percentage of weight loss, peak degradation temperature and melting temperature respectively. Degradation of the composite was found to increase with the percentage of PEEK in the composite. The study has been conducted beyond the melting temperature of the PEEK and up to 600oC. Degradation of the composite has been showing an inverse relation with rate of heating. Maximum percentage of mass degradation 28.7% of the total weight was recorded in structurally superior PEEK/HA 80/20 composite at a rate of heating 10C/ min as against 33.9% in pure PEEK.

INTRODUCTION

Polyetheretherketone (PEEK) has been identified for excellent mechanical strength and biological inertness in human body implants [1, 2]. PEEK has also been found with excellent thermal, chemical and radiological inertness [2]. Physical and mechanical properties of PEEK have become the best alternative to Collagen, the natural bone matrix. Metallic bone implants with inherited drawbacks in host tissue healing and radiological artifacts have promoted PEEK usage in bone composites. Mechanical Properties of bone and bio materials [3] presented in table 1,

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A Concise Review on processing of Hybrid Composites produced by the combination of glass and natural fibers

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Abstract

The application of natural fibers-based hybrid and pure composite materials is intensifying in the recent era. The driving factor behind this tendency is the amplified concern regarding the harm to the environment and the exhaustion of the natural resources, that is occurring due to the use of synthetic fiber-based composites. But, if the natural fiber composites are directly used for manufacturing, they can have potential challenges such as low mechanical properties, lower hygrothermal resistance…etc. In order to overcome those deficiencies, researchers are tending towards the development of natural fiber-based hybrid composites by hybridizing the natural fiber with the synthetic fibers. In this paper, a concise review was made on different methods through which hybrid composites can be manufactured. Advantages, disadvantages, and applications of those production techniques are also presented.

Peer-review under responsibility of the scientific committee of the 2nd International Conference on Materials Manufacturing and Modelling, ICMMM – 2019.

Keywords: Natural fiber composites; Hybrid composites; Processing methods; Manufacturing; Glass fiber; Natural fibers;

1. Introduction

The gush in the anxiety of the people towards environmental sustainability has led the researchers and designers to develop new materials which are environmentally friendly. In this context, the integration of natural fibers for manufacturing composites is one of the ways of designing more eco-friendly materials. But, the main cons with

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A Concise Report on properties of Hybrid Composites manufactured from glass and natural fibers

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Abstract

The utilization of natural fibers as a potential reinforcement phase for manufacturing composite materials is on the rise due to the increased concern towards reducing the damage to the environment and to control the depletion of the natural resources. But, using the natural fiber composites directly can have potential challenges such as the low mechanical strength, low thermal stability, high degradation rate…etc. In order to improve those shortcomings, researchers are tending towards hybridizing the natural fiber composites with the glass fibers. In this paper, a concise review was done over the consequence of hybridization on the mechanical properties of the hybrid composites made from a mixture of both glass fibers and different natural fibers. From this review, it was concluded that hybrid composites with this particular combination have a great potential for property improvement and applications.

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Keywords: Hybrid composites; Glass fiber; Natural fiber composites; mechanical properties; Natural fibers;

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Preparation, Deposition and Characterization of Solution Precursor

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Abstract:

The Solution Precursor Plasma Spray (SPPS) process has been used for Thermal Barrier Coatings (TBCs). In this work Zirconyle nitrate is used as solution precursor . It has prepared in house for plasma spray. The prepared solution has successfully deposited on the substrate by SPPS process.The deposited coatings were characterized by scanning electron microscope (SEM) and X-ray diffraction (XRD).

Key words —Solution precursor, Plasma Spray, TBCs, SEM, XRD

Introduction:

The thermal spray processes have been using the different kind of powder feed stocks such as for the coating. It has been widely used for various purposes like to protect from corrosion, improve durability and oxidation resistance properties at high temperature and it can reduce the metal service temperature [1-2]. The Solution Precursor Plasma Spray (SPPS) is recently developed for the fine spray. It is same as the existing conventional spraying processes with the only difference that instead of powders the feed is in the form of solution precursor. The liquid solution precursor material is injected into the plasma jet by a nozzle. Rapid heat-up and vaporization of precursor droplets in the formation of particles, which will be heated and accelerated to the substrate to generate coatings. In order to gain a better quality and performance of the coating, liquid precursors are sprayed into the plasma jet to generate finely structured coatings [3]. Deposition of small, melted particles leads to fine microstructure with the improvement in certain mechanical properties like hardness and strength. The different kinds of solutions or suspension precursors have been used for the different purposes. With normal APS process it is not possible to feed powder with size finer than 5-10μm due to the effects of surface forces on powder flow [4]. Important thing to be noted that the SPPS coating has lower conductivity than EB-PVD coatings but in the upper range found in APS coatings. Mechanical properties of SPPS coatings like fracture toughness and hardness are measured to be higher than APS coatings. Both in plane and out of plane compressive strength for SPPS are lower than the APS but in plane elastic modulus is higher and out of plane is lower for SPPS than APS [5]. In general, SPPS coatings have a very fine grain structure [6]. Compared to conventional materials the Nano grained deposits and Nano sized particles have superior properties [7]. Thermal spraying can also use in the Automobile Industry [8]. The preliminary investigations have been carried out about the effects of processing parameters in the SPPS and to understand their implications and improving of this process.

Experimental setup:

Preparation of Solution Precursor:

In the preparation of zirconyl Nitrate the following process has been carried out. The 20 gm of Zirconium Oxide (ZrO_2) and 80 gm. of Potassium bisulphate ($KHSO_4$) are mixed together in a crucible. This mixed material is heated at the temperature of 600^{0}C in muffle furnace about 15 minutes then the mixed powder is formed as a solid. After

Exploration of Laser Jet Welding by Using CFD

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Abstract: Since low aspect ratio welds can be made with Conduction mode welding, it is used in thin sheet welding. The weld geometry and microstructure depend on the temperature distribution and the cooling rates. Experimental determination of temperatures in the work-piece through the use of thermocouples, can provide data for a limited number of points and is time consuming and expensive. Numerical modeling of heat transfer and fluid flow in laser beam welding can provide previously unavailable information about the temperature distribution and thermal cycles at all points in the computational domain in a relatively short time and at low cost. A critical review of the available literature indicates the following problems with the numerical models of conduction mode welding. (1) There is no comprehensive three-dimensional model of conduction mode laser beam welding (LBW) available in literature (coded). (2) While models of conduction mode laser beam welding (LBW) have been proposed, very few has been tested for the welding of various materials with thin plates. The goal of this dissertation is to address these important issues.

In this dissertation, a comprehensive two-dimensional heat transfer model based on energy conservation equations is solved to study the shape of weld pool. Weld thermal cycle and weld pool geometry considering fluid flow for laser spot welding of mild steel for two dimensional, turbulent and transient models based on mass, momentum and energy equations is modeled to study temperature and velocity fields along with weld pool. A moving Gaussian heat source is considered as laser beam. To make model computationally efficient half of the geometry is modeled. In case of welding with fluid flow surface tension and gravity forces are considered for the calculation of transient weld pool convection. A finite volume scheme with fixed time stepping is used for the calculations. The observed weld pool dimension is compared for different beam power and beam radius applied as heat source. The behavior of the mushy zone, i.e., the solid-liquid two phase region, during heating and cooling is studied. Results show information about the weld pool shape, maximum temperature and velocity vectors. This data is useful for determining the solidification morphology and the scale of the solidification sub structure.

Key words: laser beam welding, weld pool shape, maximum temperature, velocity vectors, etc.

I.INTRODUCTION

Laser welding has become a significant industrial process because there are many outstanding advantages in using laser welding over other widely used bonding technologies. As an alternative to the common adhesives or solders used for the joining process, laser welding offers a number of attractive features such as high weld strength to weld size ratio, reliability, and minimal heat-affected zone. These provide the benefits of low heat distortion, a noncontact process, repeatability, ability to automate, and high throughput. For these reasons, the applications of laser beam welding have broadened in the past decades.

Here laser welding is carried out on small thickness where the thickness of plates is in microns which need a small heat affected zone. Lasers are well suited for welding with small length scale because they can deliver a controlled amount of energy to very small components with a high degree of precision. Laser welding is generally carried out in two modes; conduction mode welding and keyhole mode welding. In keyhole mode of welding the material is heat above its vaporization temperature forming plasma leading to deeper weld pools and hence are used with thick plates. In conduction mode welding, the material is heated below its vaporization temperature leading to small weld depths. Conduction mode is mostly preferred in micro-welds due so as to keep weld free of contamination and blow holes caused during solidification of the material.

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DESIRABILITY THROUGH EFFECTIVE MANAGEMENT OF MATERIALS

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ABSTRACT

This paper is focusing one of the problems of a Manufacturing Company in which the growing trend towards the higher cost of materials and services and constant shut down of factory, which erode business profit. The paper focuses on how business firm can attain desirability through effective management of materials. The objective of this paper is to identity problems of material management, which if corrected can result in Desirability. The paper also examines and outlines the roles and benefits of materials management. Secondary data and primary data were utilized in this study. The finding shows that there is need to recognize the materials management function and in this paper, it has been suggested that for a firm to achieve profitability, the goal of materials management outlined should be properly carried out.

Key words: Management, production, profit, materials, prudent.

INTRODUCTION

Profit is the entrepreneur's reward and in fact, a major motive for doing business. Most often too, it is used as an index for measuring performance. This paper is undertaken to outline how desirability can be achieved through effective management of raw materials. It focuses on cost reductions, adequate supply of materials and proper storage.

Materials management is that aspect of business activity that deals with planning for purchasing, receiving, handling, storing, and releasing of materials for use in production with effective control measures. Materials are industrial goods that will become part of another physical product. Rumelt (1981) has classified materials for use in manufacture under three headings:

- Raw materials primarily from agriculture and the various extractive industries e.g. mineral resources, fruits, and vegetables sold to processor.
- Semi-finished goods and processed materials to which some work has been applied or value added e.g. rods, wires, paper, chemicals, etc.
- Component parts and assemblies that are completely finished products of one manufacture, which can be used as part of more complex product by another manufactures.

Consequently, it is the managing of these materials that we refer to as materials management. Thus, materials. Management has been defined by Lee and Dobler (1997: 47) as the total of all those tasks, functions and routines which are concerned with the transfer of external materials and services into the organization and the administration of same until they are consumed or used up in the process of production, operation or sales. Materials management includes all the activities

Analysis of Inner Rotor in a Georotor

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Abstract— For any gas turbine engines, various systems are involved for the safe and reliable operation, in that oil system plays a vital role for the engine lubrication .Oil pump is the most significant equipment as a part of engine oil system.
The main function of oil pump in the engine is to supply lubricating oil to various rotating and sliding parts of an engine in order to prevent the wear & tear, excessive heat generated during the engine operation
The oil pump works on the principle of geo rotor (similar to internal gear arrangement) which is a positive displacement pump. The oil pump develops required pressure greater than the bearing chamber pressure and flow for maintaining the bearing temperature in the engine. The oil pump geo rotor is driven by the engine power through the gear box and quill shaft connected to oil pump driven shaft.
In this research we designed the geo rotor with standard measurements by using pro/e software. Also analysis should be done by taking different materials of Vonmises Stress, Strain& Total Deformation

Keywords—*Geo Rotor; Design;Vonmises Stress & Strain; Analysis*

I. INTRODUCTION

The geo rotor is a positive displacement pumping unit compared with external and internal gear pumps; it keeps an advantage of less components, simple structure, low noise and low ripple of flow rate. Therefore it is widely used in applications of lubricating systems of on-road or off-road engines.

It mainly consists of inner rotor, outer rotor. The inner rotor lies inside the outer rotor and it positions itself at a fixed eccentricity from the outer rotor inside the housing.

Input torque is to drive the inner rotor and outer rotor rotates with it since they contact each other at less several points on their geometric profile.Geo rotors may be mounted directly on an existing shaft.gerotors can handle any flowing substances from air to hot melt glue. A single geo rotor set accommodates multiple flow streams operating at different pressures.

II. DESIGN OF GEOROTOR

Georotor was designed using Pro-E software with the specified dimensions

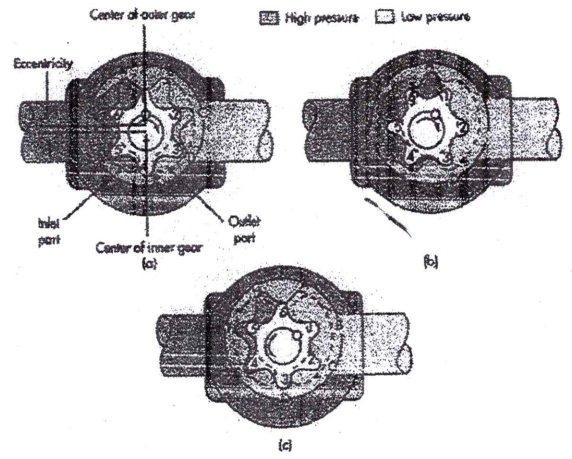

Fig-1

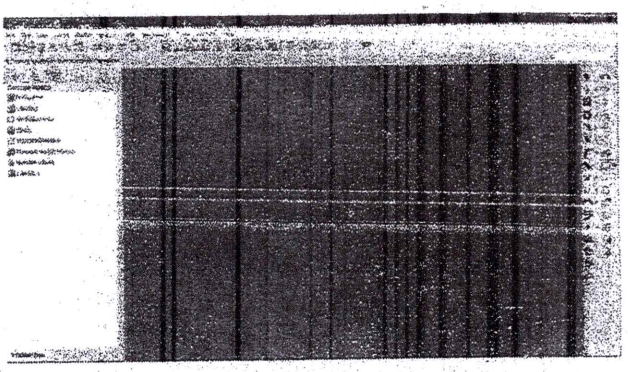

Fig-2

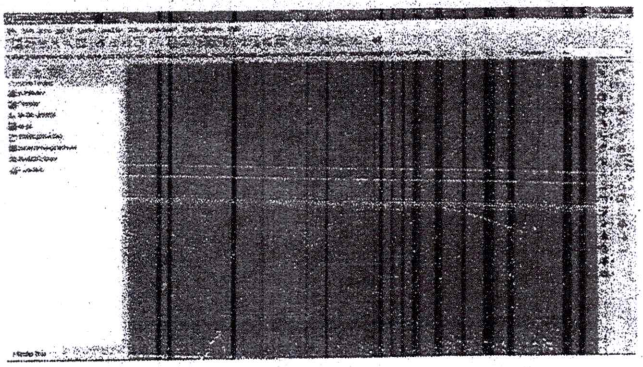

Fig-3

Plasma current effects on the microstructure of solution precursor plasma spray YSZ coatings

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Abstract -The Solution Precursor Plasma Spray (SPPS) process has been used for obtaining Zirconia coatings asThermal Barrier Coatings (TBCs). In this study an in house developed Zirconyle nitratesolution precursor plasma spray setup has been used. In this process the coating is built up by horizontal and vertical passes of the plasma torch across the substrate. The microstructural characterizations of coatings were carried out by scanning electron microscope (SEM) and X-ray diffraction (XRD). Significant effect of plasma current has been observed on the zirconia coatings.

Index Terms—Solution precursor, Plasma Spray, TBCs, Plasma current

1. Introduction:

Thermal spraying is an advanced materials processing technique which has found wide acceptance in many high technology industries. High temperature, high velocity flame is produced to heat, melt and spray material introduced into the flame. In general, thermal spray coatings have a very fine (micron sized) grain structure. Nano grained deposits and nanosized particles have superior properties compared to conventional materials. Reduction of the particle size of the thermal spray feedstock improves the homogeneity and properties of coatings.

The Liquid Precursor plasma spray (LPPS) is using to a great extent driven by the gas turbine industry, Automobile industry and in particular the manufacturing of the thermal barrier coatings (TBC) that protects the surfaces of metallic parts in the hottest zones of gas turbines used for the generation of electricity and propulsion of aircraft [1-2].

The thermal spray processes have been using the different kind of powder feed stocks such as for the coating. It has been widely used for various purposes like to protect from corrosion, improve durability and oxidation resistance properties at high temperature and it can reduce the metal service temperature [3-4]. The Solution Precursor Plasma Spray is recently developed for the fine spray. It is same as the existing conventional spraying processes with the only difference that instead of powders the feed is in the form of solution precursor. The liquid solution precursor material is injected into the plasma jet by a nozzle. Rapid heat-up and vaporization of precursor droplets in the formation of particles, which will be heated and accelerated to the substrate to generate coatings. In order to gain a better quality and performance of the coating, liquid precursors are sprayed into the plasma jet to generate finely structured coatings [5]. Deposition of small, melted particles leads to fine microstructure with the improvement in certain mechanical properties like hardness and strength. The different kinds of solutions or suspension precursors have been used for the different purposes. With normal APS process it's not possible to feed powder with size finer than 5-10μm due to the effects of surface forces on powder flow [6]. The atomized droplets of precursor undergo rapid

Flexural Fracture Analysis on 2D and 3D Weaved Carbon–Silicon Carbide Composites

S. Sapthagiri and S. Nagakalyan

Abstract Propelled materials, for example, constant fiber-fortified artistic grid composites offer huge improvements in an assortment of properties when contrasted with their mass, solid partners, etc. These properties incorporate essentially the ductile pressure, flexural stress, and crack parameters. Anyway to date, there are not really any logical examinations that gave an account of carbon fiber based propelled earthenware composites where SiC is utilized as the lattice. The present work is an endeavor to draw out the flexural fractural quality properties alongside a nitty-gritty examination of the crack conduct of 2D and 3D woven carbon ceaseless fiber strengthened (silicon carbide) ceramic–matrix composite (CFCC) materials. The crack propagation conduct has been dissected in two symmetrical indents and the introduction and its esteem are available in this paper.

Keywords Ceramic–matrix composite · Flexural strength · Fracture behavior · Three-point bend test

1 Introduction

Normally, earthenware frameworks are the conspicuous decision for high-temperature applications. High modulus of flexibility and low pliable strain, which most earthenware production have, that have joined to make the disappointment of endeavors add fortifications to acquire quality enhancement. The utilization of support with high modulus of versatility may deal with the issue to some degree and present pre-worrying of the fiber in the earthenware grid is as a rule progressively turned to as an alternative. At the point when earthenware production has a higher

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Effect of Twist Angle and RPM on the Natural Vibration of Composite Beams Made up of Hybrid Laminates

Rakesh Potluri, V. Diwakar, K. Venkatesh and R. Sravani

Abstract Rotating beams are crucial components that have a wide range of application in the aerospace and mechanical engineering fields. Some of the applications of the rotating composite beams include the helicopter blades, wind turbine blades, and propellers but rather than having a straight beam they are generally twisted which gives some added advantage to them. Having a good understanding of their behaviour, especially the natural frequencies of the structure, is crucial for designing a very good structure. In this paper, the effect of the pre-twist angle, rotation speed on the natural vibration behaviour of the rotating composite beams made up of a hybrid laminate was studied. A comparison between the natural frequencies and mode shapes of the composite beam with and without rotation and pre-twist effects was performed. The hybrid laminate was designed and properties of the laminate were found using the CLT theory, executed in the MATLAB software. Finite element analysis (FEA) was used for performing this work using the ANSYS Workbench software.

Keywords Rotating beams · Modal frequencies · Hybrid laminate · Twist angle · RPM (revolutions per Minute) · FEA (finite element analysis)

1 Introduction

In modern times, the metal beams used for the structural purpose are being replaced by the composite ones due to their inherent benefits offered by the composite materials. Rotating beams are usually found in applications such as wind turbines, turbomachinery, robotic sensors, and helicopter blades. Usually, the beams can be classified

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