

H - Cluster Thermal Infrared Imaging by Attainable Bi-Portioning

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Abstract: Breast cancer is that the commonest cancer in girls, and therefore the risk will increase with age Health authorities and doctors suggest regular screening with diagnostic procedure for girls, counting on their age and individual risk factors. That won't have the power to observe thermal signs that will counsel a pre-cancerous state of the breast, or signs of cancer at an awfully early stage, lies in its distinctive capability of watching the temperature variation made by the earliest changes in tissue physiology(function).

Thermography, conjointly called thermal imaging, uses a special camera to supply pictures, called Thermograms, showing patterns of warmth and blood flow close to or on the surface of the body. This paper presents diagnostic technique through which Breast willcer screening an determine carcinoma before someone notices any physical symptoms. Early detection will change someone to bear less invasive treatments with higher outcomes. Presenting system is employed to observe tube-shaped structure changes in breast tissue that will indicate the presence of a few years before different ways of screening can. It can even observe changes in breasts with dense tissue and implants.

Keywords: Internet of Things (IoT), Infrared radiation, mammography, Thermography

1. Introduction

The human body naturally manages the creation, growth, and death of the cells in its tissues [1]. Once this method starts to figure abnormally, and therefore the cells don't seem to be dying at the speed they must, we have a tendency to see a rise within the quantitative relation of cell growth to death, that could be a direct explanation for cancer [2]. Carcinoma happens once cells within the breast divide and grow while not affordable management. it's a widely known illness round the world. Over the past twenty years many techniques are projected for this purpose, like diagnostic procedure, that is often used for carcinoma designation. However, false positives of diagnostic procedure will occur during which the patient is diagnosed positive by another technique [1].

An X-ray photograph could be a quite X-ray. It involves pressing the breast between 2 metal plates Associate in Nursing taking an X-ray image of the breast tissue. However, it has some disadvantages; Mammography can go together with some risks. However, the recommendations on once and

the way usually someone ought to bear screening take these risks into thought. Regular testing suggests that perennial exposure to low levels of radiation, which can increase the danger of cancer slightly. Mammography can conjointly reveal noncancerous changes, resulting in false-positive results. As a result of dense breast tissue can seem white on the diagnostic procedure image, which might mask the presence of tumors, as these conjointly seem as white. Density adipose tissue, on the opposite hand, seems gray on the image, creating it easier to check any changes [3].

Diagnostic technique uses a kind of infrared technology that detects and records temperature changes on the surface of the skin. It will facilitate screen for carcinoma. A thermal infrared camera takes an image of the areas of various temperature within the breasts. The camera displays these patterns as a kind of warmth map. Once a cancerous growth develops, there could also be excessive formation of blood vessels and inflammation in the breast tissue. These show au fait the infrared image as areas with a better skin temperature.

The use of Binary Infrared Imaging relies on the principle that metabolic activity and tube-shaped structure circulation in each pre-cancerous tissue and there-for the space close a developing carcinoma is nearly perpetually above in traditional breast tissue. Binary Infrared Imaging uses ultra-sensitive medical infrared cameras and complex computers to observe, analyze, and turn out high-resolution pictures of those temperature variations. Thanks to Binary Infrared Imaging extreme sensitivity, these temperature variations could also be among the earliest signs of carcinoma Associate in Nursing/or a pre-cancerous state of the breast Studies show that an abnormal infrared image is that the single most significant marker of high risk for developing carcinoma, ten times a lot of important than a case history of the illness. Consequently, in patients with a persistent abnormal thermo gram, the examination results become a marker of upper future cancer risk. relying upon sure factors, re-examinations square measure performed at applicable intervals to watch the breasts [4]. This gives a girl time to require a pro-active approach by operating together with her doctor to boost her breast health. By maintaining shut watching of her breast health with infrared imaging, self-breast exams, clinical examinations, diagnostic procedure, and different tests, a girl features a far better likelihood of police investigation cancer at its earliest stage and preventing invasive neoplasm growth [5].

2. Technology, Interpretation imaging:

Hierarchical clustering-based segmentation (HCS) provides a generic answer to the advanced interpretation of thermal

Experimental Research on Improvement of Battery Reliability

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Abstract: The heat control and maintenance of batteries is essential for effective operation of UPS in harsh environmental condition since battery working reliability, performance, durability and its economy is directly related to the environmental temperature and air flow around batteries. Therefore, ideally, batteries should be use within its comfortable temperature range to get its optimum performance. Compact design of Batteries in enclosed environments necessitates thermal management of the battery system for optimum life and performance. This invention proposes an efficient vapour compression refrigeration system to effectively cool the batteries and maintain optimum battery surface temperature of 25 °C for better performance and extended battery life at 40°C external ambient temperature. Moreover Silica gel based Solid desiccant wheel is used to absorb moisture from air so that condensation in the battery cabinet can be minimized. Computational fluid dynamics and heat transfer simulation was performed to devise a initial concept. Experimental validation of the prototype was made to verify simulation results and actual temperature distribution.

Index Terms: : UPS, Battery, Vapour Compression Refrigeration, RBC (Replicable Battery Cartridge).

I. INTRODUCTION

Competitive environment necessitates modular design for power circuit and battery. This provides a greater flexibility for user to upgrade the UPS system during its life time. Depending on the user requirement several battery modules are assembled within the metallic enclosure. This results in modules operating at different temperatures during charging/Discharging cycles. The change in Temperature from one module to other in a battery pack causes to changes in charge or discharge behaviour in respective module and which in turn to electric unbalancement of modules or packs, finally decreases the pack performance. The object of temperature management in the battery cabinet is to ensure a battery pack maintained at optimum average temperature (25°C) provided uniform temperature distribution. This helps increasing battery life and reliability of the charging and discharging operations. To evaluate the battery pack design heat transfer, fluid flow is used. The simulated CFD analysis results are validated through real time testing. Originally there was an assumption that the UPS is being operated in controlled environment. In developing economy, the situation is totally different. UPS is being operated in harsh environment and this resulted in more failures. Also within warranty, the batteries were getting replaced multiple times. This had incurred huge cost impact and predicted failure rate is currently greater than 100%.

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Ben Ye ,Md Rashedul H R et.al are investigated the temperature control and optimization of cooling plates for battery module for electrically operated vehicles [1]. The performance analyses of Li-Ion batteries are investigated under various thermal loads [2-4]. The situ method has used in order to analyze the performance characteristics batteries [5]. The latest progress and accurate state of charge conditions of Li -Ion batteries [6-7] are really helped to improve the reliability of battery in the present work. The technique of halogen conversion- interaction chemistry in graphite, Scalable Synthesis of Dual-Carbon and experimental examination of large capacity gives the good idea in order to improve the reliability of batteries [8-12].

1.1 Conceptual design

To evaluate the battery pack design and provide solution for battery thermal issues for harsh working environment, we have used heat transfer, fluid flow principles, CFD analysis and experimental thermal validation. Fig-1 shows integration of a Battery cabinet with cooler.

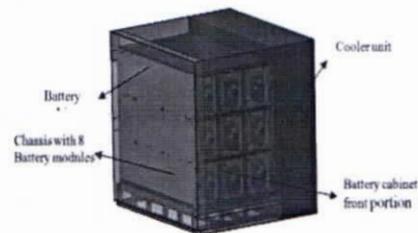


Fig -1: Integration of cooler with battery cabinet

1.2 Cooling Architecture

Vapour compression refrigeration system is attached to the side of the battery cabinet along with the desiccant dehumidification as shown in the Fig-2.

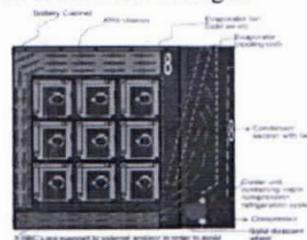


Fig -2: Battery cooler architecture concept

Performance Analysis & Optimization of IC Engine Process Parameters Using Bio-blended Diesel–Methanol with Waste Cooking Oil through Taguchi Method

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Abstract : *The energy consumption is always on the rise increasing worldwide warming too. This has brought renewable energy source and alternate fuels into centre, with biodiesel is a new option but its expenditure is more. Thus a feasible choice is to blend biodiesel with other fuels to make it environment eco-friendly and decrease the demands on mineral fuels. The bio-fuels used for improving the performance of an engine so, in this work waste cooking oil used as alternative fuel. Current one of the main intends of this work is to improve the performance of IC engine by bio blended fuels. The process parameter mostly affected on engine performance. These process parameters of IC engine have been optimized by using alternative fuels with the help of Taguchi method. An experimental investigation has been conducted on I.C engines, the results will be compared with that of diesel in terms of performance. Experimental layout designed by employing design of experiments methods and the tests will be conducted with combination of factors as per Taguchi's orthogonal array. The optimum combination level of factors will be obtained by using Taguchi parametric design. Finally obtained response results will be compared with pure diesel responses values.*

Keywords :

Keywords: Bio-diesel, IC engine, Waste Cooking oil, Taguchi Method

Nomenclature

B Blended
L3 Level3
IC Internal Combustion
L1 Level1
S/N Signal to Noise
L2 Level2
BP Brake power
V Voltage
IP Indicated Power
I Current
FC Fuel Consumption
PD Pure Diesel

1. Introduction

In recent times, the world has been confronted with the energy crisis due to depletion of natural [1] resources and increased environmental problems. The situation has led to the search for an alternative fuel, which should be not only sustainable but also environment friendly. For developing countries, fuels of bi-origin, such as alcohol, vegetable oils, biomass, biogas,

synthetic fuels, etc. are becoming important [2]. Such fuels can be used directly, while others need some sort of modification before they are substituted for conventional fuels. The energy consumption is ever on the rise increasing global warming too. This has brought renewable energy source and alternate fuels into focus. Using biodiesel is another new option but its cost is more [3, 4]. Thus a viable option is to blend biodiesel with other fuels to make it environment friendly and reduce the pressure on mineral fuels. Optimization technique plays a vital role to increase the Performance of the IC Engine. Quite a lot of research attempts have been made for Modelling of IC Engine process [5, 6] an investigation of the process performance to recuperate Mechanical Efficiency. Improving the Mechanical Efficiency and Fuel Consumption are still challenging problems that restrict the expanded application of the technology [7, 8].

2. Methodology

To fulfil the objective of the present work various theories, methods and techniques like DESIGN of Experiments and Taguchi.

The following are the steps involved in this approach

Selecting the alternative fuel Trasistification

- Produced alternative fuel
- Blending of alternative fuel with diesel
- Designing the experimental layout-DOE
- Create experimental layout
- Conduct experiments on Engine
- Optioned Results
- Optimization Method-Taguchi
- Conformation Test

2.1 Taguchi design

Dr. Genichi Taguchi is regarded as the foremost proponent of robust parameter design which is an engineering method for product or process design that focuses on minimizing variation and/or sensitivity to noise. When used properly, Taguchi designs provide a powerful and efficient method for designing products that operate consistently and optimally over a variety of conditions. Taguchi proposed several approaches to experimental designs that are sometimes called "Taguchi Methods." These methods utilize two, three, four and five and mixed-level fractional factorial designs. Taguchi refers to experimental design as "off-line quality control" because it is a method of ensuring good performance in the design stage of products or process products or processes.

Optimization of EDM Process Parameters in Machining through Hole making of 17-4 PH Stainless Steel by using Grey Taguchi Technique

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Abstract: In a number of industries, hard and brittle materials find a diversity of applications. With the enhancement and developments in imaginative technologies, low mass- high potency, high confrontation to temperature. Materials have been produced to congregate the industry desires. The High Strength Temperature Resistance Materials are not easy to machine in traditional machining process for such cases either the tool can undergoes great wear /spoil or the work material will be spoilt. To overcome on top of problems there is a need for advanced machining process. In non-conventional machining process EDM process acting very important role in metal cutting applications with high precise and outstanding machining capabilities. The main aim of this work is to optimization of multiple responses of Electric discharge machining (EDM) using orthogonal array coupled with Grey Taguchi is endeavoured. The work piece material was 17-4 PH Stainless Steel and a cylindrical copper electrode with side impulse flushing was used. The effect of machining parameters, i.e., discharge current, pulse on time, discharge voltage and pulse off time on the Material Removal Rate (MRR), Tool Wear Rate and Surface Roughness (Ra) in EDM were examined. L9 orthogonal array was used to design the experiment and the effect of the factors on the outputs were studied. As the outputs are contradictory in nature, factors of a single combination will not be treated as best machining performance for all responses. The multiple responses were converted into a normalised S/N ratio by this grey relational coefficient and grey relation grade is obtained through this the output responses before optimization and after optimization are confirmed.

Keywords: EDM, Discharge Current, Voltage, Pulse on Time, Pulse off time, MRR, Surface Roughness, Tool Wear Rate and Grey Taguchi

Introduction

The English Scientist named Joseph Priestly was initiated process in the 1770's. He seen that in his experiments that electrical discharges had removed material from the two electrodes[1,2] such as work piece and tool. Even though it was formerly noticed by Priestly, the EDM was indistinguishable and riddle from failures. The quality of a product is the main thing for viewing growth of a industry. The quality of the work product largely depends on the type of material to be used

and input parameters of the process. Optimization technique plays a vital role to raise the excellent quality of the product [3, 4]. EDM is an electro-thermal un-traditional machining process and where thermal spark is created by using electrical power energy and material removal mainly occurs due to thermal energy of the spark. Mainly the EDM is used to machine those which are difficult to cut on conventional machining process [5, 6]. It is the wide and effectively applied machining process for a variety of work piece materials which are electrically conductive. With the development of mechanization skill manufacturers[7, 8] have more passion in the processing and developing of components by these costly and tough materials. Electrical discharge machining have spread since few decades from a innovation to a manufacturing process[9,10]. Entirely many research attempts have been made on EDM for improving output responses. Still getting better results of MRR and quality of surface finish are demanding troubles that confine the prolonged application of the process [11, 12].

1. Methodology

To finish the aim of the present work, different concepts, methods and procedures like Design of Experiments (DOE) [13] and Grey Taguchi [13, 8] have been used in this paper. The methodology adopted for this present work is shown in Figure.1:

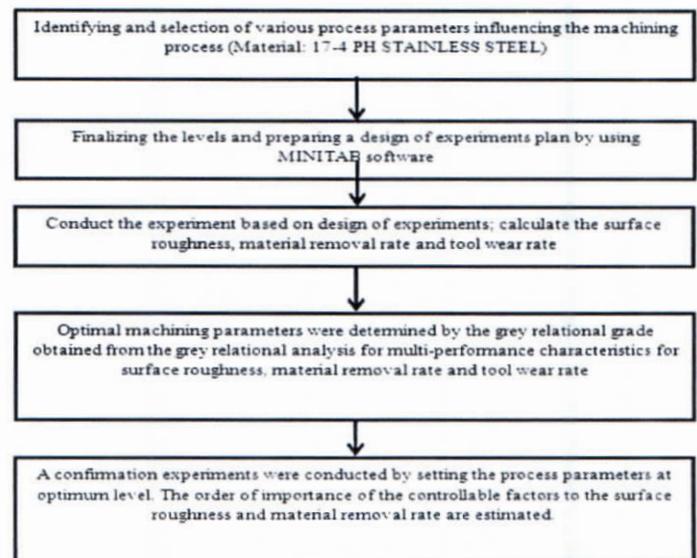


Figure.1: Experimental Flow Chart

Design and Fabrication of Low Cost Ball Milling Machine for Producing Nano Particles

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Abstract: This task is to plan and create a scaled-down ball factory that can crush the strong condition of different kinds of materials into a fine powder and able to work proficiently. The round and hollow container are utilized as a holder, the engine is utilized to pivot the container utilizing the pulley framework and the controller controls the speed of the revolution of the container. The strong material will be placed into the treated steel container with the metal balls. At that point, the container will be pivoted by utilizing engine with controller appended to it to help control the turning speed. Bearing and equipping frameworks are introduced to transmit the power from the engine. The speed of the pivot will be control by the controller and the container will continue turning until the material inside become an extremely fine powder. Following a couple of hours, stop the smaller than normal ball plant and the powder can be sifted through by the expelling the metal balls. The filtered power size is measured with the help scanning electron microscope (SEM) and the compression is performed.

Keywords : SEM, Ball Milling Machine, Nano Particles

Introduction

Pretty much consistently a few billion tons of metallic metals, minerals, concrete and different solids utilized in the fired and substance enterprises are exposed to estimate the decrease in ball plants. It is imperative to set up the ideal estimations of different factory working parameters, for example, the plant speed, ball load, ball distance across and molecule load, from the vitality utilization perspective. The present work is carried out by obtained different works carried out past years. Shubham Krishna Mhetar ,Akshay Ashok Nerle , RohitLaxmanPatil (2017) : t in this project is to minimize the production cost of Nanopowder by providing alternate machine. The major advantages of this machine include lower floor space, low initial cost. Also the quantity of nano powder required for testing is usually less Rutheravan Maria (2016) : In this paper, it was attempted to design and fabrication of mini ball mill. The small ball factory should ready to granulate the material to nano-powder with the ideal speed

and ideal measure of media ball. The rotation will be calculated to ensure a correct comminution occur. The grinded material is remove and measure in nano-powder form.K. Vidyatharran (2016) : The kinetic energy transferred at the collision event, the shock frequency and the shock power. Nanomaterials can display an unexpected resistance to grain growth. The purpose of grinding is to produce fine particles, it is recommended that the mill design and scale-up work should be based mainly on the parameters.

1.2. DESIGN

- SHAFT
 - Stainless steel
 - Length - 4.5cm
 - Diameter - 2.5cm
- SHELL (CYLINDER)
 - Length - 16cm
 - Diameter - 14cm
- FRAME METERIAL
 - Mild Steel (square 2*2)
 - Length - 48cm
 - Height - 40cm
 - Number - 15
- SUPPORTING ROD
 - Height - 36cm
 - Number - 4
- FRAME PLATES
 - Width - 4cm
 - Thickness - 0.5cm
 - Number - 5
- BEARINGS
 - Number - 2
 - Type - T
- PULLEYS
 - Number - 2
 - Size - 1.5*1*B

Debris collection in water using purification techniques: A review

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ABSTRACT

In earth for living organisms' water is a significant source for surveying, and it is natural resources. Water covers most of our earth, and it is approximately 98% of water is seawater and is unusual for drinking. As clean (i.e. freshwater) water becomes rarer, a new invention offers hope, with the potential to clean up polluted waterways and make them suitable for drinking once again. To do this, we have two techniques that are implementing nowadays. These include Water cleaner robot and River water treatment plant. The Watcleaner is a robot, which floats on the surface of the water and automatically filters the oil, trash and other pollutants. It can detect the fish, dolphins, and all living organs which are in the water, making sure that none harmed during the cleaning process. Whereas the treatment plant removes microbiological, chemicals and radiological contaminants through four stages, ultra-filtration treatment, process stages include coagulation, clarification membrane filtration granular activated carbon- filtration and chlorine treatment. But by implementing Watcleaner, some disadvantages arise, i.e. the garbage is collected by the Watcleaner and sent it to disintegrators, and it stores for a long time, and it causes pollution again. To overcome the problem, nano bytes into the disintegrators and dissolve the garbage instantly. Whereas the River water treatment plant requires more space and large equipment, but it works efficiently than Watcleaner. In Watcleaner, instead of using power generators, replace them with solar panels and batteries can save power. Also, the Global Positioning System tracking systems helps to track the exact location.

OPTIMIZATION OF DIESEL ENGINE PERFORMANCE BY PALM OIL BIODIESEL

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ABSTRACT

Biodiesel was produced from edible and non-edible. Palm is the primary source of usage in India for cooking purposes. Waste cooking palm in a form of Palm Oil Methyl Ester used in various ratios of blends for measuring the engine performance measure parameters on a 4-stroke single-cylinder diesel engine. The present work involves experimental design to experiment. The Taguchi orthogonal array introduced to maximize the experimental data with a minimum combination of experiments. The solicitation of the Taguchi method in blend with grey relational analysis has applied for solving multiple response optimization problems. A grey relational grade, evaluated with grey relational analysis, has been espoused to conceal an optimal parameter amalgamation. Using grey relational class and signal to noise ratio as a performance index, finally performed the parametric optimization by predicting the results and then verified it with confirmatory experiment.

Keywords: 4-stroke single-cylinder diesel engine, Optimization, Palm Oil Methyl Ester, Taguchi Design of Experiments, Grey relational analysis

1. INTRODUCTION

The quest for useful energy and the desire to have a clean and green environment is always of great interest to any researcher. The rapidly declining petroleum reserves have already given the worldwide warning signal for alternative ways to meet rising energy needs. Furthermore, harmful emissions of fossil fuels must also take care of [1]. Biodiesel made from different renewable sources has become a viable alternative for use as a fuel in Compression Ignition (CI) engines. Biodiesel referred to as mono-alkyl esters of long-chain fatty acids. With the help of a chemical process known as transesterification, the biodiesel is produced from vegetable oils and used for compression ignition (CI) engines. The deviation of the percentage concentration of methyl esters in biodiesel from different

Optimization of Diesel Engine Performance by Bio Diesel Using Taguchi and Grey Relational Analysis

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ABSTRACT

Biodiesel is created from non-eatable palm in a type of palm Oil Bio Fuel (methyl esters) are blends which are utilized in different proportions of mixes for estimating the motor execution measure parameters on 4-stroke single diesel motor. The present work includes test configuration to direct the test. The Taguchi symmetrical cluster acquainted with boost the test information with least blend of investigations. The requesting of the Taguchi technique in mix with dim social investigation has been connected for taking care of numerous reaction improvement issues. A dim social evaluation, assessed with dark social investigation, has been embraced to hide an ideal parameter amalgamation. Utilizing dim social evaluation and flag to commotion proportion as execution record, at long last played out the parametric streamlining by anticipating results and after that checked it with corroborative examination.

Keywords: 4-stroke single barrel diesel motor, Palm Oil Methyl Ester, Taguchi Design of Experiments, Grey relational analysis.

1. INTRODUCTION

The investigation for functional energy and the desire to have a clean and green condition remain dependably a Basic focal point for any researcher. As the quick assets of oil organizations they had given a notice wave to all over the globe that to concentrate on another way to provide food the consistently expanding need of vitality sources. Furthermore, the causing surge which is worn out of current non-renewable energy sources issues also requires to be overseen. Biodiesel is a fluid fuel created from sustainable sources that have turned into an essential job to be utilized as accessible as another plausibility fuel in Pressure Start (CI) motors.

Synthetically, transesterified biodiesel comprises of a mix of mono-alkyl esters of enduring chain fatty acids. After the procedure stream, non-indistinguishable direct vegetable oil, biodiesel has ignition properties which are fundamentally the same as those of oil diesel and can be supplanted in most current employment. The deviation in a rate of the grouping of methyl esters in the biodiesel from particular wellhead results to significant changes in the mix of physical and concoction properties of the biodiesel which result to the impact in the goodness of the motor being utilized. Biodiesels from a decision of drove stocks have been endeavored by various specialists to assistant learning and inspect in the distinctive mixes of execution, discharge and ignition prudence of the CI motor. Inspire prompts to lessen in hydrocarbon (HC) discharges diminish in brake control (BP) and sum in the brake explicit fuel consumption (BSFC) had been accounted for.

Tests with utilized cooking palm oil, some with mixes of blends oils and unadulterated diesel were inspected for the emanation with execution highlights of four-stroke Single cylinder water cooled diesel motor. Utilized cooking oil is worn as Interesterification factor to diminish generally the condition of being thick and cloud limit of the blend just as the ester. The thought process of the present work is to investigate the result of palm oil-based bio powers in the execution and discharge highlights of a diesel motor loaded up with those fills. Warmth up palm oil, PO/diesel blend and methyl/ethyl esters of the PO mix in dissimilar to amount were utilized. Execution and discharge tests were performed to assemble at different loads on stable motor speed state for each sort of fuel. The reason that biodiesel isn't made pragmatic and viable utilization of more often than not in the district of the world is expected to the generally costly of crude materials. To overpower this, one can utilize lower worth oils, for instance, squander cooking creature fat and oil that are delivered in overabundance in sustenance

Polymer Laminated Composites Reinforced With Bi-Woven Glass Fibers: Subjected To Tensile And Compression Loading

Dr. P.V. Sanjeeva Kumar, Dr. A.Hemantha Kumar, Dr. G.Venkata Subbaiah

Abstract: The present engineering applications require new and better materials for the replacement of existing ones. In view of this demand, at present we focused on latest upcoming materials such as composite materials especially laminated composites. The composites are having the greatest strength to weight ratio compared to conventional materials. Fiber reinforced polymer composites have been used in a variety of application because of their many advantages such as relatively low cost of production, easy to fabricate and superior strength compare to neat polymer resins. Reinforcement in polymer is either synthetic or natural. Synthetic fibers such as glass, carbon etc. have high specific strength but their fields of application are limited due to higher cost of production. The present research focus on characterization and testing of Bi-woven Glass Fiber/Epoxy composite material. The different mechanical tests are performed on Bi-woven Glass Fiber/Epoxy composite and the mechanical properties such as, tensile strength, tensile modulus, compressive strength is determined as per ASTM standards. The mechanical properties were improved as the number of layers of Bi-woven glass fibers reinforcement content increased in the epoxy matrix material

Key words: Laminated Composites, Bi-woven Glass Fibers, Epoxy, Hand layup Technique, Tensile strength, Number of layers, Compressive strength.

1. INTRODUCTION

Fibre reinforced polymer composites has been used in a variety of application because of their many advantages such as relatively low cost of production, easy to fabricate and superior strength compare to neat polymer resins. Reinforcement in polymer is either synthetic or natural. Synthetic fibre such as glass, carbon etc. has high specific strength but their fields of application are limited due to higher cost of production. Glass fibers reinforced polymer composites have been prepared by various manufacturing technology and are widely used for various applications. Initially, ancient Egyptians made containers by glass fibers drawn from heat softened glass. Continuous glass fibers were first manufactured in the 1930s for high-temperature electrical application. Nowadays, it has been used in electronics, aviation and automobile application etc. Glass fibers are having excellent properties like high strength, flexibility, stiffness and resistance to chemical harm. It may be in the form of roving's, chopped strand, yarns, fabrics and mats. Each type of glass fibers have unique properties and are used for various applications in the form of polymer composites. Hassan Abdolpour et.al, [1] have given in their paper the how to improve the flexural strength of hybrid sandwich plates with glass fiber reinforced polymer by using the strain hardening method. Francis L King [2] are performed the mechanical testing on the poly lactic acid reinforced hybrid fiber composite and proved that the mechanical properties are improved. M.K. Gupta and Rohit

Singh [3] are investigated the static and dynamic mechanical properties for PLA coated sisal fibers reinforced with polyester and obtained the fair results.

P.V.Sanjeeva Kumar and Dr.B.Chandramohana Reddy [4] are fabricated and tested the laminated carbon bi-woven fibers Reinforced with vinyl ester composites and evaluate its tensile and flexural strength for different number of layers. In this the vinyl ester was used as a matrix to prepare composites by in situ polymerization technique. The various investigations [5-10] are given the best results on the improvement of mechanical properties such as tensile strength, compressive strength, flexural and impact strength of polymer based composites. Sanjeev R nandaragi et.al [11] is fabricated and tested the woven glass fiber composite materials and determined its mechanical properties. The obtained results are shown in enrichment of mechanical properties. Enrique .J et.al are fabricated the hybrid laminates reinforced with aligned carbon nanotubes with situ technique and evaluated its mechanical properties. The obtained results are having the good agreement. Many investigators [12-15] are used natural fibers or bi-woven fibers as the reinforcement in polymer matrix and successfully evaluated their mechanical properties.

2. MATERIALS

2.1 Bi-woven Glass Fiber

In this project glass fibers are used for fabricating the composite specimen. The glass fibers were obtained from Dharmapuri District, Tamil Nadu, India. Polyester resin and the catalyst Methyl Ethyl Ketone Peroxide (MEKP) were purchased from M/s. Sakthi fiber glass Ltd., Chennai, India. 10% of catalyst is added with the resin for the quantity taken. The bi-woven glass fiber used for present work is shown in Fig.2.1 and its closed view is shown in Fig.2.2.



Fig 2.1: Bi-woven glass fiber

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Design Analysis and Effect of Process Parameters on 'Fsbw' of Al (2618a)-SiC Alloy

K. Nagamani, P.V. Sanjeeva kumar, S. M. Saleemuddin, N. Jayakrishna

Abstract: The research in fabrication engineering is much focused on the new or betterment in the existing metal joining techniques. In the view of the demand in improvement of the quality, strength and efficiency of welded joints, the present research is focused on design for tensile strength and optimization of friction stir butt welding (FSBW) of aluminum (2618A) and silicon carbide alloy. The design analysis is carried out for tensile strength and hardness. The functioning parameters such as tool rotational speed, transverse speed, plunge depth and tilting angle are considered. The Taguchi technique and ANOVA are used in optimization of process parameters. The high S/N ratios are mainly considered to analyze the results for tensile strength and hardness.

Keywords: FSBW, Taguchi Technique, S/N ratios, ANOVA

I. INTRODUCTION

The joining of materials is an unavoidable operation in fabrication of a product. The joints are either permanent or flexible based on the design functionality of a product. The friction stir welding (FSW) is one of the emerging joining techniques in the welding technology. The soft materials like aluminium, copper and their alloys are widely welded by FSW. In the present work an attempt is made on to join the butt parts of the aluminium and silicon carbide alloy by using the FSW. The aluminium and silicon carbide alloys are widely found in the fabrication of aircraft and naval structures because of their high strength to weight ratio and anti corrosion properties. Hongjun Li et.al [1] are investigated the effect of friction stir welding on the thermal efficiency of the joints. Naseer sadeghian et.al [2] are done an experimental investigations in order to optimization of FSW parameters. W. Yuwan and R.s. Mishra [3] are pursued the investigation on the friction stir spot welds to study the effect on tool design and process parameters. Yuri Hovanski et.al [4] are given a good novelistic information on friction stir welding. R.Nandan, T.Debroy [5] are quoted the recent advances in the friction stir welding on the weldment structure and its properties. P.Xue et.al [6] are investigated the dissimilar Al-Cu joints in order to study the effect of process parameters

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of FSW. The various studies [6-10] are on friction stir welding in order to determine its tensile strength, hardness and effect of process parameters will help to investigate the present work. The present study deals with identification of friction welding parameters and its influence on joint strength. Analysis of Variance carried out to analyze the friction stir welding parameter's influence on the responses.

II. MATERIALS

A. Base material details

Aluminium Alloy (2618A) is an engineering material having high strength to weight ratio. It is made by the combination of copper and magnesium. The resultant combination possesses the rich machinability and corrosion resistance. It is majorly found in applications such as aerospace and naval structures. The Physical Properties of aluminium 2618A is shown in table 2.1.

Table 2.1: Physical properties of 2618A

Copper	Magnesium	Iron	Nickel	Silicon	Titanium	Aluminium
2.30%	1.60%	1.1%	1.0%	0.18%	0.07%	93.7%

B. Silicon carbide (SiC)

Silicon carbide is the unique combination of carbon and silicon. It is obtained by the chemical reaction of both sand and carbon at elevated temperatures. Due to its high abrasive property, it is used in manufacturing of grinding wheels.

III. METHODOLOGY

The two main process parameters seriously affect the weld quality of FSW are:

1. Tool design
2. Welding parameters

A. Tool design

The tool selection and its design are very important in the FSW. The quality of the weld and efficiency of the joint is mostly depends up on the tool design. The welding speed also depends on the tool design. The material selections in the tool design are influencing the tool strength, its toughness and wear resistance. The important tool geometrical parameters are selected as per the literature standard and are shown in the table 3.1

A Review on Smart Materials: Classifications, Applications

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Abstract : *Smart materials are common name for a wide group of different materials. The general feature of all of them is the fact that one or more properties might be significantly altered under controlled condition. The present trend is considered to be the smart materials era. Earlier, smart material was defined as the material, which responds to its environments in a timely manner. Smart materials are multi-functional, transitional materials that can undergo changes in properties in response to an external stimulus. Another important criterion for a material to be considered smart is that the action of receiving and responding to stimuli to produce a useful effect must be reversible. This review focuses on the introduction of smart materials and their classifications and applications. Different applications of smart materials in various fields are also being discussed starting from engineering to the present environment applications.*

Keywords : Smart materials, Piezoelectric Materials, Electrostrictive Materials, Magnetostrictive Materials

I. INTRODUCTION

The world has undergone two materials ages, the plastics age and the composite age, during the past centuries. In the midst of these two ages a new era has developed. This is the smart materials era. According to early definitions, smart materials are materials that respond to their environments in a timely manner. Technology is becoming increasingly prominent in present daily lives, in many ways alleviating and in other ways fueling the demands of modern living. The effect can be caused by absorption of a proton, a chemical reaction, integration of a series of events, translation or rotation of segments within the molecular structure, creation and motion of crystallographic defects or other localized conformations, alteration of localized stress and strain fields, and others. The effects produced can be a color change, a change in index of refraction, a change in the distribution of stresses and strains, or a volume change. Also, it should be pointed out that the word "intelligent" is used to describe smart materials. The notation "smart" has been overused as a means to market materials and products. From the purist point of view, materials are smart if at some point within their performance history their reaction to a stimulus is reversible. Materials that formally have the label of being smart include piezoelectric materials, electrostrictive materials, electrorheological materials, magnetorheological materials, thermoresponsive materials, pH-sensitive materials, UV-sensitive materials, smart polymers, smart gels (hydrogels), smart catalysts, and shape memory alloys. In this treatment of the subject we will be using some of these classifications; in some cases, however, the classification of a particular material may appear to be in error. This will be done to illustrate the rapid growth of the field of smart materials and the rediscovery of the smart behavior of materials known for centuries. As we continue to better understand smart materials, our definitions will change. In each material section there will be discussions pertaining to

the material definition, types of materials that belong to that class, properties of the members, and applications of the materials. In some cases a more detailed discussion of application will be given to both illustrate the benefit of these materials and simulate the use of these materials in new applications. Smart materials are new generation materials surpassing the conventional structural and functional materials. These materials possess adaptive capabilities to external stimuli, such as loads or environment, with inherent intelligence. (Rogers, 1988; Rogers et al., 1988) defined smart materials as materials, which possess the ability to change their physical properties in a specific manner in response to specific stimulus input. The stimuli could be pressure, temperature, electric and magnetic fields, chemicals, hydrostatic pressure or nuclear radiation. The associated changeable physical properties could be shape, stiffness, viscosity or damping. Takagi (1990) explained it as intelligent materials that respond to environmental changes at the most optimum conditions and reveal their own functions according to the environment.

II. TYPES OF SMART MATERIALS

Thus this material has built-in or intrinsic sensor, actuator and control mechanism by which it is capable of sensing a stimulus, responding to it in a predetermined manner and extent, in a short or appropriate time and reverting to its original state as soon as the stimulus is removed. The following are the different types of smart materials.

- ❖ Piezoelectric Materials
- ❖ Electrostrictive Materials
- ❖ Magnetostrictive Materials
- ❖ Electrorheological Materials
- ❖ Magnetorheological Materials
- ❖ Thermoresponsive Materials
- ❖ Ph-Sensitive Materials
- ❖ Light-Sensitive Materials
- ❖ Smart Polymers
- ❖ Smart (Intelligent) Gels (Hydrogels)
- ❖ Smart Catalysts
- ❖ Shape Memory Alloys

Piezoelectric materials are very common example of such materials where they produce a voltage when stress is applied. Since this effect also applies in the reverse manner, a voltage across the sample will produce stress within the sample. Suitably designed structures made from these materials can therefore be made that bend, expand or contract when a voltage is applied. They can also be used in optical-tracking devices, magnetic heads, dot-matrix printers, computer keyboards, high-frequency stereo speakers, accelerometers, micro-phones, pressure sensors, transducers and igniters for gas grills.

Piezoelectric materials are materials that exhibit a linear relationship between electric and mechanical variables. Piezoelectricity is a third-rank tensor. Electrostrictive materials

Parametric Optimization of Wire Cut EDM Process on 'AISI D3 Steel' using Genetic Algorithm and Grey Relation Analysis

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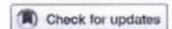
Abstract:- The manufacturing industries are continuously seeking for new and better machining operations in order to achieve the desired profile or contour of their machining parts. In view of this requirement, at present we focused on Wire Electrical Discharge Machining process. The Wire Electric Discharge Machining (WEDM) is a non-traditional process of material from conductive material to produce parts with intricate shape and profiles. Machine trade has created exponential growth in its producing capabilities in last decade however still machine tools don't seem to be used at their full potential. within the gift work, a trial has been created to optimize the machining conditions for surface roughness supported (L9 Orthogonal Array) Taguchi methodology. Experiments were carried out under varying pulse-on-time, pulse-off-time, servo control, and wire feed. An orthogonal array, the genetic algorithm (GA) and grey relational analysis (GRA) were employed to the study the surface roughness in the WEDM of AISI D3 Steel. It was determined that the discharge current was the foremost prestigious factors on the surface roughness. To validate the study, confirmation experiment has been dispensed at optimum set of parameters and expected results are found to be in sensible agreement with experimental findings.

Key words: WEDM, Surface roughness, Discharge current, Genetic Algorithm, Grey Relation Analysis

I. INTRODUCTION

Need for Unconventional Machining Processes was extremely hard and brittle materials or Difficult to machine material are difficult to Machine by traditional machining processes. once the work piece is simply too versatile or slender to support the cutting or grinding forces once the form of the half is simply too complicated. many sorts of non-traditional machining processes are developed to fulfill additional needed machining conditions. once these processes square measure used properly, they provide several blessings over non-traditional machining processes. The wire EDM is one of the vital non-conventional machining techniques. The effect of process parameters on the quality of machining especially surface roughness is much more crucial. Brajesh Kumar Lodhi et.al.[1] studied on optimization of the machining conditions for surface roughness based on (L9 Orthogonal Array) Taguchi methodology. Experiments were distributed below variable pulse-on-time, pulse-off-time, peak current, and wire feed. Jyosha Joshi et.al.[2] Investigated on optimizing the machining parameter of wire electrical discharge machining

(WEDM) for multiple performance characteristics on D3 tool steel using principal component analysis (PCA). Shivade et.al.[3] performed wire discharge machining of D3 alloy steel and Influence of pulse-on time, pulse-off time, peak current and wire speed square measure investigated for MRR, dimensional deviation, gap current and machining time, throughout convoluted machining of D3 alloy steel. Pankaj et.al.[4] are studied the effect of various process parameters such as pulse on time, pulse off time and current for high carbon high chromium cold work tool steel (D2). The experiment has been completed with the help of Design of experiment by Taguchi method is applied to create an orthogonal array of input variables using the ANOVA. M. Siva Kumar et.al.[5] Optimum machining parameter for the wire electrical discharge machining of AISI D3 steel of two different thickness (50mm & 75mm). Omkar Kulkarni et.al.[6] The experimentation has been completed with the help of Taguchi's L25 Orthogonal Array. Grey Wolf Optimizer (GWO) algorithm is stimulated by grey wolves. Mangesh et.al.[7] Performed CNC wire electrical discharge machining (WEDM) of Al 2124 SiCp Metal Matrix Composite (MMC) is analyzed by using dimensional analysis approach (DA) and artificial neural network (ANN). The various investigations [8-12] are carried out on the optimizations of process parameters by using grey analysis and genetic algorithms. Pratik A. Patil et.al.[13] investigated effect of parameter on machining of AISI D2 cold work steel through wire cut EDM. This research deals with Response Surface Methodology approach for maximizing the material removal rate in wire electrical discharge machining. M. Durairaj et.al.[14] investigated effect of parameter on machining of SS304 through wire cut EDM. Amitesh Goswami et.al.[15] Analysis trim cut machining and surface integrity of Nimonic 80A alloy using wire cut EDM with three levels of input parameters. Somvir Singh Nain et.al.[16] Modeling and optimization of process variables of wire-cut electric discharge machining of super alloy Udimet-L605. In this paper, an attempt is made to investigate the influence of WEDM process parameters on the performance measures of surface finish and cutting speed while machining of AISID3 STEEL with three levels of process parameters Pulse-on time, Pulse-off time, Wire feed & servo control.



Effect of novel hybrid texture tool on turning process performance in MQL machining of Inconel 718 superalloy

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ABSTRACT

Higher cutting zone temperatures are responsible for poor turning process performance during dry machining of Inconel 718 material. In the present work, a novel hybrid surface texture tool under minimum quantity lubrication (MQL) has been proposed to reduce the decremental effects that cause during machining of Inconel 718 material. Present work compared to the performance of three tools, namely, untextured tool (T1), texture tool having circular pit holes (T2) and hybrid texture tool combination of circular pit holes and linear grooves (T3) under MQL cooling technique. It was observed that hybrid texture tool (T3) significantly reduced the cutting zone temperature (T_m), tool flank wear (V_b) and surface roughness (R_a) to a maximum of 36%, 59% and 46%, respectively, when compared to the T1 tool whereas it was 22%, 48%, and 30% when compared to the T2 tool, respectively. The present work meets the stringent environmental regulation along with the improved machinability of Inconel 718 superalloy.

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Minimum; quantity; lubrication; machining; texture; tool; surface; roughness; Inconel 718; superalloy; wear; temperature

Introduction

Superior heat resistance of Inconel 718 superalloy material leads to having many applications in many fields, especially in aerospace applications. Dry machining of these material results in high manufacturing cost and poor surface quality.^[1] Flood cooling technique is the one and has been used to control the cutting zone temperature during machining of hard to cut materials. However, it has concerns about the environment as well as operators health negatively.^[2] Metal cutting industries are searching for effective methods to recover the process performance along with satisfying the environmental regulations. Cryogenic, MQL and compressed air cooling methods are recently developed to perk up process performance by satisfying the stringent environmental regulations.^[3] Sivaiah and Chakradhar observed superior turning performance characteristics with cryogenic cooling during machining of 17–4 PH stainless steel (PH-SS) material.^[4,5] Nevertheless, cryogenic machining required costly experimental setup. However, recent literature exposes that the surface texture of the tool is also an effective approach to increase the wear resistance of the tool. Palanisamy et al.^[6] look into the R_a , cutting forces (F_c) and V_b outputs by considering the cryogenically treated texture tool using Response Surface Methodology (RSM) during dry turning of 17–4 PH-SS. It was reported that mathematical models were developed by conducting experiments based on L_{27} and found close agreement with experimental results. Further, optimum cutting conditions were identified. Thomas and Kalaichelvan^[7]

developed different single design surface texture tools and carried out machinability studies during dry turning of mild steel (EN3B) and aluminum (AA 6351) materials with texture tools and comparison of results were done with untexture tools, respectively. From results, it was found low F_c and T_m when compared to the untexture tools, respectively, at varying cutting velocity conditions. The given reason for attained favorable conditions in texture tool was due to the increased cooling rate through convection mode at the tool–chip interface. Further, it was reported that square dimple texture tool was outperformed in improving the process performance over other texture tools due to the reduction in the tool–chip contact length (L) at the cutting zone. Arslan et al.^[8] reviewed the literature on surface texture tools and concluded that surface texture tools can improve the metal removal process performance. Further, it was reported that the method of lubricant supply and geometry of texture tool can significantly affect the process performance.

Dinesh et al.^[9] investigated the different texture tools, namely, parallel ($P-1$), perpendicular ($P-2$) texture to the chip flow direction as well as untexture tool under external spray cryogenic and dry cutting conditions, respectively, during machining of ZK60 alloy. Favorable machinability was found with $P-1$ tool under both environments when compared to the $P-2$ respectively. Additionally, it was found poor turning performance with an untexture tool when compared to texture tool under both cutting conditions, respectively, due to the high ' L ' value. Manikandan et al.^[10]

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Stock Investment of Agriculture Companies in the Vietnam Stock Exchange Market: An AHP Integrated with GRA-TOPSIS-MOORA Approaches*

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Abstract

Multi-criteria stock selection is a critical issue for effective investment since the improper stock investment might cause many problems affecting investors negatively. Investors need a range of financial indicators while they are choosing the optimal set of stocks to invest. This study aims to rank the stock of agriculture companies indexed on the Vietnam Stock Exchange Market. The data of 13 agriculture companies during the 2016-2019 periods was analyzed by analytical hierarchy process (AHP) integrated with grey relational analysis (GRA), multi-objective optimization ratio analysis (MOORA), and technique for order performance by similarity to ideal solution (TOPSIS). The AHP method is employed to determine the weights of the proposed financial ratios, and GRA, TOPSIS, and MOORA approaches are used to obtain final ranking. The results indicated that HSL is the top stock with the highest rank and GRA, MOORA, and TOPSIS rankings have strong correlation values between 0.78-1. The findings suggest that the integrated model could be implemented effectively to specific analysis of industries such as oil and gas, textiles, food, and electronics in future research. Further, other techniques like COPRAS, KEMIRA, and EDAS could be employed to evaluate the financial performance of other companies to solve investment problems.

Keywords: AHP, GRA, TOPSIS, MOORA, Stock Investment, Vietnam.

JEL Classification Code: C02, C61, D53, Q14

1. Introduction

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In today's competitive world economy, the agriculture sector is one of the key players in almost all developed and developing countries. The stock market leads financial resources for achieving the goals of the economy. It contributes to national food security, economic growth. Investors are considering the agriculture industry as the best place for investment to increase their portfolio and income. However, numerous variables, such as exchange rate and inflation rate, have a dynamic relationship with stock prices in both long-run and short-run causality (Lee & Brahmairene, 2018, 2019). The stock selection represents a challenging task in determining the factors influencing the investors' decisions. Evaluating the financial performance of a company has attracted enormous attention, and interest from various parties such as managers, creditors, financial experts, current/potential investors, researchers. The modeling of financial problems is more complicated and is sometimes conflicting, not to mention the subjectivity of the decision-makers in the evaluation process. Multi-criteria decision making (MCDM) methods have been used systematically as a tool to aid in financial decision-making (Zopounidis & Doumpos, 2002).

Melt rheology properties of PLA/ABS/TCS polymer blends

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Quantification of execution and emission efficiency of a Fuelled Diesel Engine with Biodiesel/ Diesel Blends Cotton Seed Oil

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ABSTRACT

It is a well-known fact that a significant portion of the automobile and industrial sector is largely dependent on the running of diesel engines as it is efficient and shifts a large of the goods around the globe and power various equipment. Also, as the use of energy as a diesel fuel is increasing enormously with the expansion of industrial growth, diversification, this led to the accelerating global emissions, global climatic change, health issues, and exhaustion of fuels. To succumb to this, alternative fuel is needed to fight against the ill effects and as a replacement to diesel fuel. Thus, vegetable oils as alternative fuels are drawing more attention as they are renewable and do not address the problem of greenhouse gas. In the present work, the cottonseed oil was chosen as the favourite among the vegetable oils due to its advantages like less pollutant level, excessive availability etc. The transesterification process was used to produce the cottonseed oil biodiesel. The aim of this research is to investigate efficiency, emission characteristics by using smooth diesel, cotton seed oil and mixtures with varying composition from 20% to 80% in 20% steps to identify sustainable fuel as a substitute for existing fuel and to overcome fuel demand and enviro effects. This test was conducted on single-cylinder four stroke water cooled diesel engines. From the results, it was revealed that cotton seed oil and its blends have a great influence on performance and emission characters.

INTRODUCTION:

Biodiesels are separated from plants or creatures and comprising of long-chain unsaturated fat esters. It is typically arranged by substance respond lipids like creature fat, soybean oil, or some other vegetable oil with liquor, delivering a methyl, ethyl or propyl ester. Late logical, cultural, and biological changes are compelling the new quest for potential powers for both eatable and non-consumable oil. As of now, the first-creation bio fills, for example, biodiesel and bioethanol, impact the biofuel area. This bio fills can be utilized in low-rate mixes with basic powers and can be administered through the enduring framework.

S. Nagendra et.al. Accomplish their test work by utilizing coconut oil and cottonseed oil mixed with diesel and Combustion Products Analysis to discover the diesel motor yield. The mixes of these elective powers and diesel differing extents are utilized to control the motor, and significant changes in motor effectiveness and discharge attributes are watched. Thinking about the warm effectiveness, the cottonseed oil blend (B50) is best as it gives it great bend qualities. [1]. S. Nagendra et.al. Talked about on the Four Stroke CI Engine execution breaks down utilizing Bio-Diesel. The motor was tried utilizing two distinctive cottonseed oil oils and methyl esters dependent on coconut, mixed independently with diesel. The motor's warm effectiveness is nearly higher when joined with coconut oil and expanded by 5.33 per cent contrasted with cottonseed oil and joined with coconut and cottonseed oils by 26.31%. It is seen that the motor effectiveness of the coconut oil mix B10 was better contrasted with different mixes of cottonseed oil and coconut and cottonseed oils. [2].

Free Convection Flow through a Porous Medium in the Third Grade Vertical Channel

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Abstract

We analyzed the fully developed unfixed convection through the flow of a third degree liquid by a porous medium on a vertical channel. Non-linear equations are resolved by means of the disturbance system for the speed and temperature field. Component graphs are used for the effects of different growth parameters on speed and temperature fields.

Keywords: *Free convection flow, porous medium, vertical channel, third grade fluid.*

1. Introduction

The heat transfer in free and mixed convection takes place in vertical channels with various mechanical processes and natural phenomena. Much detailed work has been done in this way for most statistical tests in different types of flows. For example, a great deal of interest for this topic stems from its use in the development of electronic cooling systems and energy treatment. As noted, the innovation in the heat exchanger includes a convection flow in the vertical channels. In general, these fluxes suggest uniform channel heating states that can be represented by the uniform distribution temperature (UWT) or by the uniform temperature thermal limit conditions (UHF). The speculation of Newtonian fluids depends on all of the above research into free and mixed convection streams on vertical channels. Hypothetical research into free, limited and mixed convective flow of non-Newtonian fluids in channels and tubes is, however, necessary in some modern procedures because of their primary and innovative importance.

The third-degree liquid flow between heated parallel plates was investigated by Akyıldız [1]. Hayat et al. [4] described the flow of a 3rd degree fluid on an exponentially expanding magneto hydrodynamic (MHD) surface. The analysis is conducted in the presence of a first order chemical reaction. The chemical reactions were constructive and adverse. M. M. Rashidi et al. [5], investigated the purpose of this newsletter is to investigate the convection flow of a non-Newtonian 3rd degree fluid as a result of a linearly stretched sheet exposed to a magnetic zone. Third-degree fluids (Rajagopal, [3], Fosdick and Rajagopal, [2]) form a subclass of fluids with a differential shape that have been well studied for many flux conditions and are designed to take advantage of non-shear as well as daily stress. Aiyesimi YM et al. [6], in the presence of a uniform magnetic field with heat transfer, the combined effect of the magnetic field on the MHD slip of a 3rd degree fluid through an inclined channel

Any porous material has been found in all the above investigations. The heat transfer work into porous media has important applications for synergistic reactors in packing beds, geothermal dams, porous solid drying, thermal insulation, storage tanks in packaged beds, gas generation, grain storage, oil resources etc. It is also keen for the nuclear industry, notably in terms of assessing heat against a nuclear reactor speculative defect and providing strong protection.

A Mixed Stream of Viscoelastic Liquid Through a Porous Medium is Situated in a Vertical Channel with Permeable Walls

L. Hari Krishna, A. Hemantha Kumar

Abstract: We examined the completely developed mixed convection flow of a visco-elastic fluid via a porous medium in a vertical channel with a permeable wall. The non-linear control equations have been resolved using the conventional disturbing method for the speed and temperature domain. Graphs will be used to detail the effects on speed and temperature of the viscoelastic Reynold number, the cross flow parameter, the number of Grashof, and Prandtl temperature.

Keywords: Viscoelastic fluid, porous medium, flow, vertical channel, mixed convection.

I. INTRODUCTION

Many recent papers have been published on the issue of convective fluid flow in saturated porous media. The interest in understanding pores material transport processes is growing thanks to the growth of geothermal technologies, high-quality insulating buildings and cold stores, increased interest in energy efficient drying methods. The nuclear industry also has an interest in the assessment of heat dissipation in hypothetical accidents and in the effective insulation of a nuclear reactor. None of us have examined the convective flux of the mixed viscoelastic fluid, fully developed in a permeable vertical flux through a porous fluid. In the vicinity of the porous medium, the flow of non-Newtonian liquids finds essential applications in improved oil extraction, filtration, insulation systems and development of composites, etc. Some of the studies [1] can be mentioned here. The combined effects of viscosity changes and convective cooling in an unstable nano-fluid circulation via a permeable tube were studied by Kamiset et al. [2] later, according to a Buongiorno method. In a vertical porous tube, Singh [3] investigated thermal radiation with a viscous-elastic sliding mixed MHD mixture. Idowu et al [4] studied the dynamic stream of MHD in an oblique magnetic field between the two infinite parallel flat surfaces. In a porously saturated porous channel, Falade et al. [5] analyzed the MHD oscillating present. Recently studied heat and mass transfers in the non-Newtonian MHD fluid on the infinitely vertical porous plate were made by Raghunat and Siva Prasad [6]. Saleh et al. [7], which focused on observations of reversal of convective flows.

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II. MATHEMATICAL FORMULATION

As shown in figure 1, we use the laminar convection stream of viscoelastic fluids in a permeable vertical flow through the porous matrix. The rate of injection on one wall shall equal the level of suction on the other wall. The x-axis has to be paralleled by a rectangular (x and y) coordination unit, but it crosses the walls of the channel opposite the x-axis. At a constant temperature of T_1 the left side (i.e. $Y = 0$), the right side of the wall (i.e. at $y = h$) is retained every time $T_1 > T_2$ is possible.

The stream is theoretically stable and fully developed, i.e. zero cruising speed. The continuity formula then comes down to $\partial u / \partial x = 0$.

Rivlin-Ericksen constitutive equation can be modeled on viscoelastic fluids

$$S = -pI + \mu A_1 + \alpha_1 A_2 + \alpha_2 A_1^2 \quad 1$$

Scalar pressure p , μ , α_1 and α_2 surface constants, commonly referred to as viscosity, elasticity and cross-viscosity coefficients, are the places where the Cauchy stress tensor is found. The product constants of a particular liquid can be calculated by viscometric fluxes.

A_1 and A_2 are tensors from Rivlin-Ericksen, showing the degree of distortion and acceleration respectively. A_1 and A_2 are set by

$$A_1 = \nabla V + (\nabla V)^T \quad 2$$

$$A_2 = \frac{dA_1}{dt} + A_1(\nabla V) + (\nabla V)^T A_1 \quad 3$$

$$\mu \geq 0, \quad \alpha_1 > 0, \quad \alpha_1 + \alpha_2 = 0 \quad 4$$

Visco-elastic liquids are called second-degree liquids when they are modeled by Rivlin-Ericksen. Dunn and Rajagopal are known for their detailed description of the properties of second-degree fluids. In the context of dissipative inequality (Clausius-Duhem), Rajagopal and Gupta [8] study thermodynamics and generally agree that Helmholtz's special free energy must be at least balanced. From the thermodynamic consideration that they assumed

According to the approach of Boussinesq, the basic equations of momentum and energy control such a stream

MULTI RESPONSE OPTIMIZATION OF MACHINING PARAMETERS FOR DRILLING OF ALUMINIUM 2219 ALLOY USING TAGUCHI AND GREY RELATION ANALYSIS

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ABSTRACT

Aluminium alloys are highly resistant to corrosion. Aluminium 2219 composite is a compound containing age-hardening copper. Aluminium 2219 composite is a stronger in strength used in economic supercritical installations, such as spacecraft rockets and storage tanks. The aluminum alloy requires excellent mechanical properties due to excellent corrosion resistance. The alloy is flexible over a temperature with good rupture hardness.

This article perceives the optimal solution criteria that improve the rate of reduction of material and surface finish while drilling. Drill diameter, spindle speed and type of coolant are the control parameters chosen for the study. Using Gray relational Analysis, this multi-response optimization is accomplished for optimal conditions to which high MRR and lowest surface content were generated.

KEYWORDS: *Drilling Parameters- MRR, Surface Roughness, Grey Relation Analysis and Aluminium Alloy*

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INTRODUCTION

DRILLING can be defined as a process where a multi-point tool is used to remove materials, which are objectionable to the development of such a desired hole. It concerns mainly those methods used in the piece of work to construct cylindrical holes. Hole have historically have been described as the most prominent machining process, requiring specialized techniques to achieve the maximum cutting parameters. In an industry the drilling machines are commonly used in metal removal operations. Hence it is important to optimize output and profitability at about the same time.

The effects of the drilling parameters on the surface roughness and the error of roundness were examined in the drilling of the Al6061 alloy with HSS twist drills. Taguchi Grey's analyzes of the experimental outcomes recorded [1]. The effect of multiple process variables on material removal rate and surface roughness on Al-TiBr, Al6082, mild steel material on radial drilling is investigated using Grey relational analysis [2,3,8]. The effect on the drilling machine on glass fiber reinforced polymer as work surface of speed, point angle and feed on surface roughness and separation component [4]. solving the multi-response optimization problem in CNC end milling by taguchi method [5,9,10]. Taguchi methods are frequently used in the experiment layout and interpretation of test data for optimization production parameters. [6,7].

Aluminum combinations are profoundly impervious to consumption. Aluminum 2219 composite is a compound containing age-solidifying copper. Aluminum 2219 composite is a higher quality combination utilized in monetary supercritical establishments, for example, shuttle rockets and capacity tanks. The aluminum compound

Tensile and Micro Structural Properties Analysis of Biodegradable Polymer Blends

B Ramanjaneyulu, N Venkatachalapathi, G Prasanthi

Abstract: poly lactic acid (PLA), Acrylonitrile butadiene styrene (ABS) and tapioca cassava starch powder (TCSP) were melt blended using twin screw extruder. Mechanical properties, which are tensile strength, young's modulus, % elongation and flexural strength Vs. flexural modulus determined by the help of Universal testing machine (INSTRON UTM-3969). Morphological of PLA/ABS/TCSP blends was investigated by the help of scanning electron microscopy (SEM), the SEM images of (b-d) shows spherical morphology on the tensile fractured

Key Words: Tensile properties and microstructure of polymer blends.

I. INTRODUCTION

Manufactured Synthetic polymers are of significance in current science and innovation as they are basic to our day by day existence with a wide scope of uses in different fields, for example, bundling, farming, food, consumer items and medical appliances. In the previous couple of decades, significant consideration has been centered on the biodegradable polymers because of their one of a kind biodegradability, upgraded biocompatibility just as adaptable physical and mechanical properties PLA and its copolymer it's have been utilized broadly in various fields, for example, tissue designing, polymer building, tranquilize conveyance framework and a few medical inserts of vital. As utilization rate in the year 2010, PLA was seen as the world second most imperative bio plastic [1]. There are report discovered that PLA and PCL structure an incomplete miscible mix where it demonstrated an expansion of extreme malleable strain of PLA when PCL was added to this blend system [2]. PLA characteristic crude materials of polymers. [3-7]. Mechanical properties of the following blends approach view [8]. Thermo Plastic [9]. The crystalline morphology of the PLA/PBS blends was measured by scanning electron Microscopy (SEM). Mechanical properties were examined by tensile testing [10]. In this research paper, explore the effect of PLA/ABS/TCSP polymer blends, on mechanical and morphological properties, which are prepare on the weight basis like as pure PLA and ABS PLA70/ABS30, PLA50/ABS50, PLA30/ABS70, PLA47.5/ABS47.5/TCSP5, PLA45/ABS45/TCSP10 PLA60/ABS25/TCSP 15 and PLA25/ABS65/TCSP15, were produced by melt blending.

II. METHODS AND MATERIALS

A. Materials

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The PLA used in this work was a commercial grade type Ingeo™ Biopolymer 3052D (MFI = 14-30 g/10 min at 210 °C) provided by Nature Works (Minnetonka, MN, USA). Its physical and thermal Properties of Density and glass progress temperature in the 1.24 g cm⁻³ and 55- 60 °C range individually, and a dissolve temperature extend involved between 155- 170 °C. With respect to, a commercial grade 3903HSN/SAC (MFI = 18 - 23 g/10 min at 160 °C) was provided by LG Chem ROK Ltd. (SOUTH KOREA) in granules structure with a thickness of 1.05 g cm⁻³, MFI= 21.3g/10 min (220°C/10 kg, MFR= 50 g/10min (200°C/21.6 kg)]. 1.146 g cm⁻³. ABS fundamental thermal most extreme arrangement temperature, T_{Max} of 88 to 89 °C in air, Cassava starch Commercial grade 11081400 HS (Density and consistency of 0.6-0.7 g cm⁻³ and 200 - 500 Cs) (i.e. Centi stokes (Cs)) provided by ANGEL STARCH&FOOD Pvt.Ltd (Chennai INDIA). It has a molecule size of 0.075mm.

B. Manufacturing of binary and ternary of PLA/ABS/TCSP Blends

Manufacturing of binary and ternary blends were completed in two separate stages. Before further preparing, all materials were dried to maintain a considered reserve from wetness, which could influence hydrolysis during collecting. PLA, ABS and TCSP were dried at 60 °C for 24 h. The amount of PLA in all ternary blends was, maintained at 70, 50, 30 wt%. In binary blends 60, 47.5, 45 and 20 wt%. in ternary mixes as showed in Table 1, and the Results had been in comparison with pure PLA, as the primary objective is to get toughened PLA formulations. The suitable amount of each component have been measured and exactly pre-blended in a zip pack. Until homogenization. At the primary manufacturing stage was conducted via extrusion in a twin-screw extruder (ZV20-High Torque, L/D= 40, NEOPLAST) at 196°C (extrusion die) and 45 rpm, from Central Institute of Plastics Engineering and Technology, CIPET (Kochi, India). A pivoting pace of 40 rpm was utilized with a temperature profile of 190°C (expulsion bite the dust), 195°C, 200°C, and 205°C (feeding, hopper). These conditions promise great processing in terms of viscosity and avoid thermal degradation, as past analyses in the gathering have revealed. After this blending stage, the got materials were pelletized and further prepared by semi-automatic compression forming in a Neo Plast Engineering (NP30) (Cochin, India). The temperature with water-cooling (25°C) and pressure was 9 MPa. The molded shaped with square sheet with dimensions of 200 mm X 200 mm X 4mm, width, breadth and thickness respectively.

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Testing and characterization of binary and ternary blends with poly (lactic acid), acrylonitrile-butadiene-styrene and tapioca cassava starch powder

B. Ramanjaneyulu ^a, N. Venkatachalapathi ^b, G. Prasanthi ^a[Show more](#)  Outline |  Share  Cite<https://doi.org/10.1016/j.matpr.2019.09.092>[Get rights and content](#)

Abstract

In this research paper explores about biodegradable polymers such as Poly lactic acid (PLA), Acrylonitrile-Butadiene-Styrene (ABS) and Tapioca cassava starch powder (TCSP) and their blends prepared using conventional method. The prepared bio degradable polymer blends are analyzed with the help of Universal testing machine (UTM-3969), scanning electron microscopy (SEM). On the weight basis PLA, ABS, and TCSP are transferred into binary and ternary blends such as PLA, ABS, PLA/ABS, PLA/ABS/TCSP (wt.%) etc. are compared with various mechanical properties such as tensile stress v/s tensile strain, tensile strength v/s tensile module and compressive. The scanning electron microscopy images for tensile fractured samples showed smooth homogeneous finish and good partial distribution.

 PreviousNext FEEDBACK 

MULTI RESOURCE CONSTRAINED PROJECT SCHEDULING ON CRITIC METHOD

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ABSTRACT

In this paper we consider the critic method resource-constrained project scheduling problem (CMRCPSP). In this paper, a text problem is considered in a critic method is developed. The objective function is the minimization of the project completion time and critical path. A weighted sum of resources for each activity is obtained and the activities are ranked based on weighted sum and scheduled. The method is explained all the way through numerical illustration. All steps of the proposed solution methodology are plotted in detail. Gantt chart shows that our results.

KEYWORDS: Project Scheduling (PS), Critic Method & Resource Allocation

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1. INTRODUCTION

The resource-constrained project scheduling problem (RCPSP) The basic form of resource-constrained project scheduling problem is as mentioned. However, since the situation is completely different in practice, changes have been made to the basic assumptions by the researchers over time. In addition have shown that the RCPSP problem belongs to the class of the strongly NP-hard problems. As a result, various solutions are used according to the changes in the basic assumptions. In the following, changes which have occurred in the general form of the base problem over time are evaluated and categorized from the perspective of four main dimensions and their subcategories, according As mentioned earlier; each activity in the project requires resources to be implemented. The need to resources, only in the form of renewable resources and assuming that they have a full capacity in each period and a fixed amount of the resource is occupied during the implementation of the activity, has been assessed in the basic RCPSP. Since the type of the consumption resource(s) of an activity depends on the nature of that activity, various resources have been evaluated, among which renewable, nonrenewable and doubly constrained resources have attracted the most attention from the researchers.

2. LITERATURE REVIEW

Since One CRITIC (Criteria Importance Through Intercriteria Correlation) method is one of the weighting methods which determines objective weights for criteria. CRITIC method was proposed by Diakoulaki et al. in 1995. This method includes the intensity of the contrast and the conflict in the structure of the decision making problem (Diakoulaki et al., 1995). It uses correlation analysis to find out the contrasts between criteria (Yilmaz

Heat and Mass Characteristics of Magneto-Newtonian Fluid Through Upright Porous Plate



P. Chandra Reddy, P. V. Sanjeeva Kumar, L. Rama Mohan Reddy and M. C. Raju

Abstract An examination has performed to explain the flow characteristics of an unsteady MHD Newtonian fluid past over a vertical porous plate with rotation under the existence of heat and mass transfer. The governed expressions of the flow pattern are solved by using finite difference scheme. The impact of diverse parameters on the fluid velocity, temperature and species concentration is depicted in the form of numerical results and graphical presentations. The obtained results are having the close agreement with the existed literature results and promising the trueness of the numerical method. The enrichment of rotation parameter causes to decline the primary velocity of the fluid and also raises its secondary case velocity.

Keywords Rotating fluid · Thermal radiation · Chemical effect · Soret number and Dufour effect

1 Introduction

Rotating flows along porous media has received extensive importance in the modern research on computational fluid dynamics. Tremendous treatises on this topic with advantages in planetary sciences and geophysics have been published before the year 1950 onwards. The shared impact of heat transfer and mass transfer is much inspired to analysts in dynamic applications especially in chemical and manufacturing processes industries.

The theoretical concepts of revolving fluids were described by Greenspan [1]. Hydrodynamic resistivity and heat thrashing of revolving solids were established by

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Geopolymer Brick by using Flyash, GGBS, Silica Fume and Kadapa Slab Dust

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ABSTRACT: Brick is the former construction material, a standard-sized non load bearing building component. The ancient bricks manufactured by clay, earth or mud. By 2007 the new 'fly-ash' brick made up of cement and flyash which is reliable, weather & acid resistant. The cement is a hugely used building material and liberates CO₂ leading to pollution. To minimize pollution and a step to advancement in sustainable development. The current research results to geo polymer brick, where the cement is replaced with GGBS, silica fume and Kadapa slab dust. For bonding, polymers were used with limited water content. Hence produced brick is a hybrid geo polymer brick with multi material combination. Fly ash 75%- GGBS 25% as a base material. GGBS is partially replaced with silica fume and Kadapa slab dust by 2 to 5%. Evaluated through compressive strength results in which we found three optimum proportions such as FA 75%-GGBS22%-SF3% & 75% FA-22% GGBS -3% KSP.

Index Terms: Flyash (FA), Ground granulated blast furnace slag (GGBS), Silica fume (SF)

I. INTRODUCTION

A brick is a building material, used to construct walls, pavements and other elements. Traditionally, A brick is composition of clayey soil, fine aggregate, and lime(calcium carbonate). Bricks are classified in to various types based on geometry and composition of materials which vary with region. Initially in 7000 BC sun-dried mud bricks were introduced, later kiln-dried clay bricks are introduced which are more weather-resistant.

Dr. Bhanumathidas and Kalidas in 1991 has developed and got patent on Flyash, Lime & Gypsum for achieving high early strength due to the conversion of calcium aluminates into calcium aluminosulphates. Leads to reduction in cost by 20%. Even though in the present scenario, a well known fact that cement is universal constructional material made of clay & lime stone a natural resource, because of its continuous usage soon they may exhaust. In order to protect the natural resource and to reduce pollution as an alternate material for sustainable development Geo-polymers-NACL & NAOH is introduced as a binding material. The materials flyash, kadapa slab dust & GGBS are used in the manufacture

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II. LITERATURE REVIEW

Hardjito and Rangan studied fly ash based Geo-polymer Concrete. The material used are fly ash-class F acquired from Thermal power station. Fly ash contains calcium by 2 percent by mass. They observed the compressive strength data and concluded that fly ash based geo-polymer concrete has good strength, fit for structural application. **Davidovits**'s the poly condensation of geo-polymer occurs at lower temperatures less than 100°C and the chemical reaction involved in their formation. **Hardjito et al.** concluded water to geo-polymer solids ratio has considerable effect on compressive strength of geo-polymer concrete, where as **Fongjan and Ludger** observed that potential properties of geo-polymeric mortar has many key factors like, physical properties, oxide-mole ratios, curing conditions and morphologies of solid materials,. **Rangan et al.** concluded that fly ash geo-polymer concrete has magnificent resistance to durability properties like creep, shrinkage and chemical attacks. **Hardjito et al.** found that effects of the concoction time and the strength gaining time. **Sumajouw et al.** studied the mechanical properties of geo-polymer concrete columns and beams. **Barbosa et al.** observed the effect of the oxides molar composition and polymerization process- water content. **van Jaarsveld et al.** studied that the properties of geopolymer is affected by water content. **Ranganath and Mohammed** analysed the effect of materials, water content, polymer proportioning, and the time interval of accelerated curing on the properties of geo-polymer concrete, whereas **Mustafa Al Bakri et al. and Jamkar et al.** analysed the fineness of fly ash leads to increase in workability and compressive strength **Chindaprasirt et al (2007)** found that, to produce a higher strength geo-polymer the optimum sodium silicate to sodium hydroxide ratio was in range of 0.67 to 1.00. Alternatively, the concentration of NaOH between 10M and 20M give small effect on the strength

III. ENGINEERING SIGNIFICANCE

Portland cement emits carbon dioxide majorly leads to global warming. Among the greenhouse gases; carbon dioxide contributes about 65% of global warming also to secure the natural resources. Numerous researches are undergoing to decrease Portland cement utility in bricks and concrete. Leads to utilization of sustainable mineral admixtures like granulated blast furnace slag, fly ash, rice-husk ash, silica fume and Kadapa slab dust, resulting different binders alternative to Portland cement.