EMERGENCY BRAKING SYSTEM FOR ELECTRICAL OVER HEAD TRAVELLING CRANE

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Abstract-

Emergency braking system is a mechanical device which was added to the slow speed end of Electrical Overhead Travelling Crane. The braking mechanism is working based on the wedge braking methods. In any EOT crane designed with two sides that is drive and driven sides. The drive side is called high speed end and driven side is called slow speed end. Both ends are connected by gear box, coupling and shafts. Thruster brake was provided at high speed end and no brakes provided at slow speed end. There is no Indian standards are enforcing to provide the braking mechanism at slow speed end. But United States made mandatory to provide the same by the EN 14492-2. Amount of Torque is less in the high speed end. Electrical motor is the propellant device of crane. Thruster brake can hold the load during operation as well as braking. If any damages occurred in the gear box or shaft thruster cannot save the load from drop/accident. This is very rare but catastrophic.

Emergency braking mechanism consists of brake drum, shaft, brake block and wedge. The arrangement was added at end of rope drum. A centrifugal switch was provided for monitoring the rated RPM of rope drum. The switch was elected based on the operational RPM. A solenoid switch was fixed under the wedge and linked with centrifugal switch. When the solenoid valve receives the signal from centrifugal switch, it can reject the wedge. The wedge will entangled between brake drum and brake block resulted brake force applied at slow speed end. Rotation of brake drum and wedge was located to induce brake at lowering motion only. The entire system will be added additional to the existing setup. It does not disturb the original setup. The braking system will be act at any accidental load drop due to failure of shaft/gear box/couplings. After the operation of emergency braking system we must replace the wedge. Because the wedge may pulged due to impact load of brakes.

Emergency braking system is very essential for warehouse containing explosive materials. More than 150 starts operational cranes are have high probability to get mechanical failure. Emergency braking mechanism will increase the reliability of EOT crane.

Keywords: Brake block and drum, wedge brake, centrifugal switch
PRODUCTION OF CASSIA JAVANICA BIODIESEL WITH MGMOO$_4$- SiO$_2$ NANOPARTICLES FOR IC ENGINE APPLICATIONS

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Abstract

Crude oil production and their resources have restricted today due to its depletion and consumption rate. Biodiesel involves less production cost, environmentally friendly, renewable, nontoxic and biodegradable. In this examination, a novel source like *Cassia javanica* has used as a feedstock for biodiesel utilizing the transesterification process. The impacts in biodiesel on exhaust gas emissions vary depending on the type of biodiesel and petrodiesel. Blends of biodiesel up to 20% mixed with petrodiesel fuels be used in all diesel engines and is easily more storage and distribution tools. Purpose of the current study investigates the analysis of biodiesel and their blends with diesel oil in four-stroke ICE applications like unburned hydrocarbons, sulfates, particulate matter, polycyclic aromatic hydrocarbon, carbon monoxide, and nitrated aromatic hydrocarbons. It ended that *Cassia javanica* methyl ester biodiesel blend (B20) with the addition of MgMoO$_4$- SiO$_2$ nanoparticles exhibit a better engine performance and emission reduced compared to fossil fuels. *Cassia javanica* methyl ester can use directly in diesel engines without requiring extensive engine changes.

Keywords: Green energy, MgMoO$_4$- SiO$_2$ nanocatalyst, Transesterification, Biodiesel, Performance, and Emission.
COMPARING THE CHARACTERISTICS OF FLYASH AND RED MUD CATALYSTS IN FUEL REFORMER

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Abstract-

The present investigation compared the characteristics of flyash and red mud catalysts in the catalytic fuel reformer (CFR). The CFR is designed and fabricated to produce the diesel like fuel from Waste Engine Oil (WEO) which can be used as an alternative fuel for compression ignition engine. Flyash and red mud were selected as catalysts to use in the CFR separately. The CFR is filled with flyash catalyst and the temperature of the fuel reformer is set to 300°C. 500 ml of WEO is fed into the fuel reformer gradually. After the catalytic reaction the gaseous form of output from the CFR is condensed and named it as WF. Similar procedure was repeated with flyash catalyst and named it as WR. The properties like density, kinematic viscosity, calorific value, specific gravity, flash and fire point of WF and WR were determined and compared to that of the diesel fuel and found that all the properties are almost similar to the diesel fuel. The characteristics of WF and WR were analysed using The Fourier transform infra-red (FTIR) instrument. The FTIR results revealed the presence of hydrocarbon in WA and WF. The suitability of using recycled WEO was analysed and concluded that it can be used as an alternative fuel for compression ignition engine. Comparatively the performance of flyash catalyst is more effective than that of the red mud catalyst.

Keywords: Engine oil, Flyash, Red mud, Fuel reformer, Catalyst
ELECTROSTATIC DISCHARGE WITH INTERLOCK SYSTEM IN PETROCHEMICAL INDUSTRY USING HAZOP ANALYSIS.

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Abstract:

HAZOP study is a risk assessment technique which is used in Qualitative Analysis. HAZOP technique is guided by guide words application to each process parameter (e.g., temperature, flow, pressure) generating the deviation of operating standards (such as low-flow, the temperature) in which the possible causes and consequences could be identified. In this qualitative approach of HAZOP study, it is necessary to give recommendations/engineering control to the identified hazards.

An interlock system in detection and discharging of static charges produced in the Petrochemical industry using an electronic circuit. This engineering control which eliminates the static hazards and also reduces the effect of risk in the working environment. After the assessment, an engineering control is implemented to eliminate the static charge by an interlock system to mitigate the static hazards.
CFD ANALYSIS OF CAVITATION IN PIPES

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Abstract-

One of the most complicated phenomenon’s in fluid mechanics is the cavitation effect. It is explained as the formation of vapor cavities in a liquid that are the consequences of forces acting upon the liquid. It usually occurs when a liquid is subjected to rapid changes of pressure that cause the formation of cavities in the liquid where the pressure is relatively low. When subjected to higher pressure, the voids implode and can generate an intense shock wave. Cavitations are an example for “Two-phase flow” in which water is converted into its vapor bubbles due to drop in pressure. This paper discusses on fabrication of an experimental setup to demonstrate and visualize the effect of cavitations. Cavitations effect is induced by a conical valve/stopper placed horizontally in a pipe section. When water at high pressure impinges on the conical valve there is drop in pressure at that particular point and the cavitations effect was clearly visible in the acrylic/Perspex tube. Computational Fluid Dynamics (CFD) analysis has been carried out to support the experimental results. The test section of the experimental setup has been modeled in ANSYS and the values of mass flow-rate was obtained by feeding the corresponding pressure and velocity values. Determination of flow rate in real time when two phase flow occurs is quite complicated as the conventional means of measurement systems fail when the two phase flow begins to show up. Improper measurement of flow rate in instances where two phase flow occurs can lead to Loss of Coolant Accidents (LOCA). LOCA is situation in which the liquid undergoes a phase change and there is a reduction in volume (flow-rate) of the corresponding liquid thereby failing in its assigned task. This CFD analysis helps to monitor the flow rate and thereby helps in prevention of loss of coolant accidents
ENVIRONMENTAL IMPACT ASSESSMENT ON WELDING FUMES AND DESIGN AND FABRICATION OF ELECTROSTATIC PRECIPITATOR IN AXLES MANUFACTURING INDUSTRY

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Abstract-
Environmental impact assessment (EIA) is a systematic process designed to identify and predict the potential impacts of human activity on the biophysical and human environment. It also functions as an environmental management tool to identify measures to avoid, mitigate or compensate for those effects. EIA is intended to be an iterative process to follow up to projects post implementation to determine actual environmental outcomes, interpret and communicate information about those outcomes and investigate opportunities for improved project environmental performance.

Environmental Impact Assessment (EIA) can broadly be defined as a study of the effects of a proposed project, plan or program on the environment. The legal, methodological and procedural foundations of EIA were established in 1970 by the enactment of the National Environmental Policy Act (NEPA) in the USA. In this work the various parameter of environment like water, land, air is analyzed and water characteristics test for raw water and treated water is done, stack emission test for various machine is carried out, analysis of heavy of metal in welding fumes is done. And the characteristics of land test are analyzed. The work highlights the environmental impact of water, air, land and its recommended actions.
LIFE CYCLE ASSESSMENT OF ALUMINIUM AUTOMOTIVE PART PRODUCTION AND SUSTAINABLE MEASURES TO MINIMISE ALUMINIUM WASTES.

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Abstract-

This research deals with the life cycle assessment of aluminium automotive part with the ideas of sustainable measures to protect the resources. The life cycle assessment methodology was used to identify the environmental hotspots and potential impacts generated during Gear Box Housing manufacturing. The results are analyzed using open LCA open source software. The environmental hotspots are identified using life cycle assessment methodology for the functional unit of manufacturing 100 Gear Box Housing. The resource depletion and the slow environmental pollutions occur due to aluminium melting and casting which generates harmful aluminium oxides was found after the analysis. The results are made from the inventory datasets in the software and from various industrial references. Lots of wastes are generated during the manufacturing of Gear box Housing where dross/slag was the one which is higher. The dross was a major by-product which can be recycled and reused after various physical and chemical processing methods. The depletion of resources can be reduced when the dross is used in other suitable methods. The dross sample is analyzed for its various metal concentrations using ICP analysis. It is also melted to visualize the presence of aluminium in the collected dross. To identify and reduce the oxides in the dross, it is subjected to soaking and boiling methods respectively. The compression test for fine dross, soaked dross and ordinary aluminium dross was made to know its maximum load bearing capacity. The result shows that finer and processed dross bears high loads than ordinary dross.
INVESTIGATION ON SUSTAINABLE EXTRACTION OF PRECIOUS METALS AND RARE ELEMENTS FROM E-WASTE

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Abstract-
Five different mobile phones are collected from local sources were used for recovering metal powder by electro deposition process, using a glass reactor setup of working volume 10 liters and aqua regia for dissolution. Copper rod was used as the anode and stainless steel rod as the cathode for the deposition process. Five mobile phone PCBs were adopted both for the dissolution and deposition processes. Based on the above investigations it found that 3 hours metal powder has dissolved and the maximum metal powder deposited was 7.68 gm in 180 minutes, which is equal to 10% of maximum recovery of metal powder from the PCBs. The maximum power consumption is found to be 0.0200 kWh for 7.68 gm of metal powder recovered. The maximum metal powder recovered in 180 minutes of the deposition process can be considered as the optimum for the 6 L of dissolved solution. There is scope to refine the process and scale it up, if proper funding and facilities are made available.
ACTIVATED CHARCOAL AND MUFFLER SYSTEM FOR REDUCTION OF GASEOUS POLLUTANT FROM A STATIONARY DI DIESEL ENGINE

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Abstract -

The main emissions from the burning of fossil diesel are Carbon Monoxide, Particulate Matters, Oxides of Nitrogen, Smoke and Odor. Activated Charcoal are consistent and potent air pollution control devices to incarcerate particulate matters, other volatile organic compounds and contaminate gases coming out of diesel engine as air polluting emissions. Exhaust gas after treatment system called Activated charcoal along with muffler system was developed in this study. The after gas treatment system was investigated on a stationary direct injection (DI) diesel engine to reduce exhaust odour and smoke to acceptable level abide by the humans. Exhaust gas from the diesel engine was passed through the system containing activated charcoal and due to its high pours value and capture capacity it can reduce the emission content directly from the diesel engine. Muffler is to make the smooth path for exhaust gas emitted from the exhaust manifold. Due to the twists and turns that the exhaust gas has to make to reach the atmosphere, there is a considerable amount of backpressure which restricts the free flow of exhaust gas. It is necessary to reduce the backpressure as it reduces the fuel consumption of the engine. The SolidWorks 2016 version was used to design the muffler for least pressure drop. By viewing the pressure distribution the pressure drop is calculated across the exhaust muffler. Hence it is concluded that Exhaust odor, smoke from the diesel engine and other emissions like carbon monoxide (CO), carbon dioxide (CO₂) and oxides of nitrogen (NOx) were significantly reduced with the help of this system making almost low eye irritation and the efficacy of the total system has been to the measure of more than 80 percent.
ANALYZING THE CHARACTERISTICS OF ALUMINA AND FLYASH CATALYSTS IN CATALYTIC FUEL REFORMER

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Abstract -

The current study analysed the characteristics of alumina and flyash catalysts in the catalytic fuel reformer (CFR). The CFR is used to produce the diesel like fuel from Waste Engine Oil (WEO) to use it as an alternative fuel for compression ignition engine. In this present work, CFR system was designed and fabricated to work under the principle of catalytic cracking. Two catalysts alumina and flyash were used separately in CFR. The CFR is filled with alumina catalyst and the temperature of the fuel reformer is set to 300°C. The WEO is allowed into the fuel reformer gradually. 500 ml of WEO is used for a cycle of operation. The gaseous form of output from the CFR is condensed and named it as WA. Similar procedure was repeated with flyash catalyst and named it as WF. The properties like density kinematic viscosity, calorific value, specific gravity, flash and fire point of WA and WF were determined and compared to that of the diesel fuel and found that all the properties are almost similar to the diesel fuel. The Fourier transform infra-red (FTIR) instrument is used to analyse the characteristics of WA and WF. From the results of FTIR, the presence of hydrocarbon in WA and WF is confirmed. Hence it is concluded that WEO can be recycled and used as alternative fuel for compression ignition engine provided further experimental investigation is required.

Keywords: Waste engine oil, Alumina, Flyash, Fuel reformer, Catalyst
CONSEQUENCE MODELLING FOR ESTIMATING THE HYDROGEN PEROXIDE DISPERSION USING ALOHA AND MAKING OF ALTERNATE STORAGE TANK TO CONTROL SPILLAGE AND BLEVE IN H2O2 STORAGE TANK.

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Abstract -

The most traumatic accidents in chemical process industry is the boiling liquid expanding vapour explosion. Death and injuries have occurred to fire fighting personnel caused by transportation accidents that resulted in BLEVES of liquid chemicals. This potential explosion is likely when mobile or stationary closed containers, tanks and drums are damaged or directly exposed to fire. The explosion itself is a physical process involving breaking of the container, the liquid changes to vapour and expansion, propulsion of pieces and shock waves.

The chemical composition of the material in the container whether it is flammable or non-flammable does not play a role in the explosion. The main aim of the ALOHA is to find the far field dispersion of hydrogen peroxide, to control the boiling liquid expanding vapour explosion in hydrogen peroxide storage tanks by providing an alternate storage tank with temperature indicator and providing a water deluge system. In this paper it is discussed that how to avoid the spillage of H2O2, to increase lifetime of storage tanks, to control BLEVE using alternate storage tank, to eliminate rupture in storage tanks.
THERMO ANALYTICAL CALCULATION FOR VARIOUS BLUE LIGHT EMITTING PYROTECHNIC FORMULATIONS

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Abstract –

Thermodynamic calculations can be made using the Chemical Equilibrium Application-NASA (NASA-CEA) to simulate burning on pyrotechnic formulations. They enable necessary data using which fine tuning of compositions can be tried. This work covers analysis of five different compositions using CEA providing values like adiabatic flame temperatures. Experiments were carried out to find additional safety and combustion characteristics. The effect of released chlorine at high temperature was studied for chemicals like Copper chloride (CuCl), Copper iodide, Potassium perchlorate and Ammonium perchlorate. Analysis revealed presence of environmentally unfriendly products. Copper iodide was found to be environmentally benign compared to the chlorine based formulations.
AN EXPERIMENTAL INVESTIGATION OF ADSORPTION COOLING SYSTEM BY USING DESICCANT COATED HEAT EXCHANGER

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Abstract –

In this paper deals with options and suitable circumstance practical function of desiccant augmented cooling systems. Today, both the user and the consultant options is to adopt non-conventional approach case by case than sticking to conventional method of designing systems. Desiccant-coated heat exchanger, which are actually fin-tube heat exchanging device coated with calcium chloride materials are investigated experimentally. Due to the hygroscopic properties of desiccant materials, both sensible heat and latent heat of process air can be handled by using this kind of heat exchanger. An experimental setup was designed and assembled to conduct test and performance of this unit. It is found that desiccant-coated fin tube heat exchanger will overcomes the offshoot of adsorption heat which occurs in desiccant dehumidification process and accomplish good dehumidification performance under given conditions.

Keywords: desiccant materials, hygroscopic, heat exchanger, evaporative cooler,
TRANSIENT ANALYSIS OF METAL - CERAMIC DISK BRAKE

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Abstract -
Disk brakes have been used for many years in automobiles and are still undergoing further development in terms of the temperatures that they can reach and operate safely at. Many new materials have been introduced for the disk brake rotor to withstand high temperature produced during braking action. Apart from the high temperature property, the disc rotor materials must also have high thermal conductivity property, as this property decides the amount of heat dissipation to the air stream from the disk rotor. A brake material with good temperature and high thermal conductivity property gives maximum efficiency by overcoming the problem of thermo-mechanical instability [TEI] in the rotor which is more common in low thermal conductivity brake rotor material. In the present work, a Grey cast iron and metal-ceramic material has been chosen for the disk brake rotor. Many methods have been introduced in the past to simulate and predict the temperature history of the different disk brake materials, To simulate and predict the temperature history for the Grey cast iron material, and metal-ceramic, a numerical simulation is carried out in ANSYS to predict temperature distribution as a function of time in the disk brake rotor. The results from the transient analysis are compared. From the analysis, the best material for the brake Rotor metal-ceramic as far as thermal and structural behavior is concerned in order to prevent “thermal elastic instability”

Keywords: ANSYS, cast iron, Disc brake, metal and ceramic.
DYNAMIC MECHANICAL ANALYSIS OF A NATURAL FIBRE REINFORCED POLYMER COMPOSITE

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Abstract -

The growing interest in proper utilisation of natural fibres, paralleled to glass and carbon fibres are chiefly due to their low cost, high specific modulus, light weight, lower energy requirements less wear and tear in processing, wide availability, biodegradability, resistance to deforestation along with other usual advantages. The incorporation of natural fibres as reinforcing agent in thermoset polymer composites has gained increasing applications both in many areas of Engineering and Technology. DMA technique which is useful in characterising composite structure and damping as a function of frequency, temperature, time, stress, atmosphere or a combination of these parameters. The dynamic parameters such as storage modulus (E'), loss modulus (E''), and damping factor (Tan d) are temperature dependent and provide information about interfacial bonding between the reinforced fibre and polymer matrix of composite material.

The storage modulus (E') or dynamic modulus typically related to the Young’s modulus. It often associated with “stiffness” of a material and determine how stiff or flimsy a sample. E' regarded as a material tendency/ability to store energy applied to it for future purpose. Loss modulus (E'') or dynamic loss modulus, is a viscous response of the materials and regarded as materials tendency to dissipate energy applied to it. The dynamic loss modulus is often associated with “internal friction” and is sensitive to different kinds of molecular motions, transitions, relaxation processes, morphology and other structural heterogeneities.
USE OF PCM R27 FOR THERMAL ENERGY STORAGE IN MODULAR HEAT EXCHANGER FOR FREE COOLING

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Abstract -
A Thermal Energy Storage system (TES) has the advantage of an efficient use of energy by reducing the imbalance of an energy demand between daytime and night time. It is classified as sensible and latent heat storage systems. The latent heat storage system is superior to the sensible heat storage system since the former reduces the installation area and the expense due to a large thermal storage capacity and constant phase change temperature during freezing and melting processes. Phase Change Material (PCM) has been used as a medium of energy storage. An experimental investigation is carried out in the present research the setup includes a room of size 8x8x8 feet which is needed to be cooled using the heat exchanger and study the technical feasibility of using R 27 as PCM in a heat exchanger for free cooling applications. The charging and discharging experiments revealed the decline in the PCM temperature from 32°C to 29.5°C. The PCM showed a gradual increase in its temperature from 28°C to 29°C during the discharge process after which the increase was rapid

Keywords: Latent Heat Thermal Energy Storage; Phase Change Materials; Free cooling; cool energy; Green Buildings; Energy savings; modular heat exchanger
INVESTIGATION OF TRIBOCORROSION BEHAVIOR OF CA-P COATING ON AZ31B MAGNESIUM ALLOY BY MAO PROCESS

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Abstract—

In biomedical applications, the conventionally used metallic materials, including stainless steel, Co-based alloys and Ti alloys, often times exhibit unsatisfactory results such as stress shielding and metal ion releases. Secondary surgical operation usually becomes inevitable to prevent long term exposure of body with the toxic implant contents.

Magnesium (Mg) can dissolve in body fluid that means the implanted Mg can degrade during healing process, and if the degradation is controlled, it would leave no debris after the completion of healing. Hence, the need for secondary surgical operation for the implant removal could be eliminated. Researchers have been working on synthesis and characterization of Mg-based biomaterials with a variety of composition in order to control the degradation rate of Mg, since uncontrolled degradation could result in loss of mechanical integrity, metal contamination in the body and intolerable hydrogen evolution by tissue.

In the project approaches to overcome these challenges include the selection of adequate proper surface treatment techniques. To investigating the Tribocorrosion behavior of Ca-P Coated with in MAO Process on AZ31B Magnesium Alloy. The specimens surface microstructure has been investing by using scanning electron microscope (SEM), X-ray diffraction (XRD) and Tribocorrosion where investigate on corrosion wear monitor with in Ringer solution. In the project to overcome drawback of the magnesium alloy AZ31B, providing surface treatment techniques to improving Tribocorrosion Behavior.

Keywords: AZ31B Magnesium Alloy, Ca-P coating, MAO process, SEM, XRD, Tribocorrosion, Corrosion Wear Monitor.
CHARACTERIZATION OF ZrO2/SEA SHELLS COMPOSITES PREPARED BY COMPRESSION MOULDING FOR DENTAL IMPLANTATION APPLICATIONS

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Abstract -  
Sea shells are hard protective coat created by means living organisms in sea, these sea shells are exoskeletons of an invertebrate composed as calcium carbonate and calcium. Shells are very often washed up onto a beach empty and clean, as the animal living inside that sea shell is dead. There are more than 50,000 varieties of sea shell present in nature. This experimental project proposes an economically efficient and environmentally friendly alternative usage of sea shell wastage.  
Zirconium implants may prove to be promising in the future; however further in vitro and well-designed in vivo clinical studies are needed before such a recommendation can be made. Special considerations and technical experience are needed when dealing with zirconia implants to minimize the incidence the mechanical failure.

In this present work to prepare the ZrO2/Sea sell, sol-gel and Epoxy composite prepared by using Compression moulding method and prepare specimen where are going to characterized by using scanning electron microscopy (SEM), X-ray scanning device, XRD method, and tribological properties are going to investigate by using pin on disk equipment and also this project provided new platform for dental implantation material application. Novel Sea shell and ZrO2, Sol-gel, Epoxy, innovative production method for ceramic composites will be considered as possible promising candidates for future dental implants.

Keywords: Sea shell (Oyster shells), ZrO2, Sol-gel, Epoxy, Compression molding, SEM, XRD method, Dental implantation material.
EXPERIMENTAL INVESTIGATION ON CUTTING QUALITY CHARACTERISTICS OF ABRASIVE WATER JET MACHINING OF AA6061 ZIRCONIUM OXIDE, GRAPHITE HYBRID METAL MATRIX COMPOSITE

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Abstract -
Aluminum metal matrix composites (AMMCs) evidently show better physical and mechanical properties as compared to aluminum alloys and results in a more preferred material for a wide range of applications. The addition of reinforcement’s restriction AMMCs employment to industry requirements by increasing order of machining complexity. However, it can be machined with a high order of surface integrity by nonconventional approaches like abrasive water jet machining.

The present study aims to Analysis the Abrasive Water Jet Machining Behavior while machining aluminum hybrid metal matrix composites reinforced with ZrO2 (5 – 10 wt %) and graphite (2 wt %).Investigations were carried on ZrO2 (50,75,100g) and graphite (20g) reinforced composite specimens fabricated by stir casting technique.

Following experiments to be investigations on the effect of process parameters such as mesh size, abrasive flow rate, water pressure and work traverse speed of abrasive water jet machining on hybrid AA6061 (ZrO2),Graphite composites. Microstructure of the machined surfaces was examined by scanning electron microscope.

Keywords: AA6061, zirconium oxide and graphite, stir casting, mechanical properties, abrasive water jet machining, scanning electron microscope.
MECHANICAL AND MICROSTRUCTURAL BEHAVIOR OF FRICTION STIR WELDING DISSIMILAR AA6061 AND AA7075 ALUMINUM ALLOY

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Abstract -
Friction stir welding (FSW), as a solid state joining process, is one of the most promising welding techniques for joining lightweight alloy due to its low heat input and low energy consumption. A great deal of efforts as been paid in the FSW of high strength aluminum alloy. It is of vital importance to consider the corrosion susceptibility of the dissimilar joints in the industrial applications.

Aluminum alloy AA6061 are widely used aircraft structures, such as wings, fuselages, more commonly in homebuilt aircraft and AA7075 are widely used in transport application due to their high specific strength marine, automotive and aviation.

In this work we are going to make a dissimilar welded joints (AA6061 & AA7075) by using friction stir welding process and the mechanical properties and microstructure of the welded portions are going too investigated by using universal testing machine and scanning electron microscope (SEM).

As compared to the conventional welding methods, FSW consumes considerably less energy. The macro and microstructure, scanning electron microscopy (SEM), were conducted to study the effects of rotational and welding speed with the pin profiles for dissimilar friction stir welded butt joints keeping AA6061 and AA 7075 plate on the advancing side. The good mixing of both the materials joined was obtained lower welding and higher rotational speed.

Keywords: Dissimilar materials joining, friction stir welding, microstructure, scanning electron microscopy, tensile properties.
INVESTIGATION OF TRIBOCORROSION BEHAVIOUR OF PVD COATINGS (TiN & TiAIN) ON 304 SS IN LACTIC ACID

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Abstract -

Most of the dairy industries and feeding bottle manufacturing industries are commonly used 304 stainless steel as storage & container’s tanks because of its better corrosion resistance and non-toxic nature.

The stainless steel 304 contains 18% chromium and 8% nickel. Therefore chromium having more corrosion resistance. Even though the milk contains lactic and malic acid Leeds to form a scaling and intergranular corrosion at elevated temperatures for long time use for storage tanks and container’s. And also the Nickel and Chromium are antigenic substance for human body and it develops Skin irritants, pulmonary sensitization, bumps on the skin and chromium increases risk of lung, nasal, Fever, liver damage and sinus cancer.

To the present work focus to overcome the above drawbacks we are going to making surface treatment by coating the ceramics material like ( TiN & TiAIN ) over the stainless steel, because Ceramics is could not undergo any chemical reactions and high corrosion resistance. ( TiN & TiAIN ) coating microstructure were investing by using scanning electron microscope (SEM), x-ray deflection (XRD),Leach test and tribocorrosion behaviour are going to investigated by using tribometer.

Keywords: Stainless steel 304, PVD coating, TiN/TiAIN, Leach, SEM, XRD Test, Tribocorrosion.
FRICTION STIR PROCESSING OF A COMPOSITE ALUMINIUM ALLOY (AA1100) REINFORCED WITH TUNGSTEN CARBIDE POWDER

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Abstract -
Friction stir processing is an emerging novel processing technique as a surface treatment, or to fabricate surface composites which is based on the basic principles of friction stir welding (FSW). Friction stir process is a green and energy efficient technique without deleterious gases and does not change the shape and size of the processed component.

Aluminum 1100 alloy are very promising for structural application in aerospace, military vehicles and transportations industries due to their light weight, high strength to weight ratio and excellent resistance to corrosion however low hardness and low strength of this aluminum alloy limit their use especially for tribological application.

The aim of this experiment work is to improve the mechanical properties of AA1100 by FSP going to carried out with different travelling speeds and rotational speeds the grooves of constant width of 1mm and different depths of 1, 2, 3&5mm are made on AA1100 alloy plate filled with tungsten carbide (WC) micro particles after this FSP process the mechanical properties like hardness and microstructure are going to investigated.

Keywords: Aluminum alloy (aa1100), tungsten carbide powder, micro hardness, microstructure, scanning electron microscopy.
OPTIMIZATION OF MACHINING PARAMETERS IN TURNING OPERATION OF CRYOGENIC TREATED TITANIUM ALLOY GRADE 09

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Abstract -
Cryogenic treatment is an add-on process to conventional heat treatment in which material is treated at cryogenic temperature. The mechanical properties of the titanium alloy are significantly improved by fully cryogenic treatment. Surface roughness and microstructure is having greater impact on the functional performance of the tool during service conditions. The objectives of this work is to investigate the effect of fully cryogenic treatment on the surface roughness and microstructure of the titanium alloy.

In this treatment, titanium alloy is brought to a temperature of the order of \(-196^\circ\text{C} (-352.8^\circ\text{F})\), improves certain properties beyond the improvement attained at cold treatment temperature. In cold treating of titanium alloy is increased strength, greater dimensional or microstructural stability, improved wear resistance and relief of residual stress are among the benefits of the cold treated titanium alloy.

In this work the working material is titanium alloy (GRADE 09) and using the coolant to treat the work piece is liquid nitrogen. As we are aimed to increase surface finish and analysis the microstructure of cryogenic treated alloy. As the result are shown improvement in surface roughness on the cryogenic treated titanium alloy.

Keywords: cryogenic coolant – cold treatment-surface roughness- liquid nitrogen- titanium alloy grade 09.
TRANSIENT ANALYSIS OF METAL - CERAMIC DISK BRAKE

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Abstract -

Disk brakes have been used for many years in automobiles and are still undergoing further development in terms of the temperatures that they can reach and operate safely at. Many new materials have been introduced for the disk brake rotor to withstand high temperature produced during braking action. Apart from the high temperature property, the disk rotor materials must also have high thermal conductivity property, as this property decides the amount of heat dissipation to the air stream from the disk rotor. A brake material with good temperature and high thermal conductivity property gives maximum efficiency by overcoming the problem of thermo-mechanical instability [TEI] in the rotor which is more common in low thermal conductivity brake rotor material. In the present work, a Grey cast iron and metal-ceramic material has been chosen for the disk brake rotor. Many methods have been introduced in the past to simulate and predict the temperature history of the different disk brake materials, to simulate and predict the temperature history for the Grey cast iron material, and metal-ceramic, a numerical simulation is carried out in ANSYS to predict temperature distribution as a function of time in the disk brake rotor. The results from the transient analysis are compared. From the analysis, the best material for the brake Rotor metal-ceramic as far as thermal and structural behavior is concerned in order to prevent “thermal elastic instability”.

Keywords: ANSYS, cast iron, Disc brake, metal and ceramic
PORTABLE GASIFIER STOVE USING
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Abstract -
One of the most deadliest threats that women and children are facing today is right inside their own home. The simple fact of cooking is responsible for two million deaths globally today each year, this is because close to three million people still depend upon solid fuels such as wood to cook their food everyday and these fuels when burned in open fire emit toxic smell that fills their surroundings. The collecting of woods leads to deforestation and these emissions from solid fuels contribute to global climate change. This silent killer kills almost half of the world’s population. But this can be reduced by using clean cook stoves which emit zero smoke.

Keywords: Gasifier Stove, Solar Energy, Fuel Moist Wood.
REUSE OF TREATED EFFLUENT WATER USING NANOFILTRATION MEMBRANE AND NANOSILVER COATED FILTER IN ETP

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Abstract -

Nano filtration (NF) is an advanced membrane separation technique for water and wastewater treatments as well as concentration/ separation of antibiotics. The major advantage of NF lies in the high rate of permeation. In the dairy industry, the treated water is used for irrigation purpose. This project water is treated for reusing in further process replacement of water in cooling towers or boilers, usage in floor cleaning etc. The prototype of the wastewater treatment setup has been made using nano membrane. The antibacterial growth inhibitor silver nano particle had been prepared. The characterization of silver nano particle was examined by TEM, SEM, X-ray diffraction. By employing this modified filtration setup in the effluent treatment plant of dairy industry the water consumption for the process has been reduced since the amount of reusable water is increased.
EXPERIMENTAL ANALYSIS OF WATER EXTRACTION FROM ATMOSPHERIC HUMID AIR BY PELTIER EFFECT

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Abstract -

In many countries like India it is very difficult to obtain water resources in irrigation or other purposes, especially in the desert regions. The problem of water scarcity is also recognized in other places of the world due to lack of rainfall. However, in extremely humid areas such as places close to the sea water can be obtained by condensing the water vapour present in air. A method was developed to produce water condensation system based on thermoelectric cooler. The system consists of cooling elements heat exchange unit and air circulation unit. Atmospheric water generator is a device that can convert atmospheric humid air directly into usable and even drinkable water. It is such a device which uses the principle of latent heat to convert water vapor molecules into water droplets. The main objective is to develop an experimentally investigate the thermoelectric fresh water generator (TFWG) based on the fundamental of thermoelectric cooling effect by condensing the moisture from the ambient humid air. It can be useful for people in coastal and humid regions with relative humidity above 60% having scarcity of drinking water. An internal heat sink of surface area 0.2m² and length 0.65m is placed on the cold side of the modules to enhance heat transfer rate. The observations from the experiments show that with the use of internal heat sink, the quantity of water generated per 10 hours increased by 81% as compared without internal heat sink. Electric current, air mass flow rate and humidity of moist air were varied to understand their impact on the quantity of water generated. Based on the observed results, the quantity of water generated is directly proportional to all these parameters in the domain of experimentation.

Keywords: Thermoelectric cooler, condensation, atmospheric water generator.
COMPUTATIONAL FLUID DYNAMIC ANALYSIS OF AN AUTOMOBILE RADIATOR

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Abstract -

The purpose of this study is to design an automotive radiator which meets the cooling requirements. The new radiator design will be used in 150cc motor cycle. Overheating can lead to a loss of strength. The top piston ring groove temperature must be limited to about 200\(^\circ\)C if the lubrication is to remain satisfactory. Above this temperature lubricants can degrade, leading to both the loss of lubrication, and packing of the piston ring groove with the products from the decomposed oil. Failure can result through thermal strain. Normally 150 cc motor cycle engines are cooled by air cooling system. In order to reduce the initial pick up time of the motorcycles from 8.4 to 5 seconds; the compression ratio has to be increased from 10.4 to 12.1. Due to the increase in the compression ratio, heat loss increases. The air-cooled system will not be sufficient enough to remove the heat from the engine. Hence, we go for liquid cooling system in motorcycles. Cross flow type of radiator is selected because of availability of space which leads to the choice of the radiator. The tube and corrugated fin type of core is adopted for studying since the core of this type increases the surface area of fins, air turbulence and structural strength of the radiator compared to than other types of radiator cores. The inlet temperature of the coolant is 90\(^\circ\)C and it is cooled to outlet temperature of 67\(^\circ\)C. Polyethylene glycol fluid is used as a coolant and the temperature difference is 15 to 25\(^\circ\)C. Further improvements can be done to extract heat and work more effectively.

Keywords: Automobile, Radiator, Radiator Materials, CFD, Numerical analysis
DYNAMIC ANALYSIS OF PASSENGER CAR COMPOSITE SIDE-DOOR BEAM

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Abstract –

Over the years, the presentation of composite materials in secondary automobile composition has shown superiority over metals. Currently, there is increasing interest to use composites for primary structures for higher weight savings and potential cost reduction. For this reason, a stringer-stiffened panel, with the potential to be used in automobile composition, is considered. In this experiment, steel and composite materials were used and rectangular and circular beams types considered and compared to find the best suitable by using finite element models.

Keywords: circular beam, composite, finite element models, rectangular beam, Side doors
REVIEW OF LOW-TEMPERATURE SUPERPLASTICITY OF NUGGET ZONE OF FRICTION STIR WELDED AL-MG ALLOY JOINT

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Abstract –

In this Review paper Commercial 5083Al rolled plates, 2.8mm thick, were subjected to friction stir welding (FSW) with the aim of achieving low-temperature super plasticity (LTSP) in the nugget zone (NZ). Fine-grained microstructure with average grain sizes of 1.6 and 1.8µm was obtained in the upper and lower parts of the NZ, respectively. The NZ was subjected to super plastic investigation at 250 and 300°C. It was indicated that the upper and lower parts of the NZ exhibited similar LTSP values of 550–570% at 300°C, much higher than those reported previously (<300%) in friction stir processed 5083Al. This excellent LTSP was attributed to the extremely fine-grained microstructure and predominant high angle grain boundaries (>84%). Grain boundary sliding was determined to be the dominant deformation mechanism, with grain boundary diffusion as the rate-controlling step.

Keywords: Low-temperature super plasticity (LTSP), Friction stir welding, Nugget Zone(NZ), Aluminum alloys, Grain boundary sliding.
EXPERIMENTAL ANALYSIS OF AL-FLY ASH COMPOSITE MATERIAL ABOUT ITS WEAR RESISTANCE BEHAVIOUR AND ITS OPTIMIZATION

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Abstract –

Composite materials are widely used in automotive industry due to their enhancing mechanical properties such as wear resistance, hardness and tensile strength. Grey cast iron castings cause residual stress, brittle, high density and low shock resistance. In the present study they can be replaced with Aluminum LM6 matrix material and various weight percentage of fly ash (10%, 20%, and 30%) to increase wear resistance. The mechanical behavior and microstructure of Al-Fly ash composites are investigated. The dry sliding wear behavior of unreinforced alloy and composites are studied using Pin-On-Disc machine at a load of 10, 20, 50, 65 and 80N at a constant sliding velocity of 1 m/s. In this experiment the Al-Fly ash composites are best suitable for automobile Disk brake due to its high coefficient of friction.
DESIGN AND FABRICATION OF AUTOMATIC MOVABLE SCREW JACK


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Abstract –

Screw jack (Scissor jack) is one of the vehicle lifting device. Manual usage of screw jack is very hard. There is lot of difficulties while placing and lifting the screw jack under the axle of the vehicles. It is very challenging that to lift the vehicle without effort for replacing of tyre (In case of puncture & damage). To overcome this problem and to make simple we have introduced a new concept as rack and pinion mechanism in screw jack set up which was run by automatically with the help of limit switches and dc forward & reverse switch. By using this mechanism we reduce the time of replacing tyre when it attain puncture. It does not require skilled person to operate. Its main aim to make simple to handicap person, lady person and aged person to lift the vehicle without effort.

Keywords: Rack and pinion mechanism, limit switches, DC forward and reverse switch, screw jack etc.,
SOLVING MULTI OBJECTIVE U-LOOP CELL LAYOUT PROBLEMS USING OPTIMIZATION TECHNIQUES

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Abstract –

Arrangement of production equipments within the cell in the given layout is very important task in any manufacturing systems. This paper deals with the design of fixed area U-loop cell layout problems in cellular manufacturing. The multi objectives of this paper are finding the placement of machines within the cell by reducing the total travelling distance of the products, to reduce the total material handling costs, total moment value, and number of back tracking movements. This paper compares the results of simulated annealing (SA) algorithm, artificial bee colony (ABC) algorithm and particle swarm optimization (PSO) techniques. Finally it concluded that the PSO technique performed well for solving the fixed area U-loop layout problems. Priority of the product, hazardous moves are the relative importance factors considered while designing of cell layout. A layout which has the larger layout moment ratio is considered as the more desirable layout; it helps in finding the better layout.

Keywords: Cellular layout, Simulated annealing, artificial bee colony, particle swarm, layout moment ratio.
AN ECO-FRIENDLY COMPRESSED AIR DRIVEN ENGINE

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Abstract –

The air driven engine is an eco-friendly one which operates with compressed air. The expansion of compressed air is used to drive the pistons of an engine. It acts as a pneumatic actuator that creates useful work by expanding compressed air. In this case mixing of fuel with air is avoided during combustion stage. However Compressed Air Technology is used to run the engine. The Compressed Air Technology is quite simple. If we compress normal air into a cylinder the air would hold some energy within it. This energy can be utilized for useful purposes. When this compressed air expands, the energy is released to perform the work. Further the released energy is used to activate piston movement. This is the basic working principle of the ‘Air Driven Engine’. In this paper, compressed air principle is applied and power generated to rotate crankshaft of the engine.

**Keywords:** IC Engine, Compressor, Pneumatic Actuator.
FABRICATION OF WASTE HEAT RECOVERY UNIT FROM THE CONCRETE TERRACE

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Abstract –

To increase the usage of waste heat in India, a low-cost solar collector made of concrete is experimentally investigated in Salem, Tamil Nadu, India using the integrated concrete collector in terrace, and use waste heat energy for the domestic purpose. The concrete slab consisting of metal fibers is placed in a wooden box, with immersed serpentine copper tube dimension of 1m x 1m x 0.05m. With an objective of improving the efficiency of the collector, a heat transfer augmentation technique is applied and a collector is fabricated in which water is circulated inside the serpentine tube. Test is carried out during the rainy and winter season, for a water flow rate of 0.004167 kg/s to understand the working of collector. Here the effect of the fully embedded and partially embedded copper tube in the concrete collector is tested and compared. Testing results show that the average temperature of the collected water per day is 35°C–45°C.

Keywords: Waste Heat Recovery, Solar Collector, Concrete Terrace.
HEAT TRANSFER ENHANCEMENT ON FIN AND TUBE HEAT EXCHANGERS

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Abstract –

Fin and tube heat exchangers designs rely upon copper and aluminum construction of fin and tube heat exchangers. The hot temperature was controlled by circulating water through copper tubes and fins. The main aim of this work is to increase the heat transfer rate from changing the existing fin shape and tube. In this project copper straight tube with flat fin has been replaced by copper U–tube with spline fin in the heat exchanger. Pressure drop, velocity and heat transfer characteristics of heat exchanger were analyzed by designing of heat exchanger using solidworks and performing analysis using Computational fluid dynamics (CFD). From the result obtained is concluded that, the enhancement of the heat transfer rate and efficiency is increased up to 5% of heat exchanger in spline fin compared to the flat fin and by passing the fluid inside the fin in cross flow it also increased pressure drop and the higher pumping power in heat exchanger.

Keywords: Heat exchanger, CFD and Solid works.
DESIGN AND FABRICATION OF SAVONIUS VERTICAL AXIS WINDMILL

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Abstract –
Increasing demand for energy in recent years has been a rise in development of alternative energy sources. In the present work, VERTICAL AXIS WIND MILL turbine is being designed and fabricated as for the specification. The VAWT turbine blades are designed as Savonius blade shape, with less weight and more stiffness. The assembled VAWT will be mounted on the area where air velocity is maximum which is enough for producing energy and electric power. VAWT is a special purpose wind mill designed in such a way that the blades are like a half drum type connected to the shaft at the centre of the assembly which in turn connected to the generator, generates the power. The power developed by the VAWT is shorted in battery. This power is used for some useful application.

Keywords: Wind mill, drum, VAWT.
ENERGY CONCEPTS AND ENVIRONMENT IN HVAC

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Abstract –

Heating, ventilation, and air conditioning is the technology of indoor and vehicular environmental comfort. Its goal is to provide thermal comfort and acceptable indoor air quality.

The modern commercial or office building consists of the HVAC system which is Heating, Ventilation, Air-conditioned. In this report, we’ll going to identify the purpose and goals of HVAC system, describe HVAC types, describe HVAC parts and describe how this part works together or its working cycle. "sides to air-conditioning there are ventilation systems lie ceiling fan, fresh air supply and exhaust fan where ceiling fan is used is used to ventilate the air with rotating blades and exhaust fan is used to displace the inside air to the outside environment, fresh air supply is used to displace the inside air to the outside environment by supplying fresh air from the outside air.

Keywords: Heating, ventilation, and air conditioning.
PERFORMANCE & ANALYSIS OF ALUMINIUM PISTON COATED BY CERAMIC POWDER

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Abstract –

This paper proposed the methodology of reconditioning the existing used piston from the petrol engine. Normally the existing used piston had irregular surface over its outer cylindrical shape, because of wear and friction were occur during the running time. This kind of the piston will affect the engine performance. So we need to recondition the existing piston to attain the higher performance than new piston. Ceramic coating preferred for reconditioning the existing piston. This ceramic coating applied over the piston where it had more wear areas in cold metal coating condition. Then the piston performance evaluated from the specific engine test module.

Keywords: Piston, reconditioning, ceramic coating.
DESIGN OF AUTOMATIC DRILLING ATTACHMENT IN CENTRE LATHE

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Abstract –

Any industry has its own desire to maintain their ability to provide safe and secure drilling of their customer’s hazardous materials in centre lathe drilling operation in the centre of the components using tail stock by manual feed due to manual feed, there is a chance of time delay, poor finishing of dimensional deviation. Addressing these challenges is an important task and the efficient delivery of their cargo, play a vital role in the economy of the industry. This project provides the safe and accurate drilling facility, when the component have drill requirement which can be made in centre lathe. By providing automatic feed system through spur gear, with chain drive which is engaged to lead screw. The automatic feeding system works more effective, accurate and smooth operation and also it increases the life of the tool. This system also eliminates the problem of improper feed rate by adjusting the gear system. This attachment will definitely play a vital role in future study.

Keywords: automatic feeding system, gear system, drilling.
FTIR ASSESSMENT AND INVESTIGATION OF CURCUMA LONGA ANTIOXIDANT ON THE FUEL STABILITY OF WASTE-COOKING OIL BIODIESEL

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Abstract –

Diesel engines are commonly used for transportation of people and goods. Emissions produced from the Diesel engines are harmful to environment and living beings. The depletion of fossil fuel leads to the identification of alternate energy sources which includes biodiesel fuels. Biodiesel can be produced from edible and non-edible feedstock, which is a renewable. Biodiesel also possess the disadvantages such as reduced oxidation stability, and high NOx emission during combustion. Biodiesel from waste cooking oil (WCO) was blended with neat diesel in the proportion of 20% of biodiesel with 80% of neat diesel. The fatty acid composition of the selected waste cooking oils is determined by means of GC-MS. Dosage of antioxidants is an appropriate method for improving the fuel stability and reducing NOx emissions of biodiesel. In the present study, natural antioxidants extracts of Curcuma longa (Ginger family) are prepared by means of ethanol. The phenolic compounds present in the antioxidants are responsible for increasing the oxidation stability which was confirmed by means of Fourier Transform Infrared Spectroscopy (FTIR). The fuel properties of the test samples such as Density, Viscosity, Flash point, Calorific value, Cetane number and Cloud point were found to be matching with diesel fuel and so it can be used directly in Diesel engine without engine modification. The performance and emission characteristics of the compression ignition engine were evaluated with diesel fuel as reference. FTIR spectrum data concluded that the prepared biodiesel could be stored for an extensive period by dosing 1000 ppm of Curcuma longa antioxidant.
CHARACTERIZATION AND MECHANICAL PROPERTIES OF ARECA CATECHU FIBRE THROUGH ECO-FRIENDLY COMPOSITE PLATES

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Abstract –

The Natural Fibers play a vital role in the production of composite materials. Since Natural Fibers exhibit eco-friendly properties it has grabbed the attention of the world’s scientific community towards natural fiber reinforced eco-composites. One such natural fiber is Areca Fruit Husk (AFH) which is rich in high cellulose content (63%). The Physical Characterization of AFH fiber is done to examine its Mechanical, Morphological properties. The Areca Fibers are inspected both in treated and untreated conditions, the fibers are initially pre-treated with NaOH, KOH solutions. Epoxy Resin with Hardener is used as the matrix in the composite material. Among the pre-treated chemicals, KOH concentration up to 6% of the solution is used for 1 hour which fits the requirement for making a composite material. The composite plates are prepared in the following ratios 40:60, 50:50, 60:40. Upon which Tensile test, Impact Test, Hardness Test, Flexural test were performed. As a result, the composition of 40:60 seems to be one of the best results.

Keywords: Bio-reinforced polymer composites, Areca catechu fiber, physical properties, Surface treatment, Mechanical properties, Composite processing.
INVESTIGATION OF STRENGTH PROPERTIES OF DEFORMED STEEL BAR FOR CONCRETE STRUCTURES

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Abstract –

India is among the fastest developing nation in the world with major constructions like bridges, dams, airports, residential buildings etc. In a developing economy where infrastructure is getting boom, strength" of structural members is of great importance. This is where Thermo Mechanically Treated (TMT) bars plays a major role. For understanding the proper behavior of structural members, physical properties, mean projected rib area and macrostructure are very essential. Nowadays there are many companies which supply untreated and twisted deformed bars as TMT bars which would do much harm for structural stability. There is an urgent need to use the phrase “Quenching and Tempering” to label the TMT bars. This project is an effort to showcase the ways to identify good quality TMT bars. Good strength, bond with concrete, thermal expansion characteristics and bend ability are prime attributes which make steel bars most effective reinforcing material for engineering of RC structures. This study aims at improving the yield strength of deformed steel bar by considering some process parameters which are water quality, water pressure, cooling rate, speed of rolling.

Keywords: Quenching, Tempering, Hardening, Thermo Mechanical Treated Bars, Yield Strength, Ultimate Strength