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2nd International Conference on Future Generation Functional Materials & Research-2022

Organizing by
Department of :
Mechanical Engineering
&
Auto mobile Engineering

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CHAIRMAN MESSAGE

It is my great pleasure to welcome you to the International Conference ICFMR-2022, which takes place in PACE Institute of Technology and Sciences, Ongole, Prakasam, Andhra pradesh Researchers and Scientists for sharing their knowledge and innovative ideas in the recent trends in the field of Mechanical and Automobile Engineering.

All events will provide ample opportunities for discussions, debates, and exchange of ideas and information among conference participants. The conference would not have been possible without the enthusiastic and hard work of a number of colleagues.

We would like to acknowledge the efforts of our members and references and their priceless help in the review process. I thank the ICFMR steering committee, for their vision and leadership. We are awaiting the exciting presentations, discussions, and sharing of technical ideas with colleagues from around the world.

We thank you for attending the conference and we hope that you enjoy your visit.

Dr. M. Venugopal BE, MBA
CHAIRMAN
PACE Institute of Technology and Sciences

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SECRETARY MESSAGE

We feel enthralled on this gracious occasion to welcome you to the Second International Conference on "Future Generation Functional Materials & Research (ICFMR-2022)" organized by Departments of Mechanical and Automobile Engineering from 9th to 10th December 2022 at PACE Institute of Technology and Sciences, Ongole, Prakasam, Andhra Pradesh, India. The International Conference provides ample opportunity to the engineering and management field researchers across the country to transmit the knowledge generated through their research. We are also glad to learn that many academicians, students and other industry partners from India and all over the world have shown interest to participate in this conference. We are sure this conference will quench the knowledge of thirst of research activists and share their knowledge and valuable experience and time in the field of Mechanical and Automobile Engineering.

Finally, we would like to thank all the authors, the reviewers, editors and the delegates for their contributions and participation. The international conference will not be a success without your expertise and active participation. On behalf of the organizing committee, we thank you for making this conference a great success.

Dr. M. Sridhar B.E, M.Tech, MBA
SECRETARY
PACE Institute of Technology and Science

MESSAGE FROM PRINCIPAL

I take the privilege to welcome the eminent researchers and the students for the Second International Conference on "Future Generation Functional Materials & Research (ICFMR-2022)" organized by the Departments of Mechanical and Automobile Engineering on 9th and 10th December 2022 at PACE Institute of Technology and Sciences, Ongole, Prakasam, Andhra Pradesh, India.

I expect it to be a great opportunity and an inspiring occasion for learning. I hope that the International conference will provide a better platform to interact and share their remarkable knowledge and experience with the eminent speakers on the cutting-edge themes of Mechanical and Automobile Engineering.

Dr. G. V. K. Murthy B.E, M.Tech, Ph.D
PRINCIPAL
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HOD MESSAGE

I deem it my immense pleasure to invite you to the conference ICFMR-2022, which is going to be held on 9th and 10th December 2022 PACE Institute of technology and Sciences, Ongole. Indeed it has been a real reputation and opportunities to us to organize a great event ICFMR-2022.

Research in the substratum for the advancement of the country and world. Therefore, the international conference is intended to raise the research quest in the engineers, researchers and scientists. Certainly the conference will be a scaffold to share the innovative and pioneering ideas with all the researchers.

I would like to thank for the efforts of our members and referees for their invaluable help in the review process. I thank the ICFMR-2022 steering committee, for their tremendous efforts. We are anticipating for the pragmatic presentations, discussions, and sharing of technical ideas in the conference.

I hope the conference would give profound insights of research.

Dr. G. Kondaiah M.Tech, Ph.D
HOD
PACE Institute of Technology and Sciences

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• Mr. Durga Vara Prasad

Principal Researcher. Tata Steel, Jamshedpur

• Dr. M. Jagannatham., Manager in Research, WIL.

• Mr. K. Baji., JSW Steel Salem, Tamil Nadu

About PACE Institute of Technology and Sciences

(Autonomous)

PACE INSTITUTE OF TECHNOLOGY AND SCIENCES (PACE ITS), was established Under the Srinivasa Education Society in 2008 at Valluru village near Ongole. It has been running successfully since the academic year 2008-2009. PACE, being an NRI project, is committed to creating a world- class technical education.

The Institution was established in the year 2008 with a humble beginning with a modest strength of 240 students, by the founders Dr.M.Venugopal Rao, Chairman, and Dr.M.Sridhar, Secretary & Correspondent. Ever since it has been flourishing from the minimum strength to the immense student strength in the stewardship of enlightened management. PACE has been situated in a panoramic area of 11.0 acres. The institute has obtained a place of pride and become a pioneer in imparting higher education in the rural domain. The management has initiated courses such as B.Tech, M.Tech, MBA, and Diploma.

The AICTE, New Delhi approved PACE Institute of Technology and Sciences in the year 2008 and sanctioned the strength of 60 students for each branch of EEE, ECE, CSE, and IT. In the year 2009-2010, CIVIL and MBA were approved successively. In the consecutive year 2010, the college sanctioned the Mechanical and Automobile branches. An M.Tech Program (CSE) and 120 seats for B.Tech (CSE) were sanctioned by AICTE. In the year 2012, the institute was approved by AICTE for M.Tech Programmes in ECE and EEE, along with 120 seats for B.Tech (Civil & Mechanical). By adding another feather to the eminence of PACE, the State Board of Technical Education of Andhra Pradesh sanctioned Diploma (EEE & MECHANICAL) in the year 2012. The various courses run by the Management are endowed with a team of dedicated faculty working with a missionary zeal.

About Department of Mechanical Engineering

The Department of Mechanical Engineering is one of the most versatile and prodigious fields of engineering. It was established in the year 2010-2011 and offers a four year graduate program in Mechanical Engineering with an annual intake of 60 Students meeting the global demands of engineers. The department possesses the state-of-the-art labs and equipment to facilitate the students to acquire implication and industry required skills. It is committed to equip the students with domain expertise, research and soft skills therefore the students find a larger scope in the Mechanical Sector.

THEME OF CONFERENCE

The conference covers a wide range of topics but is not limited to the following:

- Functional materials in energy and environmental applications
- Materials science and engineering
- Materials manufacturing and processing
- 3D Printing / Additive manufacturing
- Materials properties measuring methods and application
- Nanotechnology & smart materials
- Methodology of research and analysis and modeling
- Nanocomposites / Materials
- Electronics Devices
- Nuclear Materials
- Super Conductivity
- Energy Engineering
- Hybrid Electric Vehicles
- IOT / Artificial Intelligence / Machine learning

LIST OF KEYNOTE SPEAKERS

	Dr. Gujjala Raghavendra. Assistant Professor. Department of Mechanical Engineering. National Institute of Technology, Warangal - 506004, Telangana, INDIA.
	Dr. Murali Mohan Cheepu, Research Manager, Department of Materials System Engineering, Pukyong National University, Busan, South Korea.
	Mr. Venkata Charan Kantumuchu, (MBA LSSMBB CMQ CQE CQA) 3rd degree connection 3rd Global Quality Directo at Electrex, Inc., Stanford University, South Hutchinson, Kansas, United States.
	Dr. T.Niranjan Assistant Professor, Department of Mechanical Engineering Mahatma Gandhi Institute of Technology, Hyderabad, Telangana, India.

LIST OF ABSTRACTS

EFFECT OF FUEL CELL OPERATING TEMPERATURES ON THE PERFORMANCE OF MINIATURE PROTON EXCHANGE MEMBRANE FUEL CELL

T. Ravi Teja[1], Srinivasa Reddy Badduri[1], J. Rajasekhar[1], T. Rakesh[1], K. Akhila[1]

[1]Department of Mechanical Engineering, KITS Warangal, Warangal, Telangana 506015, India.

Abstract: Proton Exchange Membrane Fuel cell (PEMFC) is an electrochemical system which directly transforms the chemical energy of a fuel into electrical energy (Direct Current). Improvement of Fuel cell performance is one of the challenging tasks, which depends on many parameters such as design parameters, operating parameters, membrane electrode assembly, bipolar plate materials, and current collectors, transporting the reactants and removing of products. Therefore, the Flow field designs and its dimensions of a bipolar plate is one of the key parameter to improve the performance of proton exchange membrane fuel cell (PEMFC). A complete three dimensional miniature PEMFC model with single serpentine design with circular cross section was developed using ANSYS FLUENT and simulations were carried out at 100% humidity conditions. This study focuses on miniature PEMFC model and analyzing fuel cell performance in terms of current density using Computational Fluid Dynamics (CFD) at different operating temperatures. The current densities at different operational voltages and fuel cell performance at various operating temperatures are computed and analyzed. It is observed from the polarization curve that the current density decreases as the fuel cell voltage is increased at same fuel cell operating temperature. It is also found that the performance of the fuel cell increased with increasing the operating temperature from 313 K (40^{o}C) to 333 K (60°C) at 0.4v and then steadily decreased thereafter. The results show that the maximum current density of 39682.16 A/m^2 is obtained at 0.4v and 333K (60°C).

Keywords: Miniature Fuel Cell, Operating Temperature, Current Density, Electro-Chemical Device and ANSYS FLUENT.

EXPERIMENTAL INVESTIGATION ON INFLUENCE OF PROCESS PARAMETERS DURING ELECTRONIC DISCHARGE MACHINING OF TITANIUM ALLOY

Atharva Patil[1], Abhishek Indupally[1], J Aditya Ram[1], K Shamith Reddy[1] and T Niranjan[2,*]

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Abstract: Titanium alloy has high strength and rigidity hence it is tough for the machining. It is used in various industries, especially aerospace, because of its high strength-to-weight ratio. This work involves the study of the effects of process parameters on Electrical Discharge Machining (EDM) of Ti-6Al-4V. The process parameters power input (3-5 KVA), pulse on time (60-80 μsec), pulse off time(20-40μsec), the pressure of dielectric fluid (6-10 MPa)are taken into consideration and studied their influence on the performance of EDM machining. The performance is evaluated by tool wear rate (TWR), material removal

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rate (MRR), surface roughness(SR) Ra & Rz and taper angle. Brass electrode is used along with deionized or distilled water as the dielectric fluid. Taguchi L18 experimental design is used for determining the optimal combination of process parameters. The results showed that dielectric fluid pressure is the most influencing parameter on MRR and current is highly impacting process parameter on TWR, SR and Taper Angle.

Key words: Dielectric fluid Pressure, taper angle, surface roughness, Titanium alloy, EDM.

REVERSE ENGINEERING AND PARAMETRIC STUDY OF A HELMET USING ADDITIVE MANUFACTURING: A REVIEW

Abhishek Indupally[1], Atharva Patil[1], J. Lakshmi Deepak[1], Ankush Kushal Swaraj[1],T. Niranajan[2]

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[2]Assistant Professor, Department of Mechanical Engineering, Mahatma Gandhi Institute of Technology, Hyderabad.

Abstract: Helmets are a very important instrument for the safety of riders in a vehicle. Two-wheeler vehicle riders mostly use these. In most cases, this is the only form of protection for riders to protect them from crashes or accidents. Therefore, there needs to be a thorough analysis of helmets. This paper is aimed to research the existing literature and research on the topic and review it as a summarization of the whole.

Keywords: Helmet, Reverse Engineering, Finite Element Analysis, Additive Manufacturing and Review

DENSIFICATION AND MECHANICAL PROPERTIES OF ALUMINIUM ALLOY 2024-FLY ASH WITH METAL MATRIX COMPOSITE PRODUCED THROUGH POWDER METALLURGY

Venkata Kondaiah E[1], K. Harshavardhan Reddy[1], G. Kondaiah[2]

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[2]Department of Mechanical Engineering, Pace Institute of Technology and Sciences, Ongole-523272, Andhra Pradesh, India.

Abstract: Aluminum alloys have been widely used in the Automotive and Aerospace industries as they can be heat-treated to enhance the superior properties of strength, workability, thermal, electrical conductivity and corrosion resistance while maintaining low weight. The present work concerns the processing of Al 2024alloy along with fly ash by metal matrix composite. This involves preparation of powders, compaction, sintering. Then these powders were compacted by uniaxial press to form pellets. Sintering was carried out at temperature between 480^0C to 570^0C. It is observed that there is improvement in the mechanical properties such as hardness, compressive strength, yield strength, ductility and fracture toughness due to the finer microstructure and less segregation than ingot metallurgy route.

Keywords: Aluminum alloys, Automotive, Aerospace industries and Al 2024 alloy

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RAILWAY WHEEL CONDITION DIAGNOSES WITH THE ASSISTANCE OFANFIS TECHNIQUE

Kota Venkatswaralu

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Abstract: Prominent purpose is to design AI (Artificial Intelligence) under predicting model for diagnosis conditions of railway wheel demonstrates how AI technique proves as a valuable alternative for remaining methods under sophisticated mathematical models during this can be applicable on problem of wheel-rail contact force measurement. This intention originates in obstacles such as identifying conditions on rail wheel that computes complex as well as consumes time. Such urge is integrating AI methods for predicting conditions of railway wheel to overcome the obstacles. The database holds attributes of input such as train velocity, vibration level and frequency, conversely condition of wheel into output attributes. Eventually, such database uses to ANFIS (Adaptive Neuro-Fuzzy Inference System) for identifying the conditions of railway wheel. Here, diagnosis conditions of railway wheel can be categorized into Dangerous (D), Low Damaged (LD), Faulty (F) and Good (G). Such investigation evidently done on manual computation AI methods can be proficient for predicting conditions of railway wheel during less computational time. Above contest methods, ANFIS shows superior predicting performance of 96.5% accuracy for diagnosing conditions of railway wheel consequent preventive maintenance requirement.

Keywords: Artificial Neural Network (ANN); Adaptive Neuro-Fuzzy Inference System (ANFIS); railway wheel conditions.

DEVELOPING PROGRAM CODE FOR AUTOMATIC COLOR CODE SENSING PUNCHING MACHINE USING WPL SOFTWARE

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[2]Assistant Professor, Department of Mechanical Engineering, Eswar College of Engineering, Narasaraopet.

[3]Assistant Professor, Department of Mechanical Engineering, Pace institute of Technology and Sciences, Ongole-523272, Andhra Pradesh, India.

Abstract: This paper presents the idea of developing a logic or program code for an Automatic Color code sensing and punching machine which is driven based on Pneumatic architecture and can be used at the packing section in industries where the end user can punch labels on the objects which are moving on the conveyor based on their color. The program code basically controls the Pneumatic valves present in the system which actuates the Cylinders and helps in clamping and de clamping of moving objects and henceforth achieving the label at required spot, whereas the desired color is acquired from the dedicated color sensor which helps in deciding the labeling process. This paper uses the advanced industrial controller (PLC) software called WPL Soft which is the most widely used tool in industries. This software requires a dedicated programming language called Ladder diagram, which is the 80%

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preferred programming language worldwide for programming PLCs. A program has been developed for automatically creating the application for color sensing and punching label on the desired objects based on color.

MODELING, AERODYNAMIC AND CRASH SIMULATION ON CAR USING FLUIENT

Shaik. Chand Mabhu Subhani[1], D.V. Rao[2], N. Vijay Kumar[3] and M. Guna Sekhar[4,*]

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Abstract: The aerodynamic and crash analysis on car with of material Al 6061 & AISI 4130 with wall and vehicle is considered The given model is tested under frontal collision conditions and the resultant deformation and stresses are determined with respect to a time of 80 Mille sec for ramp loading using ANSYS software. The crash analysis simulation and results can be used to assess both the crashworthiness of current frame and to investigate ways to improve the design. This type of simulation is an integral part of the design cycle and can reduce the need for costly destructive testing program.

Keywords: CAD, CFD, Pro-E, ANSYS, Drag Coefficient, Drag Force, Aerodynamic, ANSYS and Fluent.

TO STUDY THE MECHANICAL PROPERTIES OF SLAG AND FLY ASH REINFORCED AA 2024 COMPOSITES

D.V. Rao[1], Shaik. Chand Mabhu Subhani[2], M.V. Balram[3], Ch. Naveen Kumar[4*]

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Abstract: Metal Matrix Composites (MMCs) possess significantly improved properties compared to unreinforced alloys. There has been an increasing interest in composites containing low density and low cost reinforcements. In view of the generation of large quantities of solid waste by products like fly ash and slags, the present study is discarded; new methods for treating and using these solid wastes are required. Hence, composites with fly ash and Granulated blast furnace slag as reinforcements are likely to overcome the cost barrier for wide spread applications in automotive and small engine applications. In the present investigation, AA 2024 alloy – 5 wt.% fly ash and slag composites separately were made by stir casting route. Phase identification and structural characterization were carried out on fly ash and GBF slag by X-ray diffraction studies. The hardness and compression tests were carried out on all

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these alloy and composites. The reinforcement Improved hardness and mechanical properties were observed for both the composites compared to alloy; this increase is higher for AA2024-Fly ash composite than AA2024- Granulated blast furnace slag composite.

Key words: Aluminum Alloys, MMCs, Fly Ash, Slag and Stir casting.

INTERVENTION AND FABRICATION OF SOLAR POWER WEEDER

K. Chiranjeevi[1], Dr. G. Kondaiah[1] and Dr. J. Hussain[1]

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Abstract: Weed control in crops is major problem in India. Generally Indian farmer use traditional way for doing fieldwork that is weeding is done by bulls or workers with the help of khurpa. This method is useful but it is very demanding of labour. To overcome this problem we introducing an alternative solution that is "solar power weeder". This solar power weeder will remove grass between two rows and also do the cultivation. We will use rotary blades for doing weeding as well as cultivation which is operated by the solar power. With the help of this machine we are trying to reduce human efforts with less maintenance cost. The weeder driven by man to move in forward direction and the blade is attached at front end is placed at the roots of weeds, once blades get rotated then they starts cutting the weed, like this the complete land of cultivation is made as weed free. Main purpose of this machine is reducing labour cost by reducing the number of labours with optimal time consumption. This paper work is executed with an idea to achieve an effective solution to the weed control. The designed equipment is safe to use and ecofriendly. Single operator can operate this machine to weed out the plants. Labor requirement and fuel charges are greatly reduced by this weeder. Today in the world fuel prices rises day by day and the pollution may also. To control this pollution and to save the petroleum product and bio product this project is designed. This system requires heavy initial investment but it gives the energy output for life time with low maintenance cost.

Keywords: Solar Energy, Weeder, Transformers, Rectifiers & IC DB 107, Resistor and Rotary Blades etc.

FABRICATION AND INVESTIGATION ON BASALT FIBER AND JUTE FIBER REINFORCED HYBRID COMPOSITES

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Abstract: Composite materials are judicious combination of two or more materials that produce a synergistic effect. A material system composed of two or more physically distinct phase whose combination produces aggregate properties that are different from those of its constituents. The purpose of the fiber is to impart strength to the product and the matrix bins the filaments together, and protects the fibers from environmental damage. Composites as a class of materials are stronger and stiffer on a weight to weight basis than any other conventional engineering material. We use in our daily life. In addition, there are other very interesting possibilities of aligning the orientation of fiber along the load direction in the component and varying the

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volume proportion of fiber and resin, which provide further scope for weight reduction. The present experimental study aims to fabricate the hybrid natural fiber composites. Samples of several jute Basalt fiber, Polyester hybrids natural fibers will be manufactured using hand layup method where the stacking of plies was alternate and the weight fraction fiber matrix are at different percentages. The void content of composites increases with increase in both the fiber loading and fiber length. As far as the effect of fiber loading is concerned composites with 25wt% fiber loading shows better hardness value as per the tests conducted. The maximum tensile strength can be observed for 25wt% of fiber. Tensile modulus is good for average weight percentage of fiber loading i.e., 25wt% other than 25% tensile strength is decreases.

Keywords: Basalt Fiber, Jute Fiber, Epoxy Resin LY556, Hardener HY591, Tensile test, Hand lay-up technique, flexural test , Density testing, Impact testing and Flexural testing etc.

PERFORMANCE, EMISSION & COMBUSTION CHARACTERISTICS OF I.C ENGINE USING JATROPHA METHYI ESTER OIL AND BIO-DIESEL BLENDS

A. Sai Prasad[1], K. Venkateswarulu[1], N. Vijay Kumar[1] and Dr. V. Venugopal[1]

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Abstract: Petroleum based fuels play a vital role in rapid depletion of conventional energy sources. Along with their increasing demands, these are also major contributors of air pollution which is contributing to greenhouse effect and consequently to ozone layer depletion. Major portion of today's energy demand in India is being met with fossil fuels. Hence, it is high time that alternative fuels for engines should be derived from different indigenous sources. As India is an agricultural country, there is a wide scope for the production of vegetable oils (both edible and non-edible) from different oil seeds. This paper is based on recommending an alternate fuel for diesel engines. Expectations have been high for the production of biodiesel from the Jatropha oil-crop. Jatropha is promoted as a drought and pest resistant crop, with the potential to grow on degraded soils with a low amount of inputs. These characteristics encourage hope for positive environmental and socio-economic impacts from Jatropha biodiesel. These studies reveal that the diesel-biodiesel blends can be used as alternative fuels for diesel engines. Recent research has shown that the use of diesel biodiesel blends can substantially reduce emissions of CO, total hydrocarbons (HC) and particulate materials. The mixing of biodiesel with diesel significantly reduces the emission particulate matter (PM) because the blended biodiesel contains oxygen. From various tests it was suggested that some alternative fuels which are friendly to atmosphere. Therefore in the present study the selected biodiesel is **jatropha** seed oil which was obtained by Trans-esterification process by crude seed oil, because the large availability and easily extract from seed by different process.

Keywords: Biodiesel, Bio fuels, Blending Jatropha, Renewable energy, CO, HC,PM and Trans-esterification etc..

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EXPERIMENTAL INVESTIGATION ON STATIC MECHANICAL BEHAVIOR OF HEMP & PALMYRA FRUIT FIBER REINFORCED POLYMER MATRIX HYBRID COMPOSITES

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Abstract: Composites as the class of materials are stronger and stiffer than any other conventional materials which we are using in our daily life. This gives rise and interesting possibilities of reduction in mass of carrying parts. In addition, there are other very interesting possibilities of aligning orientation of fiber along load direction in the component and varying the volume proportion of fiber and resin, which provide further scope for weight reduction. In this paper, three work pieces of composite material are made up with hemp and palmyra fruit fiber by taking different volume proportions. And then some of the static mechanical tests are performed and found their tensile strength, flexural strength, impact strength, hardness and density. It has been noticed that the various properties of the composites are greatly influenced by the fiber loading and fiber length. The void content of composites increases with increase in both the fiber loading and fiber length. The micro-hardness value increases with increase in fiber length. As far as the effect of fiber loading is concerned composites with 5wt% fiber loading shows better hardness value as compared to 10wt% irrespective of fiber length except for 20 mm length. A gradually increase in tensile and flexural strength can be observed with the increase in the fiber length up to 15 mm of composites. However, further increase in fiber length i.e. 20 mm there is a decrease in the strength properties. It can be observed that with the increase in fiber length, the tensile modulus increases irrespective of fiber loading.

Keywords: Hemp and Palmyra fruit fiber, micro-hardness, tensile and flexural strength etc.

THERMAL AND STRUCTURAL ANALYSIS OF A GAS TURBINE BLADE

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Abstract: This equipment is a type of agricultural power weeder operated with the utilization of solar power. The drive mechanism of this machine includes one solar panel, one electrical dc motor, one battery, rotary blades with weeding mechanism. One electrical dc motor is connected to the rotary blades of the machine with the help of gear rod. These mechanisms transmit the power from the motor to the shafts of the wheels and weeder blades. In this machine rotary blades are used. This shape of blades mainly used for tilling hard soils such as dry lands. These rotary blades are attached to the rear end at the roots of weeds and are driven by the electric dc motor. The DC motor is connected to the battery individually in series. Battery is connected to the solar panel. The solar radiation immersed on solar panel. By this process the generated solar energy is converted into electrical energy. This energy is stored in battery. This stored energy is supplied to the dc motor when they needed through which the wheels and weeder blades are rotated. The motor speed is varied by altering the operated voltage output through the speed controller.

Keywords: Gas Turbine Blade, ANSYS software, Inconel 718, Titanium T6, CATIA, Forging and Casting etc.

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SYNTHESIS OF AA6061-SiC POWDER-METALLURGY COMPOSITE MATERIAL

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Abstract: Composite materials are combination of two or more materials that produce a New Engineered Materials. A material composed of two or more physically distinct phase whose combination produces aggregate properties that are different from those of its constituents. Metal matrix composites (MMC's) possess significantly improved properties including high specific strength; specific modulus, damping capacity and good wear resistance compared to unreinforced alloys. There has been an increasing interest in composites containing low density and low cost reinforcements. Hence, composites with SiC as reinforcement are likely to overcome the cost barrier for wide spread applications in automotive and engine applications. It is therefore expected that the incorporation of SiC particles in aluminium alloy will promote yet another use of this low-cost by-product and, at the same time, has the potential for conserving energy intensive aluminium and thereby, reducing the cost of aluminium products. Here we are blending two different metal powders properly and Compacting was done at 100-150 KN and then Sintering of Compacted specimen at 495-5000C to form solid and then finally study of SEM and Hardness tests was conducting on the specimen. While MMC's have been widely used in the aerospace and automobile industry, Composites as a class of materials are stronger and stiffer on a weight-to-weight basis than any other conventional engineering material. We use in our daily life. This gives rise to an interesting possibility of reduction in mass of carrying in mass of load carrying parts.

Keywords: Powder-Metallurgy, Sintering, Hardness, Scanning Electron Microscopy (SEM), Aluminium Power.

DESIGN AND MICROSTRUCTURE ANALYSIS OF TIG WELDING WITH TWO DIS-SIMILAR MATERIALS

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Abstract: In this paper, the effect of post weld heat treatment on the microstructure and mechanical properties of dissimilar weldments of Al6061 and EN8, was investigated. The survey of micro hardness profile in the as-welded samples showed fluctuations across the weld zone and a minimum in the hardness occurred in the heat affected zone (HAZ) of alloy 6061. In our present study we are conducting micro structural analysis and analyzing the mechanical properties of weld joints by using the TIG welding process in 60Amps, 70Amps, 80 Amps. These findings were done by using optical

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microscopy and scanning electron microscopy in different sectional areas like pin affected zone, shoulder affected zone, and swirling zone within the SZ and in this work mainly describes the effect of filler material on weld quality, strength and hardness of the joint. The optical microscope approach for the weldments of 200 µm. TIG welding were carried out among the two different materials aluminum - Al6061 and EN8 and concluded that the ultimate tensile strength of all three samples are different for , 60, 70 and 80Amps and sample -1 at 60 amps of UTS result is better as compared to the other two samples.

Keywords: TIG Welding, Al6061, EN8 and Optical microscope etc.

PERFORMANCE AND EMISSION EVALUATION OF VARYING COMPRESSION RATIO IN A DIESEL ENGINE FUELED WITH B20 BLEND OF SEA MANGO BIODIESEL

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ABSTRACT: Biodiesel is renewable and clean burning fuel that is made from waste vegetable oils, animal fats, or recycled restaurant grease for use in diesel vehicles. Biodiesel produces fewer toxic pollutants and greenhouse gases than petroleum diesel. It can be used in pure form (B100) or can be blended with Petro-diesel in the form of B2 (2% biodiesel, 98% petroleum diesel), B5 (5% biodiesel, 95% petroleum diesel), B20 (20% biodiesel, 80% petroleum diesel) and B100 (pure biodiesel.VCR engine running with B20 blend of sea mango biodiesel at different CRs of 16:1, 17:1 and 18:1. The test results of the B20 blend were then compared to that of diesel, which was operated at standard CR (17:1). At standard CR, the BTE of the B20 blend was almost identical to diesel. Though, the BTE of the B20 blend was lower at CR 16:1 and 17:1 than diesel, at CR 18:1, the BTE of the blend improved by 5.12%. The SFC and EGT improved with higher CRs. At CR 16:1 and 17:1, the blend's SFC and EGT values were found to be greater than diesel. However, at CR 18:1, the SFC and EGT of the blend were reduced by 6.6% and 3.01%, respectively, when compared to diesel.

Keywords: Single Cylinder-4S VCR Diesel Engine, Eddy current dynamometer, BTE, CR, SFC and EGT

DESIGN AND ANALYSIS OF GEARLESS TRANSMISSION USING ELBOW MECHANISM

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Abstract: Todays world requires speed on each and every field. Hence rapidness and quick working is the most important. Now days for achieving rapidness, various machines and equipment are manufactured by man. This transmission system is to be analyzed in solid works software to study reaction of elbow rods and hub and then the fabrication of mechanism is carried out. The ANSYS analysis of the hubs is being

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presented in this paper. The project GEARLESS TRANSMISSION is being compact and portable equipment, which is skillful and is having something precise in transmitting power at right angle without any gears being manufactured. about the Strength, Speed, Torque Transmissibility of Elbow mechanism as this are very much important terms in defining applications of the mechanism in replacement of gears. It mainly focused on the theoretical, analytical and FEA method. Computation of various parameters like Number of pins, Material used, Dimensional difference of elements, Speed, Torque. Many previous approaches were made to find out the optimum design in order to make this mechanism better then old mechanism by using different analysis software. It consist Theoretical & Analytical method for the design of elbow mechanism.

Key words: Transmission System, Gearless Transmission, Elbow Mechanism, CATIA V5, ANSYS

FLOATING WINDMILLS

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Abstract: A floating wind turbine system with a tower structure that includes at least one stability arm extending there from and that is anchored to the sea floor with a rotatable position retention device that facilitates deep water installations. Variable buoyancy for the wind turbine system is provided by buoyancy chambers that are integral to the tower itself as well as the stability arm. Pumps are included for adjusting the buoyancy as an aid in system transport, installation, repair and removal. The wind turbine rotor is located downwind of the tower structure to allow the wind turbine to follow the wind direction without an active yaw drive system. The support tower and stability arm structure is designed to balance tension in the tether with buoyancy, gravity and wind forces in such a way that the top of the support tower leans downwind, providing a large clearance between the support tower and the rotor blade tips. This large clearance facilitates the use of articulated rotor hubs to reduced damaging structural dynamic loads. Major components of the turbine can be assembled at the shore and transported to an offshore installation site.

Keywords: Wind Turbine, Pumps, Rotor Blade Tips and Offshore Installation etc.

PRODUCTON OF EPS PATTERN AND MOULD FOR COAL LIFFTING BUCKET IN FULL MOULD GREEN SAND CASTNG TECHNOLOGY

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Abstract: The EPS Pattern made and moulding done in full mould casting process for the coal lifting bucket grey iron cast component. As these cast components required in mass production this is economically produced work in limited to Expanded Poly Styrene (EPS) pattern making and mould making only.

The EPS coal lifting bucket for grey iron castings are made by using hot wire cutting machine manually. The

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required coal lifting bucket geometry and gauges are made are made from the layout and from that the cutting of EPS materials is done. After cutting the profiles, fevicol is used to glue the members to the required. Advantage is 30% cost saved directly and indirectly in full mould casting process compared to conventional Sand-Casting process.

Keywords: Sand casting, Expanded Poly Styrene (EPS) and Grey iron cast etc..

EXPANDABLE POLY STYRENE (EPS) PATTERN & MOULD MAKING FOR BOILER NOSE LEG

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Abstract: In this paper preparing nose leg components which are used to hold the shaft of power plant boiler. For this, pattern is made up with an expandable poly styrene (EPS) prepared for making a mould. After making the EPS pattern, the pattern is painted with FOSECO paint (factory coating) and dried for better quality of mould which will give good surface finish for the final casted object. In this full moulding with green sands are used to complete the casting process material is use as cast iron and melted properly in furnace .Once the mould is ready then the molten is poured in to this to get the casting product. Finally allow for solidification and do machining to get the final casting object.

Key words: Casting, Green Sand Mould, Expandable Polystyrene (EPS) & Power Plant Boiler.

DESIGN AND DEVELOPMENT OF ELECTRO MECHANICAL LIFTING JACK

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Abstract: Power screws are wont to convert motility into translatory motion. A mechanical jack is an example of an influence screw within which a tiny low force applied during a horizontal plane is employed to boost or lower an oversized load. The advantage of a mechanical jack is that the ratio of the load applied to the hassle applied. The peak of the jack is adjusted by turning a lead screw and this adjustment is done either manually or by integrating an electrical motor. The planning and modification of quick lifting jackscrew with gear arrangements that are safe, reliable and capable of raising or lowering heavy load with little effort. This mechanism consists Lead screw, Bearing, Lead screw nut and assembly, Lead screw driving mechanism, Motor, structure, Lead screw selection. So, during this research paper we design and analyse the lead screw against eccentric load the designed motorized jack will save time and requires less human energy to control. Generally, jacks undergo buckling once they reach maximum load conditions (as per the tests conducted by consumer affairs). For this reason, we've got to develop the system which might use toggle jack which is automatic operating using motor. Vehicle's batteries are often used as a source of

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power for this motor. The current study provides automated and simplified levelling system to help the levelling of the vehicle simultaneously reducing the manual involvement & effort.

Key words: Power screws, Lead Screw, D.C Motor, Gear Ratio & Torque

CNC PROGRAM & PROGRAMMING OF CNC MACHINE

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Abstract: A programming to make parts are CNC Programming (Computer Numerical Control Programming) for machines. An NC program consists of a sequence of instructions that control the motion and automatic sequences of an NC Machine to perform a particular processing task. In a general sense, the term NC programming refers to the creation of control data for machining workpieces on NC and CNC machines. NC programming has a decisive influence on the cost-effectiveness and profitability of NC manufacturing. The selection of a programming system is mostly guided by the need for software that is suitable for the application at hand, readily available, and as universally applicable as possible.

Key words: CNC Machine, CNC Program and Manufacturing System etc…

DESIGN, ANALYSIS AND WORKING OF POWER STEERING SYSTEM

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Abstract: A power steering is a mechanical device equipped on a motor vehicle that helps drivers steer the vehicle by reducing steering effort needed to turn the steering wheel, making it easier for the vehicle to turn or makeover at lower speeds. Hydraulic or electric actuators add controlled energy to the steering mechanism, so the driver can provide less effort to turn the steered wheels when driving at typical speeds, and reduce considerably the physical effort necessary to turn the wheels when a vehicle is stopped or moving slowly. Power steering can also be engineered to provide some artificial feedback of forces acting on the steered wheels. Hydraulic power steering systems for cars augment steering effort via an actuator, a hydraulic cylinder that is part of a servo system. These systems have a direct mechanical connection between the steering wheel and the linkage that steers the wheels. This means that power-steering system failure (to augment effort) still permits the vehicle to be steered using manual effort alone. Electric power steering systems use electric motors to provide the assistance instead of hydraulic systems. As with hydraulic types, power to the actuator (motor, in this case) is controlled by the rest of the power steering system. Other power steering systems (such as those in the largest off-road construction vehicles) have no direct mechanical connection to the steering linkage; they require electrical power. Systems of this kind, with no mechanical connection, are sometimes called "drive by wire" or "steer by wire", by analogy with aviation's "fly-by-wire". In this context, "wire" refers to electrical cables that carry power and data, not thin wire

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rope mechanical control cables.

Keywords: power steering, electric actuators , Electric power, hydraulic systems

DESIGN A NON-ELECTRIC REFRIGERATOR USING ECO-FRIENDLY REFRIGERANT MATERIALS

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Abstract: In this study, we describe the design, construction and the performance of an eco-friendly non-electric refrigerator. The refrigerator is made up of stainless steel (SS) chambers, drawers, four different types of insulation materials, refrigerant materials, gaskets, screws, sensors etc. The refrigerant material used herein was the mixture of table salt and ice with an optimum ratio of 1:2. The refrigerant materials were preserved in a stainless steel (SS) chamber of optimal dimension covered by four successive layers of insulation materials. A refrigeration time of about fifty three hours of the preliminary designed refrigerator was attained. The microbiological effects of freezing mixture on foods and food stuffs preserved into the refrigerator have also been studied. The performance of the preliminary setup is found to be promising for developing non-electric low cost refrigerator considering the raw materials used, easy fabrication procedure, temperature control mechanism and health issues. However, further studies are needed for realization of an environmental friendly novel green refrigerator powered by chemical energy from very low cost freezing mixture.

Keywords: Refrigerator, Refrigerant, Insulation materials, Gaskets and Sensors etc.

REVIEW ON CASTING DEFECTS AND METHODOLOGIES FOR QUALITY IMPROVEMENT

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Abstract: In the current scenario of globalization, foundry industries of India play a key role as they are the major source of casting producer. Manufacturing sectors plays a crucial role and contributes major parts in GDP and countries economic growth. Casting is most promising process to produce complex geometries with intricate details but defect free casting poses a serious threat in its development as compared to other manufacturing practices. Even the process with the controlled environment and skill workers, defects are induced during process which leads to rejection and increases cost of overall production. Therefore, the aim of this research paper is to review the existing research progress in the field of foundry industries and explore the major causes of casting defects and methodologies being adopted by practitioners in foundry industries to develop defect free casting to mitigate the adverse effect on overall cost of product.

Keywords: Defect free casting, strategies for defect free casting, casting defects.

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THRUST VECTORING

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Abstract: Thrust vectoring is the ability of an aircraft or other vehicle to deflect the angle of thrust away from the vehicles longitudinal axis. The concept of thrust vectoring is not a new one. The Germans used graphic control vanes in the exhaust stream of their V-2 ballistic missile in ww2 for directional control. Thrust vectoring in aircraft is a new practice and a concept came under widespread consideration during the cold war. There are several methods employed to produce thrust vectoring. Most current production aircraft with thrust vectoring use turbofan engines with rotating nozzles or turning vanes to deflect the exhaust stream. This method can deflect thrust to as much as 90 degrees providing a vertical takeoff and landing capability. However for vertical thrust the engine has to be more powerful to overcome the weight of the aircraft, this means the aircraft requires a bigger heavier engine. As a result of the increased overall weight of the aircraft the manoeuvrability and agility are reduced in normal horizontal flight. Another method to produce thrust vectoring is through fluidic thrust vector control. This is achieved using a static nozzle and a secondary flow between the primary jet and the nozzle. This method is desirable for its lower weight, mechanical simplicity and lower radar cross section.

Key words: Thrust vectoring, V-2 ballistic missile (ww2), Nozzles and Radar

ALGORITHMIC TRADING BOT

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Abstract: Algorithmic trading uses algorithms that follow a trend and defined set of instructions to perform a trade. The trade can generate revenue at an inhuman and enhanced speed and frequency. The characterized sets of trading guidelines that are passed on to the program are reliant upon timing, value, amount, or any mathematical model. Aside from profitable openings for the trader, algo-trading renders the market more liquid and trading more precise by precluding the effect of human feelings on trading. Our project aims to further this revolution in the markets of tomorrow by providing an effective and efficient solution to overcome the drawbacks faced due to manual trading by building an Algorithmic Trading Bot which will automatically trade user strategies alongside its own algorithms for day-to-day trading based on different market conditions and user approach ,and throughout the course of the day invest and trade with continuous modifications to ensure the best trade turnover for the day while reducing the transaction cost, hence enabling huge profits for concerned users be it Organizations or individuals.

Keywords – Algorithmic Trading, Finance, Random Forest Regressor, Moving Average, Back testing.

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DESIGN AND FABRICATION OF STERLING

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Abstract: Sterling engine is an external combustion engine in which heat energy is applied to the outside of the device. These engines use pistons but the engine itself is sealed to the atmosphere. They can be supplied with heat from a variety of different sources including combustion fuels, waste heat and from solar heat energy. There are a range of different Sterling engine designs but all rely on two pistons for each cylinder or unit. If a Sterling engine is driven mechanically it can act as a refrigerator. A free piston engine is another type of reciprocating engine, one that does not have a crankshaft of any mechanical constraint on the motion of its piston. The engines are often simple and potentially more efficient than crankshaft engines but they are more difficult to engineer and exploit successfully. In the Sterling engine, a gas is heated and expanded by energy supplied from outside the engine's interior space (cylinder). It is then shunted to a different location within the engine, where it is cooled and compressed. A piston (or multiple) move the gas to the correct places within the engine, at the correct time in the cycle, and extract mechanical power from it. The gas oscillates between these heating and cooling spaces, changing temperature and pressure as it goes. A unique feature is the Regenerator, which acts as a temporary heat store by retaining heat within the machine rather than dumping it into the heat sink, thereby increasing its efficiency. The execution of the Sterling cycle requires innovative hardware. That is the main reason the Sterling cycle is not common in practice. Working Principle The system includes two pistons in a cylinder with a regenerator in the middle. Initially the left chamber houses the entire working fluid (a gas) at high pressure and high temperature.

Keywords: Sterling Engine, Sterling Cycle, Refrigerator and solar heat energy.

DESIGN MODEL AND ANALYSIS REPORT ON ELECTIC VEHICLE POWER GRIDS

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Abstract: This is a brief analysis report on the electric vehicle and the charging power grid infrastructure and the EV market in India. Electric vehicles are a relatively recent technology that is seeking for its place in the market. It has several advantages, such as the reduced greenhouse emissions, fuel savings and its ease of use. The increase of the electric vehicles in the roads raises issues about their impact on the grid, in terms of power quality. This paper presents the main considerations about power balance and the impact of an electric vehicle charge in the voltage, current, and total harmonic distortion. An experimental charging station prototype for Modes 2 and 3 is used to acquire data of voltage, current and active and reactive power for different charging profiles and battery state of charge.

Keywords: Electric Vehicles, Electric Drive Technology, EV Controller, PHEV, MSME and Range.

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A REVIEW ON EFFECT OF HEAT TREATMENT PROCESS ON MECHANICAL PROPERTIES

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Abstract: The properties of steel depend on composition and structure. Structure of steel and properties can be changed by heat treatment. In heat treatment process there are different types of process by using that process we can get required mechanical properties. Such processes are 1.annealing 2.normalising 3.hardening 4.tempering 5.surface hardening. Annealing process is used to soften the material and normalizing process is used to refine the structure of material and hardening process is used to increase the hardness and tempering is used to eliminate brittleness in hardened material and surface hardening is used to provide resistance surface with tough core. We can improve mechanical properties like Ductility and hardness and toughness ex. by using above heat treatment process we can get required mechanical properties.

Key Words: Annealing, Normalizing, Hardening**,** Tempering and Surface hardening

FABRICATION OF MINI ROCKET BOOSTER

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Abstract: Water rocket activities are one of the most popular STEM activities used in engineering, though engineering is heavily implied in the STEM acronym. This study investigated the amount of engineering present in water rocket activities, and options for emphasizing engineering more in water rocket activities using an open-platform flight simulator for use by educators to enable students to predict flight parameters of a water rocket they designed, and test those predictions against experimental data. The simulator was constructed in Excel with many functions, but the function validated in this study was the prediction of maximum height. The simulator was able to predict maximum height of a water rocket at specific input parameters within 5.773% with 95% confidence using a calibration factor to account for unknown sources of error. Further validation of the simulator at other input parameters is needed to ensure the calibration factor enables the accurate prediction of maximum height with varied input parameters, as is common occurrence in STEM water rocket activities.

Key Words: Water rocket, STEM, Excel and Simulator.

NON DESTRUCTIVE TESTING OF MATERIALS

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Abstract: Non-destructive Testing (NDT) is a method of testing metals without any destruction and finding the fault in metals .It is also called as non-destructive inspection (NPI).Non-destructive testing is a different kind of tests which are used to learn about the physical properties of specimens. There are 8 ways of Testing the metals .The methods are Visual Inspection, Microscopy, Radiography, Dye penetrate, Ultrasonic, Magnetic Particle, Eddy Current and Acoustic Emission. The most useful of them must be chosen to specimen that will be investigated.

Keywords: Non Destructive Testing, Radiography, Visual Inspection and Dye Penetration etc..

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SOLAR COOLING

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Abstract: Solar cooling refers to any cooling system that uses solar power. This can be done through passive solar, solar thermal energy conversion and photovoltaic conversion (Sun to Electricity). The U.S. Energy Independence and Security Act of 2007 created 2008 through 2012 funding for a new solar air conditioning research and development program, which should develop and demonstrate multiple new technology innovations and mass production economies of scale. Solar air conditioning will play an increasing role in zero energy and energy-plus buildings design. Solar energy, radiant light and heat from the sun, has been harnessed by humans since ancient times using a range of ever-evolving technologies. Solar radiation, along with secondary solar-powered resources such as wind and wave powers, hydroelectricity and biomass, account for most of the available renewable energy on earth. Only a minuscule fraction of the available solar energy is used. Solar powered electrical generation relies on heat engines and photovoltaic. Solar energy's uses are limited only by human ingenuity. A partial list of solar applications includes space heating and cooling through solar architecture, potable water via distillation and disinfection, day lighting, solar hot water, solar cooking, and high temperature process heat for industrial purposes. To harvest the solar energy, the most common way is to use solar panels. Solar technologies are broadly characterized as either passive solar or active solar depending on the way they capture, convert and distribute solar energy. Active solar techniques include the use of photovoltaic panels and solar thermal collectors to harness the energy. Passive solar techniques include orienting a building to the Sun, selecting materials with favourable thermal mass or light dispersing properties, and designing spaces that naturally circulate air.

Key Words: Solar cooling, Electrical Generation, Solar Hot Water and Solar Cooking.

DEVELOPING PROGRAM CODE FOR AUTOMATIC COLOR CODE SENSING PUNCHING MACHINE USING WPLSOFTWARE

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Abstract: This paper presents the idea of developing a logic or program code for an Automatic Color code sensing and punching machine which is driven based on Pneumatic architecture and can be used at the packing section in industries where the end user can punch labels on the objects which are moving on the conveyor based on their color. The program code basically controls the Pneumatic valves present in the system which actuates the Cylinders and helps in clamping and declamping of moving objects and henceforth achieving the label at required spot, whereas the desired color is acquired from the dedicated

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color sensor which helps in deciding the beling process. This paper uses the advanced industrial controller (PLC) software called WPL Soft which is the most widely used tool in industries. This software requires a dedicated programming language called Ladder diagram, which is the 80%preferred programming language worldwide for programming PLCs. A program has been developed for automatically creating the application for color sensing and punching label on the desired objects based on color.

Keywords: Punching Machine, PLC Software (WPL Soft) and Ladder diagram etc..

INTEGRATING REVERSE ENGINEERING AND 3D PRINTINGTECHNIQUES FOR DIGITAL MANUFACTURING: A REVIEW

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Abstract: Digital manufacturing is a new revolution in the manufacturing industry that employs tools such as reverse engineering, 3d printing, and design optimization techniques such as generative design. This most recent technological advancement can be used to improve our existing designs and products for the best performance and efficiency with the power of computation. Reverse engineering is a technique or approach in which one tries to understand, using deductive reasoning and little to no understanding of how something works, such as how a previously created device, process, system, or piece of software performs a function. It can be used to collect visual data to recreate models of desired objects using 3D scanning methods. 3D printing, is the process of creating a three-dimensional object from a CAD model or digital 3D model. It can be accomplished through various techniques in which material is brought together, frequently layer by layer, and then deposition, joining, or solidification are all controlled by computers. Numerous factors influence the various aspects of the 3D printing process, which in turn affect the mechanical and thermal qualities of the final result, such as Tensile Strength, Flexural Strength, Impact Strength and Wear characteristics. It is possible to tune these variables for various purposes. The study's goal is to review these various advances to optimize a 3D-printed parts using reverse engineering technique in the perspective of digital manufacturing.

Key words: Reverse engineering, 3d printing, digital manufacturing, 3d scanning

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