IEEE – MECHANICAL 2024 -25

1. Development and performance test of an evacuated tube solar water heater

Abstract:

The climate change due to global warming and worldwide energy scarcity are prompting almost all the countries of the world to look for alternate energy sources like nuclear and renewable. Because of infrastructure and other reasons, developed countries can tap into nuclear energy but developing countries are not fortunate enough to have that option. Consequently, the only option that is left open to developing countries is renewable energy. Among renewable energy solar, wind, hydro, geo-thermal and wave energies are most reliable, which do not cause carbon emission. Solar energy can be used in many purposes like water heating, air heating etc. Among the various types of solar collector, evacuated tube solar collector is one of the most effective water heating device. An evacuated tube solar water heater was constructed from locally available material. In the first attempt, the highest. storage tank temperature obtained was only 47°C. In the present attempt, cylindrical parabolic reflectors were placed under each evacuated tube. Consequently, the maximum water temperature obtained at outlet to collector was 8I°C and 76°C in the storage tank in the month of April-May.

PROPOSED SYSTEM: spiral cooling system – COPPER tubes

AIM OF THE PROJECT: Compact Design

Note: Comparison of Heating Effect and Flow rate between **U & SPIRAL** Also Possible

2. Ocean Energy Harvesting to Generate Electricity Using a Raft

Abstract:

Ocean energy is tremendous and has a recent interest as a renewable energy resource. Moreover, because of global warming and the troubles of fossil fuel resources, searching for other sustainable energy sources will be very important. This study aims to investigate experimentally the possible benefits of energy that could be harvested from ocean (sea) energy. The main source of this energy is moving waves during the tidal and other reasons to generate electricity. The principle in designing this rig is the buoying force and how to invest it in generating electricity. The raft is fixed on the bottom of the sea, and when a wave occurs, the rope will pull (rotate) the roller, which then will rotate the generator shaft to generate the electricity. The results show very promising findings. Moreover, the electric generation during tidal was much more likely to generate electricity at other times.

PROPOSED SYSTEM **:** Rack & Pinion in two Direction

AIM OF THE PROJECT **:** Compact Design using thermocol

3. Design of Five-Axis Denture Carving Machine Based on Open CNC System

Abstract:

With the development of science and technology, CAD / CAM technology is applied in the denture processing, gradually replacing the traditional denture processing method, and improving the high efficiency and accuracy of the denture processing. According to the functional requirements of the developed five-axis denture carving machine, the main mechanical structure of the machine tool is determined, the design and application of Delta Open CNC control system and DOPsoft configuration software to realize the control system scheme, and the hyperDENT® CAM software is selected to generate the NC code of the machine tool, so as to make the machine tool run.

4. The extension of the function of CNC milling machine—Slotting key-groove replaced by CNC milling machine

Abstract:

Based on actual production's needs, the function of CNC milling machine is extended to slotting process. By analyzing the functions and features between two machine tools, making technological transformation in main components and equipment, product performance is acceptable. The replacement between CNC milling machine and slotting machine leads to improve efficiency.

5. A general motion simulation description of multi-axis CNC machine tools

Abstract:

CNC simulation will improve the efficiency of CNC machine tools and ensure the correction of NC code. It is difficult to promote the application of simulation algorithm to specific machine tools. This paper proposes a general description of CNC machine tools kinematic chain. NC code can be checked by workpiece coordinate system simulation effectively; hence a general conversion algorithm from machine coordinate system to workpiece is discussed. CNC machine tools models are built by OpenGL kernel to verify motion and workpiece simulation. The simulation results show that this description is correct and can be applied to any form of multi-axis cascade CNC machine tools.

6. Application of imaging technology in quality inspection of agricultural products

Abstract:

society and residents attach great importance to the quality and safety of agricultural products in daily life. Image analyzer integrates image and spectral technology to obtain spatial and spectral information of the research object. It has the characteristics of non-damage, precision and fast, and has become one of the main technical means in the quality detection of agricultural products. According to the latest research results this paper introduces the principle and system of imaging technology, classifies and summarizes the application of imaging technology in agricultural product quality detection, points out its advantages and disadvantages, and analyzes the development direction of imaging technology in agricultural product detection in the future.

7. Modern Farming Using IoT-Enabled Sensors For The Improvement Of Crop Selection

Abstract:

Agriculture industry is shifting towards modern farming system using Internet of Things (IoT). It has been observed that with the advent of IoT in agriculture sector, there are many significant changes has been observed like exponential increase in farming efficiency, increased food production, smart farming with latest sensors equipped devices, integrated crop prediction, reduced fuel utilization, etc. These Internet of things (IoT) based devices would bring revolutionary changes in Agro based industry and further helps to establish a sustainable agriculture with conserving human resources, protecting land from chemicals and increasing productivity of crop. The various critical factors which are necessary for the selection of crop are also discussed. In this paper the author has also done a comparative analysis between Traditional Farming devices and IoT (Internet of things) devices based on the parameters like Data Collection, Efficiency, Accuracy, Maintenance, etc which will provide clear understanding that how IoT devices can revolutionized the way we approach farming by providing real-time data collection and analysis. The wide uses of Internet of things (IoT) sensor devices which will be helpful in agriculture industry like Electrochemical Sensors, Airflow Sensors, Mechanical Sensors, Dielectric Soil Moisture Sensors etc. are discussed. In this paper the authors had formulated few research questions like IoT devices for finding moisture in soil, IoT devices for selecting temperature, IoT devices for rainfall prediction, etc. and shown how the selection of crop could be improved with the help of IoT sensors.

8. Design and Optimization Underwater Vehicles Design

Abstract:

Underwater vehicles are capable of relieving humans of task execution in hazardous environments, such as seas or oceans. Elevated pressure, poor visibility and the importance of structural tightness are just a few factors that must be considered during the design and later in the implementation phase. In this paper, a design a water robot design steps is shown using the example of the PWr Diving Crew project, where simplified Remotely Operated Vehicles (ROVs) were improved to Autonomous Underwater Vehicles (AUVs) with enhanced environment perception and capability of autonomous task performance. Robots' characteristics and the altered approach to the problem in successive vehicle generations are described, and the conclusions on the structure optimization are drawn based on the experience gained in the process.

9. Design and Development of Intelligent Agricultural Machinery

Abstract:

With the rapid development of science and technology and the acceleration of urbanization, agricultural mechanization has become an indispensable condition for sustainable agricultural development. Automation is an important cornerstone to improve the rapid development of agricultural machinery in the direction of specialization, efficiency, automation, informatization and intelligence. It can not only help improve the quality and output of agricultural products, but also ensure the healthy and sustainable development of modern agriculture, and accelerate the process of agricultural modernization. This review systematically summarizes and analyzes the technological achievements of intelligent agricultural machinery in recent years, explores future opportunities and challenges, and provides the latest reference for researchers.

10.Integrating Fuzzy Logic with LDR Sensors for Optimized Solar Energy Harvesting in Sun-Tracking Systems

Abstract:

This study explores the integration of Computer Science and AI with sustainable energy solutions, specifically focusing on optimizing the energy output of photovoltaic (PV) arrays using intelligent tracking systems. The research introduces a dual-axis solar tracking mechanism that utilizes fuzzy logic for real-time analysis of sunlight intensity, thereby enhancing the efficiency of solar arrays. An array consisting of four Light Dependent Resistor (LDR) sensors as well as a UNO Arduino microprocessor are at the centre of the apparatus for assessing the appropriate concentration of incoming sunlight. The system regulates the position of the photovoltaic cells continuously via two motorised axes—horizontal & vertical guided by input from the LDRs. The data from the sensors are interpreted by the fuzzy logic controller in order to figure out the exact motions needed by the solar panels to remain in the perfect alignment with the sun's rays. The novel application of fuzzy mathematics enables sophisticated making choices, emulating rational thought & allowing the machine to respond to various degrees of light. This is great as it increases the power collection ability for the solar array with respect to the PV cell having the optimum potential angle exposure throughout the day. Not only does this enhance the efficient use of energy, but it also shows that there can be saving on the needless usage of a tracking device itself. This research fills the gap between green energy technology and smart autonomy, showing how artificial intelligence leads to higher production of solar electricity generation.

11.Design of a Small-Type Wheeled Pipeline Robot Driven by Monocular Vision

Abstract:

Based on the foundation of existing mature pipeline robots, a small-type pipeline robot is developed by using wheel locomotion mechanism in this paper, which is applicable to small pipelines with an inner diameter of about 120mm. The support mechanism of the proposed pipeline robot is acted by springs, similar to that of the wall-pressing pipeline robots. The waterproof probe capturing video in CCTV format is arranged on the proposed robot and then the image is converted into USB format through a converter, which is found after a lot of effort, allowing the image to be transmitted to the computer for real-time processing. In the later detecting imaging characteristics of landmarks of pipe or depth of field planned to be used to model the interior of the pipeline, to achieve the goal of driving the pipeline robot with vision.

12.Design and development automatic Robotic Arm equipped mechanical gripper for holding irregular shape

Abstract:

Automation plays a vital role in industry since it reduces human intervention, leading to maintaining grip. In this paper, the design of an automatic Robotic arm-equipped with gripper machine has been proposed. Initially, the automated gripper machine is fabricated and later the robotic arm has been introduced to make the machine fully automatic. The design and analysis are performed using CREO. The performance is evaluated through the simulation in ANSYS software. The performance of both scenarios, (i) partially automated has been evaluated and verified. The proposed design can be improved by making IoT enabled sorting and placing system to achieve the next level of automation.

13.The Effect of Ambient Temperature on the Costs of Battery Electric Vehicles Charging in the Microgrid

Abstract:

Global adoption and use of battery electric vehicles (BEVs) is limited by their prices, driving ranges and insufficient charging infrastructure. The driving range depends on vehicle efficiency, aging, battery capacity, driving conditions, ambient temperature, etc. The effect of ambient temperature on the costs of battery electric vehicles charging in a microgrid is analyzed in this paper. The schedule of charging/discharging electric vehicles is optimized so to minimize the energy costs of the microgrid according to the day ahead energy prices given per hour. The microgrid has photovoltaic panels with estimated energy production, and it is connected to the main grid. Optimization of the microgrid electricity costs is done in program Lingo.

14.Effect of Sintering Process on the Mechanical Properties of Silicon Nitride

Abstract:

With the rapid development of silicon carbide (SiC) power semiconductors, the significant improvements in power density and higher current level result in much higher heat flux density than that of conventional Si power modules. Thermal management has therefore become one of the biggest challenges to further improving the power density. As the substrate of choice, ceramic substrate with copper or aluminum metallization, i.e. direct-bond copper (DBC), direct-bond aluminum (DBA), and active metal brazing (AMB), have gained popularity due to their ease of use, high thermal conductivity, high voltage insulation capability and high mechanical stability. Among different ceramic materials, silicon nitride (Si3N4) has drawn extensive attention due to its superior mechanical properties, rendering it a promising substrate material for high-power density, high-reliability power device packaging. In this review, we presented and compared the properties of Al2O3, AlN, and Si3N4 substrates, with special emphasis on the effect of different sintering condition parameters on the structures and properties of Si3N4 substrates. The latest progress of Si3N4 ceramic substrates is reviewed and critical trends are proposed.

15.Mechanical Effect of Silane Coupling Agent Modified Alumina Filler on Breakdown Characteristics of Epoxy Composites

Abstract:

Alumina is an important part of epoxy composites, filling into epoxy resin, improves the mechanical strength of epoxy composites, but reduces the absorption properties of epoxy cured products. In order to solve this problem, used silane coupling agent modified alumina filler, and prepared test sample. Used the impact breakdown tester measured the breakdown strength of the sample. The results show that with the increase of alumina filling, breakdown strength of the sample was decreased. The 3 samples are prepared by using alumina filler, Silicon Carbide, Rice Husk reinforced with Abaca Fiber the breakdown strength increased first and then water absorption reduced when the amount of silane coupling agent adding. The addition of a silane coupling agent to the neat epoxy resin reduced the water absorption and other filler material increase the Impact and Flexural strenth of the sample, from the experimental results to find the best filler material for composite to manufacture High electrical Insulation.

16.Preparation and Characterization of Epoxy and PLA & PA pellets Composites

Abstract:

High crash strength and Tensile strength of PLA & PA pellets composites were produced by firing green bodies prepared in a fluidized reactor at room temperature. Then these pellets were bonded together by epoxy resin to produce composites with very high filler concentration but light weight. The mechanical properties of the composites were investigated. Because the component in the raw materials of pellets is varied by weight ratio, the corresponding composites have tunable permittivity and dielectric properties. In the composites, PLA & PA pellets are nearly close packed, which can be observed by Hand layup method. The novel close packed structure of pellets endows the composites with highly efficient pathways for heat dissipation and reliable framework of bearing compressive loading. The surfaces of the spheres were modified by 1wt. % silane coupling agent, before combining with epoxy resin in order to improve their chemical compatibility with epoxy resin. The results demonstrate improvement of Impact and Tensile properties of epoxy resin, and feasibility of extending its working ranges in both compression strength and temperature as a multifunctional material in insulating area.

17.Metal-Ceramic and Epoxy Composite Materials Nanostructure Coatings

Abstract:

One of the ways to increase the reliability of various products is the use of protective coatings. As for now scientific and technical developments offer various methods and ways of applying and forming multipurpose functional coatings. They include various composition materials gas flame spraying. Nowadays the method of cumulative-detonation multi-chamber high-speed spraying of metal powders, their oxides, nitrides, carbides, etc., has been actively developed and implemented. The advantages of this method include the high strength of adhesive joints to the base, the nanostructures formation, and the possibility of the formation of phases with different types in coating material. Metal details protective properties are improved. The combination of metal-ceramic and polymer coatings will expand a functional range of their potential use. Gradient multilayer coatings based on aluminum oxide and epoxy composite are proposed. The first adhesive layer is sprayed with a thickness of 100–150 microns from aluminum oxide (Al 2 O 3) with a dispersion of 5–15 microns. Aluminum oxide is more preferable when applied to an aluminum base. Such a layer has high electrical breakdown strength, thermal conductivity and adhesive strength due to the crystalline compatibility between the aluminum base and the material of the sprayed layer. In addition, nanostructured formations appear in the coating material during spraying. It gives a wide range of required coatings operational characteristics. This will provide the coating with a set of operational characteristics.

18.Improving the corrosive Characterization of Al7075 gripper by Ceramic Coating using Plasma arc Nitriding

Abstract:

The fabrication of a ceramic coating on the metallic substrate is usually applied to achieve the improved performance of the material. Plasma arc Nitriding is one of the most promising methods to reach this performance, mostly wear and corrosion resistance. Traditional PAN is carried out in an aqueous electrolyte. However, the current work showed the fabrication and characterization of a ceramic coating using PAN in molten salt which was used to avoid disadvantages in system heating-up and the formation of undesired elements in the coating. Aluminum 7075 alloy was subjected to the surface treatment using PAN in molten nitrate salt. Various current frequencies were applied in the process. Coating investigations revealed its surface porous structure and the presence of two oxide layers, _-Al2O3 and -Al2O3. Microhardness measurements and chemical confirmed these results. Potentiodynamic polarization tests and electrochemical impedance spectroscopy revealed the greater corrosion resistance for the coated alloy. Moreover, the corrosion resistance was increased with the current frequency of the PAN process.

19.Mechanical Characteristics and Microsopic Studies on Jute Fibre Reinforced Epoxy Composite for the Application of Lower Limb Prosthetics

Abstract:

The aim of this research is to perform tensile test, hardness test and microscopic studies on jute fibre reinforced epoxy composite. In this research epoxy resin is chosen for the synthesis of composite with jute fibre. As epoxy resin shows excellent moisture and chemical resistance, impact resistant, long shelf life and low shrinkage during cure. Composites were prepared in two different compositions, one with 2 layers of jute fibre and the other with 3 layer of jute fibre. Composites were fabricated using compression molding method. The prepared composites were subjected to tensile, hardness performance studies. The fractured specimens where analysed using an optical microscope to know the failure mechanisms.

EXISTING MATERIAL: JUTE

PROPOSED MATERIAL: ABACA or BANANA FIBER mat

20.Effect of Fiber Layering and Acetylation Treatment on Mechanical and Rate of Water Absorption Properties of Luffa Cylindrica Fiber Epoxy Composite

Abstract:

This research aims to prepare composite materials by means of Luffa Cylindrica fiber and epoxy resin. Three different layers of composites, namely single, double, and triple, were prepared and studied for their mechanical characteristics such as tensile, and flexural properties. The mechanical characteristics and swelling thickness of the treated composites are compared. The composites improved the adhesion between the fiber and epoxy matrix, resulting in enhanced mechanical characteristics such as increased tensile strength, and flexural strength. Additionally, the water absorption rate of the composites treated was found to be significantly lower than that of the untreated composites, indicating that the acetylation process reduced the hygroscopic nature of the fiber. The conclusions of this research propose that the usage of Luffa Cylindrica fiber treated with the acetylation process could lead to the production of composites with improved mechanical characteristics and reduced water absorption rate. This could have potential applications in various fields such as construction, automotive, and aerospace industries where lightweight and durable materials are required.

Existing Material: Luffa Cylindrica fiber

Proposed Material: SISAL or KENAF fiber mat to avoid water absorption.

21.Effect of Dip-Coating on Tensile and High Cycle Fatigue Behavior of 3D Printed Bio-Polymer Blends

Abstract:

Considering the desirable biodegradable properties and mechanical characteristics of poly lactic acid (PLA) and poly caprolactone (PCL), these polymers are recently widely utilized in medical applications including the fabrication of body-compatible implants. One of the most efficient manufacturing methods to fabricate polymer-based implants is 3D printing, due to its ability to rapidly produce parts with complex geometries. In this study, an effort has been made to study the impact of the dip-coating process on tensile and high cycle fatigue behavior of 3D printed PLA/PCL blends. The results demonstrate that after applying the PCL coating on the surface of the samples, the fracture strain of the pure PLA, PLA/10wt% PCL, and PLA/20wt% PCL increases by 67.6%, 94.6%, and 9%, respectively, compared to those of the uncoated ones. Moreover, a slight increase was observed in the high cycle fatigue life of coated samples, especially under lower stress amplitudes.

22.Impact of 90:10 (WC-10Co-4Cr: NiAl) composite coating on the 20MnCr5 alloy Gear Material

Abstract:

Working condition in gear systems has become serve due to rise in demand for high-speed, heavy-duty, lightweight, low energy consumption, downsizing and environmental conditions Also, reliability is a major concern as gears are part of machines used in many critical conditions. All these requirements lead to the development of gears which are more resistant to working conditions and low cost. Major of the gear failure arises from surface failure due to friction and wear. In the current study the WC-10Co-Cr-NiAl composite coating was developed on standard gear material 20MnCr5 alloy steel. Scanning Electron Microscopy and X-ray diffraction systems have been made use of to study developed coating microstructure including wear mechanism. The evaluated parameter was friction of both coated and uncoated specimens at 40 °C & 400 °C temperature with 15 N & 25 N load and 0.5 m/s & 1 m/s sliding speed. Under all test conditions the wear resistance of the coated specimens is shown appreciably higher in comparison to uncoated specimens. At 40 °C the wear mechanism is observed to be abrasive as well as adhesive whereas at 400 °C it appeared almost adhesive.

23.Improved Mechanical Property and Corrosion and Wear Resistance of High-Voltage Aluminium Wires by Micro-Arc Oxidation Coating

Abstract:

New surface treatments are required to improve the resistance of high-voltage aluminium conductors to corrosion and wear. This paper describes the preparation of ceramic coatings on the surface of aluminium wires by the micro-arc oxidation (MAO) technology. The surface morphology, mechanical and tribological properties, electrical resistivity, wear and corrosion resistance of the MAO-treated aluminium samples are examined and compared not only with the untreated samples but also between the use of different current densities in the MAO process. The MAO treatment can increase the tensile strength of the wire and mitigate the wire elongation at excessive high temperature. In addition, the increased surface hardness and the overlapping micro-porous distribution of the MAO coating improve the resistance of the treated sample to wear and corrosion respectively, protecting the aluminium substrate from the joint effects of wear and corrosion. Furthermore, the MAO coating has little impact on the electrical resistivity of aluminium conductors and can mitigate the resistivity change due to corrosive damage. The MAO technology providing a potential idea for the surface treatment of aluminium conductors is expected to extend the service life and alleviate maintenance needs of aluminium conductors operating in harsh environments.

Existing Method of coating = Micro-Arc Oxidation Coating

Existing Method of coating = Plasma Arc ceramic Coating

24.Metal-Ceramic and Epoxy Composite Materials Nanostructure Coatings

Abstract:

One of the ways to increase the reliability of various products is the use of protective coatings. As for now scientific and technical developments offer various methods and ways of applying and forming multipurpose functional coatings. They include various composition materials gas flame spraying. Nowadays the method of cumulative-detonation multi-chamber high-speed spraying of metal powders, their oxides, nitrides, carbides, etc., has been actively developed and implemented. The advantages of this method include the high strength of adhesive joints to the base, the nanostructures formation, and the possibility of the formation of phases with different types in coating material. Metal details protective properties are improved. The combination of metal-ceramic and polymer coatings will expand a functional range of their potential use. Gradient multilayer coatings based on aluminum oxide and epoxy composite are proposed. The first adhesive layer is applied with a thickness of 100–150 microns from aluminum oxide (Al 2 O 3) with a dispersion of 5–15 microns. Aluminum oxide is more preferable when applied to an aluminum base. Such a layer has high electrical breakdown strength, thermal conductivity and adhesive strength due to the crystalline compatibility between the aluminum base and the material of the sprayed layer. In addition, nanostructured formations appear in the coating material during spraying. It gives a wide range of required coatings operational characteristics. This will provide the coating with a set of operational characteristics.

25.Improvement the Performance of Carbide Cutting Tool by YSZ Coating

Abstract:

This paper examines the impact characteristics of multilayer TiO 2 /8YSZ coated and uncoated carbide cutting inserts. Turning tests were conducted on a carbide insert at a cutting depth of 0.1 mm, four cutting speeds 88, 112, 141, and 172 m/min, and two feeds 0.065 and 0.265 mm/rev. Measurements were made of tool life, flank wear breadth, and temperature variations at the insert tip. It has been demonstrated that the multi-layer coating significantly reduces flank wear and temperature during cutting. The life of the inserts was doubled by the performed coating. Grey Relational Analysis (GRA), based on the Taguchi Method was used to investigate the impact of coatings and turning conditions on cutting performance. The best possible rating for the grey relationship category was 88m/min, and 0.065 mm/rev.

26.CHARACTERIZATION OF CERAMIC COATING FOR SCRATCH RESISTANCE ON ROBOT GRIPPER SURFACE

ABSTRACT

- Robot gripper surfaces play a critical role in ensuring effective and reliable manipulation of objects in various industrial and research applications. However, these surfaces are susceptible to wear and damage during frequent use, leading to reduced performance and service life. To address this issue, we present a comprehensive study on the characterization of ceramic coatings applied to robot gripper surfaces to enhance scratch resistance. Our findings reveal that specific ceramic coatings exhibit superior scratch resistance compared to conventional materials. The study provides valuable insights into the potential of ceramic coatings to enhance the durability and performance of robot gripper surfaces. This research contributes to the advancement of robotics and automation technologies, offering promising avenues for the development of more robust and long-lasting robot gripper systems.

27. Structure, Hardness and Wear Resistance of Detonation Coating Based on Cr3C2-NiCr After Pulse-Plasma Treatment

Abstract:

This paper discusses the results of a study of Cr 3 C 2 -NiCr-based detonation coatings after pulse-plasma treatment. It is determined that after pulse plasma treatment (PPT) the surface roughness value decreases by 48% and the coating friction coefficient increases by 2 times, the material microhardness of Cr 3 C 2 -NiCr coatings increases from ~12 GPa (initial) to ~16.2 GPa. It was also revealed that after pulse-plasma treatment the resistance of Cr 3 C 2 -NiCr coatings to abrasion and erosion wear increases. Pulse-plasma treatment provides formation of qualitative coatings from ceramic-metal materials of Cr 3 C 2 -NiCr system with complex heterogeneous structure-phase state where the layered structure of areas of carbide particles and matrix metal in immediate proximity from border “carbide - matrix” with allocation of disperse secondary carbides in matrix is revealed.

28.Influence of Processes Parameter on the Machinability of Wire Electrical Discharge Machining for Tool Steel Grade JIS SKD 11

Abstract:

Wire electrical discharge machining is a modern manufacturing process that is widely used on difficult-to-cut materials with a controlled discharge current in order to erode a conductive workpiece. An adjustment of the controlled parameters can possibly effect the machinability of the machining process. Therefore, this study aims to investigate the influence of controlled parameters on the machinability of wire electrical discharge machining for cutting JIS SKD11 grade tool steel. The controlled parameters consist of feed rate and pulse duty factor. The machinability was evaluated in terms of cutting speed and kerf width. In addition the quality of the machined surface was evaluated by arithmetic average roughness. The results showed that cutting speed directly increased with the feed rate for the workpiece at a thickness of 10 mm. However, an approximately 63.50% reduction in the cutting speed was found at the highest feed rate of 5 mm/min and 27.0% for the workpiece thickness at 50 and 25 mm, respectively. The kerf width and surface roughness slightly decreased with the feed rate. The lowest roughness levels were shown at approximately 2.48, 2.40 and 2.46 µm and for the feed rates of 3, 4 and 5 mm/min for the workpiece thickness of 10, 25 and 50 mm, respectively. In addition, the cutting speed, kerf width and roughness of the machined surface increased with the pulse duty factor due to greater duration of pulse on time in the discharge cycle.

29. Issues and Strategies in Friction Stir Welding of Al-Mg-Si Alloy Pipes

Abstract:

This article reviews the Friction Stir Welding (FSW) technique specifically applied to Al-Mg-Si pipe welding. FSW is a solid-state welding method and offers many advantages over traditional fusion welding methods. The article discusses the fundamental principles of FSW, its adaptation to pipe welding, and the process parameters that affect the Al-MgSi pipe welding. Mechanical and microstructural changes, challenges faced during the FSW including issues related to the weld defects are discussed in details. This article provides the recent advancements in FSW of Al-Mg-Si pipe and help the researchers and practitioners in selection of the correct strategy for welding of these materials.

30.Study on Optimization of Ultrasonic Welding Process Parameters of Al-Cu Bimetallic Busbar for use in Battery Electric Vehicle (EV)

Abstract:

The battery is the power source of an Electric Vehicle (EV) and improving its operational efficiency is one of the requirements to achieve the required product performance and quality. There are numerous electrical connections in the assembly of a battery pack from cell to module and further module to the battery pack. These connections such as Tab-toTab (i.e., cell-to-cell joining to connect the battery cells in series or parallel) and Tab-to-Busbars can be made through various methods such as soldering, crimping, resistance welding, fusion welding, etc. Still, all these conventional joining methods have some mechanical, metallurgical, electrical, and economic constraints that limit the overall process efficiency. One of the factors includes poor weld quality, voids, cracks, pores, and other defects in the weld zone that affect the battery performance. The Ultrasonic Welding (UW) technique can overcome many issues that persist in conventional methods. In this work, we describe the study of the UW zone's mechanical, thermal, and electrical properties based on the mechanical and microstructural analysis using design and validation processes such as lap shear strength tests, Optical Microscopy (OM), and Scanning Electron Microscopy (SEM). Here we attempted the Ultrasonic Welding of Copper and Aluminum of different thicknesses. The thickness of the intermetallic layer in the heataffected zone could be observed with the help of SEM. Results were validated with experimental results, which can be employed to analyze battery pack performance. This study provides important insight into Al and Cu UW for electric vehicle battery assembly as a basis for future research directions in the field.

31. Investigation of the Mechanical Properties of Aluminum AA4007 Joints Using the MIG and FSW Processes

Abstract:

Welding is more economical, more convenient, and less susceptible to failure or corrosion in comparison with other joining processes. The aim of this paper is to investigate the two welding processes that produce welds with high mechanical properties. Friction Stir Welding (FSW) and Metal Inert Gas (MIG) experiments were conducted on aluminium AA4007 alloy. ASTM E384, E8/E8M-09 standards were followed when conducting microhardness and tensile testing at the weld zone. The results show that FSW has higher mechanical properties (7.1% harder and 12.3% stronger) as compared to MIG. The hardness and tensile strength of FSW samples were reported to be 76 HV and 130.78 MPa respectively. MIG has a hardness of 70.6 HV and a tensile strength of 114.7 MPa, according to tests.

32.Static and Vibration Analysis of Manned Lunar Rover Frame Based on Ansys

Abstract:

As lunar exploration projects continue to progress, increasing expectations are being placed upon the efficiency and detection range of lunar surface exploration. For the next stage of lunar exploration projects, a breakthrough technology regarding the utilization of manned lunar rovers is requisite. In view of the driving environment of the lunar characterized by low gravity, uneven surface, and complexity, it is paramount to ensure the safety and stability of manned lunar vehicles in operation. Therefore, the static structure should be checked, and the environment for the frame of the manned lunar vehicle should be set to conduct vibration analysis for the lunar surface. Utilizing the finite element method in conjunction with existing data relating to manned lunar rovers, a finite element analysis model is established. Besides, the Ansys software is utilized to conduct static structural analysis, non-rigid body modal analysis, and vibration analysis of lunar sea driving when the manned lunar rover is fully loaded. The results indicate that the strength and stiffness of the manned lunar rover frame meet the requirements, and the maximum stress and maximum deformation caused by vibration are within the acceptable limits. This study provides a theoretical reference for further research endeavors involving the manned lunar rover.

33. Design Optimization and Improvement of Water-Cooling jacket Based on ANSYS Workbench

Abstract:

Water cooling jacket has been widely used in petroleum, chemical, food, energy and other industries. In the exhaust gas treatment device of the chemical experimental platform, bulge phenomenon was found in the inner cylinder. This paper completed the analysis and calculation by ANSYS Workbench and completed the upgrade and optimization of the water-cooling jacket structure. At present, the optimization mechanism has been upgraded and reformed, and passed the test and inspection, and provided a number of engineering experiment data, for the reference of relevant technical designers.

34.ANSYS based Analysis of Leaf Spring Systems with Hybrid Material Arrangement

Abstract:

Deformations that may occur on multi-level parabolic leaf spring systems due to external effects such as vibration and force should be analyzed before the system is designed. In this work, ANSYS-based deformation analyzes were carried out for 10-7 parabolic leaf spring systems designed by using stainless steel and titanium alloy materials in hybrid structure. From the deformation analyzes performed under the force values of 5000 N, 10000 N and 15000 N, it was observed that the highest total deformation values were obtained in the Group 6 structure as 1.0042 e-4 m, 2.0084 e-4 m and 3.0125 e-4 m, respectively. On the other hand, among the leaf spring system structures with different material arrangements, it was observed that the lowest total deformation values were obtained in the Group 5 structure as 5.1221 e-5 m, 1.0244 e-4 m ve 1.5366 e-4 m, respectively.

35. Thermal analysis of an EV lithium iron phosphate battery pack for improved cooling

Abstract:

Lithium-ion battery packs comprise a significant share of an electric vehicle's cost, especially for low-cost variants such as those used for public transportation (e.g. jeepneys in the Philippines). These can easily occupy 40% of the vehicle's cost. In this regard, it is very important to ensure the longevity of the battery cells. Lithium-ion cells which are poorly-managed thermally risk having to be replaced sooner than their intended usable life. Thus, proper attention must be given to the design of the battery packs to allow effective and efficient cooling. This study performed a cooling simulation on prismatic lithium iron phosphate cells using ANSYS Workbench. The simulation looked into (1) the effect of the layout of the cells; (2) the thickness of cooling fins; and (3) the temperature and flow rate of the cooling fluid to the thermal profile of the battery pack. The simulations successfully showed that the recommended operating temperature can be obtained even with a compact layout and using thin cooling fins. Practical considerations such as space constraints on the vehicle and weight of the battery pack outweigh the technical benefits of improved heat transfer efficiency using a more spaced-out battery layout and thicker cooling fins.

36.Simulation and Analysis of Venturi Tubes for Use in Duct Wind Turbine Power Plants

Abstract:

This paper discusses the venturi tube used as a duct wind turbine power plant. The design of the power plant using duct wind turbine method is another alternative in exploiting the potential of wind energy as an environmentally friendly power plant. Before the design of the electric generator is carried out, a simulation and analysis of the geometry of the venturi tube is carried out. The simulations is to find the optimum design for wind speed and energy generated. In this paper, four designs are made, namely a straight design, a bent design on the input channel, a bent design on the input and output channels, and a bent design without sharp corners. To help analyze the designs, the Ansys Fluent is used. The simulation results show that the highest airflow velocity is located in the throat channel and the average velocity ratio between the input channel and the venturi channel is around 5x. Venturi Tubes with Bent Shape on the input and output channels without sharp angles can reduce turbulence in all parts of the channel.

37.Comparison and Failure Analysis of Solid and Hollow Compression Helical Spring By FEA

Abstract

Helical springs play a pivotal role in various engineering applications, ensuring controlled motion and stability in mechanical systems. This study presents a comprehensive analysis of solid and hollow compression helical springs using advanced numerical simulations conducted in ANSYS Software.

The investigation encompasses geometric modelling, material characterization, finite element analysis (FEA) setup, parameter monitoring and result analysis.

38. Design, Modelling, Simulation, and evaluation of an Electric Scooter Energy Consumption Model

ABSTRACT

These motorcycles have been known as a source of air pollution. Therefore, shifting the motorcycle to electric-driven based technology is inevitable. However, it is quite challenging as the residents prefer higher performance (in terms of power and speed) of the electric model which is unavailable in the market. Unfortunately, the demand for higher performance models creates other problems, such as the requirement for a bigger battery. This is because there is a range of anxiety phenomena in-vehicle usage. However, the capability to accurately estimate the electric motorcycle's range does not exist. Therefore, this paper focuses on how to develop an electric scooter model to simulate its performances, especially its range estimation. The modeling approach was the use of an electric scooter with bumper model developed in CREO environment. Based on the dimensions and targeted performance, the developed model was simulated in ANSYS to determine its Explicit Dynamics. It is then validate using a fabrication on-road conditions. it can be concluded the developed model is valid and can be used as a basis for the next development of any electric motorcycle.

E-Scooter

The commercial Xiaomi M365 was chosen as a template for the e-scooter model.

39.Analysis and design of roof turbine ventilator for wind energy harvest

Abstract:

Harvesting energy using roof turbine ventilator and electroactive material has been investigated to verify its performance. Since electric power gained from a single piece of regular size is usually small, auxiliary device to vibrate multiple pieces of electroactive materials in order to harvest more power is required. In this paper, an attempt of using the developed nozzle wind collector associated with the popular roof turbine ventilator employed with gear mechanism to impact and vibrate a group of electroactive material to generate electricity is proposed. Number of blade and blade angle of the roof turbine ventilator are influential to the effectiveness of wind collection. Also, number of electroactive material employed on the turbine ventilator under the wind speed in environment eventually determines the efficiency of wind harvest. A simple model is derived to estimate the minimum driving force from the wind power that needs to overcome the inertia of the turbine ventilator mechanism and the electromechanical energy conversion of electroactive materials. Wind drag force is calculated by using CFD is assumed to provide such driving force. Various combinations of the blade angle, number of blade and electroactive material actuators are investigated in simulations. Optimum design concerning the environment wind resource and configuration of turbine ventilator is discussed. According to several case studies, a few of design trends is addressed for better efficiency of energy harvest.

40.Static structural analysis of roof ventilator turbine blades using ANSYS

Abstract:

The current study examines the efficiency of roof ventilator turbine blades made of three distinct materials: aluminium, zinc, and high-density polyethylene. (HDPE). This will help the user select the right roof ventilator turbine blade material and understand the turbine blade's load-carrying capacity under varied wind loads. Prior works in the field of this study have been thoroughly reviewed in this study. Roof ventilator turbine blades can be studied using ANSYS software to analyse material variations and wind loads affect their structural performance. The performance of aluminium, zinc, and high-density polyethylene (HDPE) roof ventilator turbine blades is examined and contrasted. Roof ventilator turbine blades with aluminium material show less deformation and the same elastic strain for the applied wind load compared to the other two materials. But, roof ventilator turbine blade with zinc material gives higher Equivalent Von-Misses stress for the applied wind load when compared with other two roof ventilator turbine materials.

41.Design of a 72 V 40 Ah Electrical System Battery Pack for Electric Motorcycle

Abstract:

In Indonesia, there are many industrial electric motorcycle battery packs on the market with different voltages and different charging communication systems. This is because there is no standard used in Indonesia. However, currently many batteries circulating in Indonesia uses a voltage of 72 V with a capacity of 20 Ah. Therefore, this study aims to design a battery pack with a specification of 72 volts with a capacity of 40 Ah. The advantage of the results of the battery pack design in this study is that it has the same dimensions and weight as battery packs on the market but has twice the capacity of 40 Ah so that electric motorbikes can travel farther than those in circulation. Based on the research results of BMS monitoring, it is estimated that charging 100 % at a voltage of 70.7 Volts. The difference in voltage in the battery management system and the results of the analysis calculations is caused by variations in the voltage in each battery cell. Technically the difference between each battery cell under 2 Volts will not be a problem as long as the BMS used has an active battery cell voltage balancing feature. In the dyno test results for each additional speed the battery can function properly at any given torque variation. In the next stage this battery pack can be used for electric motor vehicles to measure the maximum mileage.

PROPOSED : **Composite Material 3D print**

42.Performance Analysis of a 48V Battery Pack Using SoC Estimation and Cell Balancing for Electric Vehicle

Abstract:

Battery Management System (BMS) an Electric Vehicle's most crucial and essential component. The primary function of a BMS is to safeguard the battery, which provides smooth and reliable operation. A lithium-ion battery is chosen over a lead acid battery to keep the reliability and safety of the battery, but a li-ion battery should be operated within safely due to being extremely sensitive to high temperatures and inherently explosive, which can lead to danger. So, it is challenging to design the proper BMS for the electric vehicles. In this work, the performance analysis of the 48V battery pack has been simulated and validated by analyzing the charging and discharging characteristics of the battery and applying cell balancing technique. To validate the performance MATLAB/Simulink platform has been used. The results prove that the electric vehicle's battery life cycle, drive performance, power management, and security are successfully improved.

EXISTING : MATLAB/Simulink

PROPOSED : **Composite Material**

43.Functional Safety Assessment of Battery Management System of Autonomous Electric Vehicle

Abstract:

There has been an exponential increase in the usage of electric vehicles in recent years. Electric vehicles are powered by batteries for all their functions. Battery management system (BMS) helps to manage the inherent risks associated with batteries and their associated systems. Functional safety assessment of BMS plays a key role in identifying all the failure causes, associated risks and suggesting improvements in design. In this work, a comprehensive assessment of functional safety of the BMS of autonomous electric vehicle is carried out based on ISO 26262. Hazard Analysis and Risk Assessment (HARA) is used to determine the hazards and their risks. Quantitative Fault Tree Analysis (FTA) is carried out for identifying all the possible causes of failure and determine its probability of failure. Since the preliminary system architecture was not satisfying the threshold failure rate of violation of safety goal defined in the standard, some safety measures are integrated into the system. FTA is repeated for the modified system. The modified BMS meets the target failure rate as per ISO 26262, ensuring the functional safety.

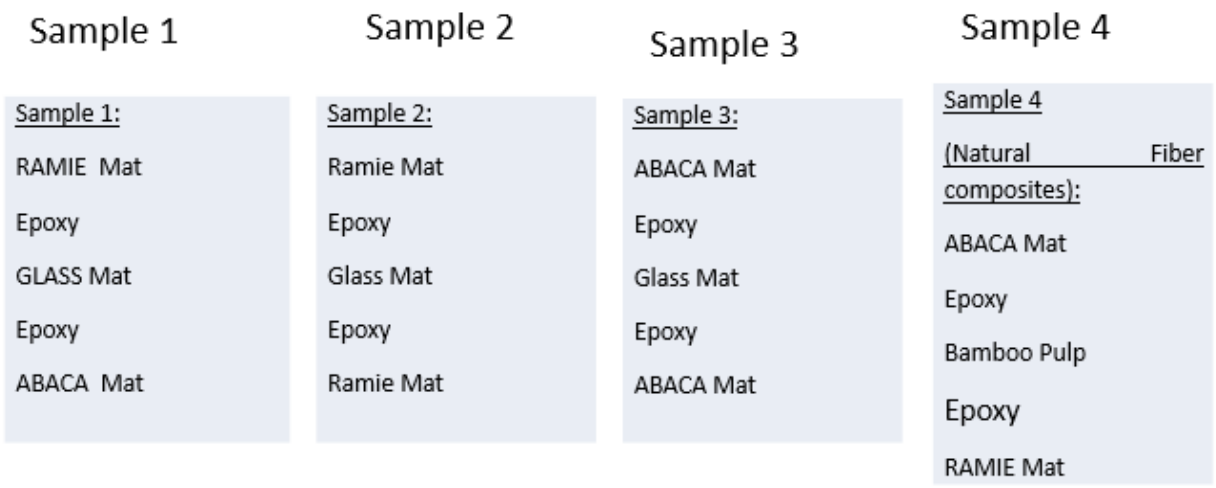
44.Exploring Innovative IoT Solutions for Automated Battery Condition Detection in Electric Vehicles

Abstract:

In recent times, the development of Electric Vehicle (EV) batteries has become a hot topic of discussion. The existing literature clearly describes that the conventional techniques like various NB-IoT, Bluetooth module were utilized to monitor any particular parameters as well as its performance is poor. With the increase of safety concerns, it is essential to monitor the status of batteries such as voltage, current, temperature, level of charge and surrounding humidity. To facilitate this, Internet of Things (IoT) is used to send data from the device to a mobile device for analysis. This will help the user take appropriate measures to protect the vehicle from any harm. Additionally, the data can be shared with third parties to alert them if the driver is in any danger. For testing purposes, a motor load is used to discharge the battery. If the voltage drops below 5V, the relay automatically disconnects the load to ensure battery efficiency. This paper outlines the design, development and implementation of this system.

45.Effect of fibres orientation on interfacial Mechanical Characteristic for adhesively bonded composite plates

- Environmental awareness and trends to develop sustainable resources have directed much research attention towards ABACA fibre as an alternative reinforcement in composite manufacturing. Numerous studies have been conducted on ABACA and its hybrid composites. Most studies were conducted on kenaf/glass hybrid composites compared to other kenaf/Jute (Natural fibres) composites. Similar with other materials, mechanical properties were the fundamental knowledge identified by the researcher. Limited studies conducted on other properties have restricted the use of ABACA, RAMIE, BAMBOO PULP and GLASS FIBER composites to automobile components applications like sun roof cover.



46. Experimental analysis in Mechanical properties of Natural Hybrid Composite for Roof

ABSTRACT

In the scenario the environment the demands for technologies of the best suitable composite materials has begun instead of Roof steel. Materials having required characteristics along-side remaining non-pollutant are being researched and formulated to be put them in use. With the availability of natural fiber composites which share proportionate properties with that of manmade fibers are added together with a matrix to achieve best and good outputs. The hybrid composite materials are a blend of natural and synthetic fibers which are either in same proportion ratio to have desired properties. This present work deals with the study mechanical properties of basalt fiber mat(BI directional) composites having bamboo fibres pulps to which reinforced with epoxy resin as the matrix. The overall mechanical properties of the composites showed improvement to change the roof material into Hybrid composites.

47.Development of Polymer Composite Battery Pack Case for an Electric Vehicle

ABSTRACT

The evolution toward electric vehicle nowadays appears to be the main stream in the automotive and transportation industry. The required battery pack is a big, heavy, and expensive component to be located, managed, climatized, maintained, and protected. This paper develops some engineering analyses in material of some possible solutions that could be adopted. The possible consequences on the position of the vehicle center of gravity, which in turn could affect the vehicle drivability, lead to locate the battery housing below the passenger compartment floor. This solution is also one of the most interesting from the point of view of the battery pack protection in case of a lateral impact and for easy serviceability and maintenance. The integration of the battery pack's housing structure and the vehicle floor leads to a sort of sandwich structure that could have beneficial effects on the body's stiffness (both torsional and bending). This paper also proposes some considerations that are related to the impact protection of the battery pack, with particular reference to the side impacts against a fixed obstacle, such as a pole, We manufacture our battery cases from BASALT fiber, PP sheet 3 mm and glass fiber in the form of sandwich composites material using Epoxy. The excellent properties of the fiber composite construction make the battery enclosure a supporting element of the vehicle structure.

48.An investigation about stresses and crash analysis in explicit dynamics of CFRP plates structure

ABSTRACT

- Unidirectional carbon fiber reinforced polymers (CFRP) laminates are widely employed in different fields due to their low density combined with high stiffness and strength. However, unlike usual materials, composite laminates may present many different failure mechanisms. Additionally, the stress distribution depends on the material properties due to its anisotropy, making the composite design a hard task. This study deals with a plate made of CFRP. The main goal of this investigation is to carry out an analysis of the stress distribution and mechanical characteristics.

- Experimental Analysis of composite plate using Composites material objective to study the effect of replacement of steel reinforcement by carbon and basalt fibre reinforcement. To conduct Tensile, flexural and Impact strength test in Hybrid composites material. To develop a non-ferrous hybrid reinforcement system for crash box (Automobile) by using continuous placing of fibres mats reinforcement. Main objective of this project is to restrict the fire and collision avoiding in automobile industry by using inner layer of Basalt and Carbon Fibre. By using Glass Fibre chopped in-between the layers for Heat reflection in summer days. Design a crash box with different types of structure using CREO like Traditional, Triangle and Honeycomb Structure. In explicit dynamics to compare the

deformation and stress of three different structures of crash Box using ANSYS.

Sample 1:

Carbon Fiber Mat (BI)

E- Glass fiber chopped (Filler)

Basalt Fiber Mat (BI)

Sample 2:

Carbon Fiber Mat (BI)

E- Glass fiber chopped (Filler)

Carbon Fiber Mat (UD)

49.Development of graphene nano-composite fibres for improving the toughness of thermoset composite

ABSTRACT

We report on the development of phenoxy-graphene nano-composite fibres for improving the toughness of thermoset composites. In this paper, a systematic experimental investigation into the underlying mechanisms of graphene nanoplatelets (GNP) reinforcement of Natural and Synthetic fibres prepared via hand layup compression molding metod using Epoxy.

Development of the Polymer Composites with natural fibers and fillers like Graphene Nanoplatelets (GNP composites) as a sustainable alternative material for some engineering applications, particularly in aerospace applications and automobile applications are being investigated. Natural fibre composites such as ABACA mat, SISAL mat and JUTE mat appear more attractive due to their higher specific strength, lightweight and biodegradability and low cost. In this study, ABACA mat, SISAL mat and JUTE mat with Filler Materials Of Almond Shell/ graphene Nano platelets /SiC Nano particles are reinforced epoxy composites are prepared and their mechanical properties such as tensile strength, flexural strength, Hardness and impact strength are evaluated.

Sample 1	Sample 2	Sample 3	Sample 4
Sample 1: **ABACA mat** **Sisal mat** **Almond Shell filler** **Epoxy**	**Sample 2:** **ABACA mat** **Sisal mat** **GrapheneNano Platelet as filler** **Epoxy**	**Sample 3:** **ABACA mat** **Sisal mat** **Silicon carbide filler** **Epoxy**	**Sample 3:** **ABACA mat** **Sisal mat** **MagneisumOxide filler** **Epoxy**

50.Implementation of lightweight roller in roller conveyor using Hybrid composites

- *In the scenario the environment the demands for technologies of the best suitable composite materials has begun instead of steel. Materials having required characteristics along-side remaining non-pollutant are being researched and formulated to be put them in use. With the availability of Hybrid composites which share proportionate properties with that of manmade fibers are added together with a matrix to achieve best and good outputs. The hybrid composite materials are a blend of natural and synthetic fibers which are either in same proportion ratio to have desired properties. This present work deals with the study mechanical properties of basalt fiber mat(Bi directional) composites having Carbon fiber mat (UD) filler as Glass Fiber chopped are to reinforced with epoxy resin as the matrix. The overall mechanical properties of the composites showed improvement to change the roller material for conveyor into Hybrid composites.*
- *The paper highlights investigate the existing roller conveyor system and material optimize and analyses the critical parts like Roller to minimize the overall weight of the assembly and material saving. This work also involves geometrical and finite element modelling of existing design and optimized design. Geometrical modelling will be going to do by using CREO 5.0 and the finite modelling tool. Molding the composites Samples*

and Results of Tensile, Flexural and Impact test to be carried out on the sample will do using a universal testing machine (UTM In LAB). In this work, the composite material is considered for the sample testing for CFRP.

Material Preparation- LAYER by LAYER Mat Fiber

(SAMPLE 1 - Carbon Fiber (Bi), Abaca Fiber Mat, Glass Fiber Mat
SAMPLE 2 - Carbon Fiber (Uni), Abaca Fiber Mat, Glass Fiber Mat
SAMPLE 3 - Carbon Fiber (Bi), Chopped Glass Fiber, Abaca Fiber Mat)

51.Fiber orientation effecting the mechanical properties at coconut fiber reinforce epoxy resin composite

Abstract:

This paper presents with the effect orientation on the mechanical properties of coconut fiber reinforced epoxy resin composite. The composite materials were prepared by using the hand lay-up technique with three totally different oriented patterns as follows: random, continuous unidirectional and weaving patterns. Evaluate and compare the mechanical properties such as tensile strength and impact strength. Fracture surface and the adhesion between fiber and matrix were studied by scanning electron microscope (SEM). Results from the study showed that the mechanical properties of weaving patterns are significantly higher than in continuous unidirectional and randomly oriented fiber composite. The best mechanical properties of the composite were succeed by fiber orientation that is weaving patterns, which showed increase in tensile strength by 123.75 %, elasticity of modulus by 501.11 % and Impact strength by 10.46 % compared to the pure epoxy resin. Surface morphology observation using SEM showed fiber pull out and matrix-fiber adhesion.

52.Effect of fibres orientation on interfacial Mechanical Characteristic for adhesively bonded composite plates

ABSTRACT

- Environmental awareness and trends to develop sustainable resources have directed much research attention towards ABACA fibre as an alternative reinforcement in composite manufacturing. Numerous studies have been conducted on ABACA and its hybrid composites. Most studies were conducted on kenaf/glass hybrid composites compared to other kenaf/Jute (Natural fibres) composites. Similar with other materials, mechanical properties were the fundamental knowledge identified by the researcher. Limited studies conducted on other properties have restricted the use of ABACA, RAMIE, BAMBOO PULP and GLASS FIBER composites to automobile components applications like sun roof cover.

53.Effect of Fillers Mechanical properties e of Epoxy Reinforced Hybrid Composites

ABSTRACT

Development of the Polymer Composites with natural fibers and fillers as a sustainable alternative material for some engineering applications, particularly in aerospace applications and automobile applications are being investigated. Natural fibre composites such as sisal, jute, hemp and coir polymer composites appear more attractive due to their higher specific strength, lightweight and biodegradability and low cost. In this study, Sisal/ Banana/kenaf with Filler Materials Of Almond Shell/glass/Sic fibre reinforced epoxy composites are prepared and their mechanical properties such as tensile strength, flexural strength, Hardness and impact strength are evaluated. Composites of Natural fibres with the filler material of silicon carbide, Glass and Almond Shell are investigated and results show that the composites compared to the composites with silicon carbide filler.

54.Design and analysis of hybrid sandwich layered industrial safety helmet

ABSTRACT

The ultimate aim of the project is to design and analyse a hybrid sandwich layered safety helmet that is made from natural materials like epoxy resin and different types of fibres. The safety helmet is designed using design software and simulated with different types of load tests like static load applying. Stress analysis tests and deformation tests are performed using software like an ANSYS workbench.

The helmet is designed and constructed in a lightweight pattern not compensating the safety in comparison with existing helmets

The helmet is made cost-efficient in comparison with existing models as it eliminates moulding costs.

The usage of fibres in this helmet results in fire resilience and moisture resistance compared to conventional products available.

The usage of natural fibres of KENAF, BAMBOO PULP and RAMIE fibre results in the production of a bio-degradable helmet that is eco-friendly.

55.Material optimization for aircraft interior application by using natural fibers

ABSTRACT

Polymers and their composites are one of the most advanced and adaptable engineering materials. The strength of any composite depends upon number of factors such as volume/weight fraction of reinforcement, types of fibers, orientation angles, chemical treatment of reinforcement, and many others

The present work focuses on the analysis of mechanical properties (tensile and flexural) of synthetic and natural fiber (Sisal Fiber & BANANA fiber)-reinforced with epoxy composites. An attempt is made to reduce the usage of synthetic glass fibers by incorporating natural banana fibers such that the resultant hybrid composite shows increased strength when compared with single synthetic fibers (Glass fibers). The test specimens were prepared and tested according to ASTM standards. Experimental results revealed that reinforcement of natural fibers up to some extent increases the mechanical properties and reduces the overall cost of fabrication of composites.

- Resins: Any, e.g. epoxy
- Synthetic fiber: GLASS MAT
- Natural fiber : BANANA & SISAL MAT
- **TESTING = TENSILE TEST, FLEXURAL TEEST, IMPACT, HARDNESS TEST & WITHOUT ANSYS**