NCAME 20

II[ND] NATIONAL CONFERENCE

PROCEEDINGS OF

NATIONAL CONFERENCE ON ADVANCES IN MECHANICAL ENGINEERING

DEPARTMENT OF MECHANICAL ENGINEERING

01 AN ALTERNATIVE NANO- FUEL TO DIESEL IN A COMPRESSION IGNITION ENGINE OBTAINED BY PYROLYSIS METHOD FROM WASTE PLASTICS

02 TiC COATING ON ALUMINIUM BY TUNGSTEN INERT GAS (TIG) CLADDING PROCESS

CO-ORDINATORS,

Dr. ABDUL RAHMAN K

Prof. ANU NAIR P

In association with the Institution of Engineers, Kochi Local Centre

Owned and managed by the Malankara Orthodox Syrian Church

MAR BASELIOS CHRISTIAN COLLEGE OF ENGINEERING & TECHNOLOGY

ABOUT THE INSTITUTION

Mar Baselios Christian College of Engineering & Technology, Kuttikkanam, Peermade, is a self-financing institution for professional education, affiliated to Kerala Technological University & Mahatma Gandhi University and approved by All India Council for Technical Education (AICTE), New Delhi. The college is owned and managed by the Malankara Orthodox Syrian Church, which plays a paternal role in the institution's establishment and operations. The institution focuses on offering baccalaureate degree programs in various Engineering streams. In 2001, the college started functioning as a new generation Engineering College. Since its inception in the year 2001, the college has been on a steady path of growth and up-gradation. Our aim is to provide our students with the best possible facilities and the right training. We emphasize on teaching excellence and wholesome learning experience and strive towards making MBC a premier educational institution. With the various batches of students already passed out with flying colours, the college is well on to fulfill its long term objective of being a centre of excellence as far as quality education and student life is concerned. The college has continued its advancement as a centre for learning and public service coupled with excellent university exam results, high profile campus placements and cultural activities. The full time B.Tech enrolment of about 1600 students, the emphasis on teaching excellence, and the increasingly high proportion of students and teaching faculty residing in the campus highlight the personal collegiate atmosphere that makes the MBC Campus quite unique.

The institution is currently offering degree programs

Bachelor Degree Program (Under Graduate Courses)

- Civil Engineering
- Computer Science and Engineering
- Electrical and Electronics Engineering
- Electronics and Communication Engineering
- Mechanical Engineering

Master Degree Program (Post Graduate Courses)

- Computer Science and Engineering
- Communication Engineering

Research Program

- PhD Program in Science and Technology Stream

About the Mechanical Department

The Department of Mechanical Engineering started functioning in 2004, three years after the inception of the college. Currently, the department offers a four year UG program in Mechanical Engineering and is affiliated to APJ Abdul Kalam Technological University. UG program in Mechanical Engineering attracts bright and aspiring students every year and is designed to provide solid foundations for careers in industry, research, and academia. The department has highly qualified, experienced and dynamic faculty members with specialization in Thermal Engineering, Machine Design, Materials Engineering, Advanced Manufacturing, Industrial Engineering and CAD/CAM. The department is equipped with most modern infrastructure and state of art laboratories to undertake high-end teaching, research and developmental activities. The department has well equipped seminar and drawing halls, department library and remarkable computing facilities with the latest software like Pro-E, CATIA, Solidworks etc. The department is vibrant with several activities, both academic and cultural round the year.

Long term goals

- To make a full-fledged Department offering UG, PG and Doctoral programs in all main streams of Mechanical Engineering.

Short term goals

- To improve the infrastructural facilities viz. additional lab buildings, equipment's and software.
- To enhance employability and placement of students.

NCAME-20

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PREFACE

The Second National Conference on Advances in Mechanical Engineering organized by the Department of Mechanical Engineering held at MBCCET, Peermade, Kerala, India on 05th May 2020. This Conference was an important achievement in the history of the Department of Mechanical Engineering and the college.

The objective of the conference was to provide a forum to disseminate the most recent and relevant information and innovations in the field of Mechanical Engineering. About 60 technical papers from all over India and various parts of globe in different domains were received. Out of which 55 papers were selected by a group of technical reviewers for presentation in the conference. Among them, 50 have been registered to take part. After the second review by the technical committee of various journals, the paper which meet their standards will be published in the Scopus indexed listed Journal –Institution of Engineers Springer C series. The cover page of the proceedings highlight the award winning best papers in both M.Tech and B.Tech.

We acknowledge special thanks to our respectable Chief Patron, Director, Trustees of MBCCET, Principal and Bursar of MBCCET for their continuous support and encouragement

Editors of the proceedings wish to thank all the Researchers, Academicians, Industrial Delegates and students for their interest in presenting papers and participating in the Second National Conference on Advance in Mechanical Engineering (NCAME-20). We express our sincere thanks to the Advisory Committee members, Chief Guest, Keynote speakers and session Chairperson for their timely and untiring efforts. We acknowledge our Colleagues of Mechanical Engineering Department, Students and Faculty members of other departments for extending their timely help and support.

Acknowledgement

We express our heartfelt gratitude to all those who provided support, guidance, encouragement, and assistance for organizing the Second National Conference on Advances in Mechanical Engineering (NCAME 20), successfully. We extend our sincere thanks to the President of our institution, H. H Baselios Marthoma Paulose II for his support, guidance and blessings. We are grateful to Rev. Fr. Gigi P Abraham, Director and Patron of the conference, for his accessibility and guidance from time to time and also for providing all the facilities for organizing the conference. We whole heatedly thank our Principal Dr. Pradeep C for his constant support. We are grateful to our Bursar Mr. K.A. Abraham for inspiring us. We sincerely thank Dr. Roja Abraham Raju, HoD of Mechanical Department for his valuable suggestions and encouragement.

It's time for us to express our most sincere and heartfelt thanks to the renowned professional body, INSTITUTION OF ENGINEERS INDIA (IEI), the main and to be lifelong associate of our conference "NCAME" who with their help and support has encouraged us to conduct the conference. A special thanks is in order for the Kochi chapter of IEI who were in constant contact with us in all the phases of the conference. We thank Er. V. Vijayachandran MIE, National Council Member and Director, Centre for Professional and Academic Development CPad, IEI Kochi, Er. T. P. Raveendran FIE, Chairman, IEI Kochi, and Er. M. P. ELDHOSE MIE, Hon. Secretary, IEI Kochi for their very valuable support in the conduct of the programme.

We express our profound gratitude to the Key note speaker Mr. Edin Michael, Research Associate, IIT Hyderabad, Reviewers, Technical chair persons, Expert of panel discussion, who have shared their knowledge with the participants. We would like to express our special thanks to the whole members of our advisory committee for their valuable suggestions throughout the conference. We also thank all the participants who presented their papers and involved in active discussions held during the conference.

We wish to place on record our thanks to Deans of the institution, Heads of various Departments, and student advisor for their support. Last but not the least we express our sincere acknowledgement to the faculty members of the Mechanical Department for assisting us in various sub-committees in organizing the conference successfully.

We finally thank all those who directly or indirectly contributed to the success of the programme.

Dr. Abdul Rahman K, Prof. Anu Nair P

Coordinator (s)

NCAME 20

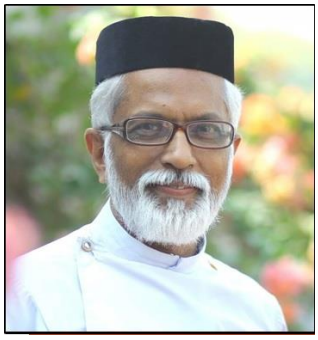
MESSAGE

It gives us immense joy to note that the Department of Mechanical Engineering of our Mar Baselios Christian College of Engineering and Technology is organizing a National Conference on Advances in Mechanical Engineering (NCAME19) on 05th May 2020. The conference will undoubtedly provide an excellent platform for interaction among industries, researchers, academia and students to collectively reflect upon the ways and means for meeting the challenges raised by 21st century and to share their views and experiences. We are happy that there are deliberations on the upcoming trends in the field of Mechanical Engineering and its applications in industries as part of this Conference.

Let this noble endeavor help you to pave way for furthering the "Make in India" movement in which skill set development plays a pivotal role. May this programme be a grand success.

God bless you.

Baselios Marthoma Paulose II
President
MBCCET, Peermade



MESSAGE

It gives me immense pleasure that the Department of Mechanical engineering of Mar Baselios Christian college of Engineering and Technology is organizing a National Conference on Advances in Mechanical Engineering (NCAME20) on 05th May 2020. Incipiently, I congratulate the coordinators and all the members of the organizing committee for organizing such a great conference in our college.

Mechanical engineers can be at the forefront of emerging technologies for environmental remediation, farming and food production, housing, transportation, safety security, healthcare, and water resources. They can create possible solution around the globe. This necessitates new knowledge and skill to implement systems engineering approaches across the multi-scale systems. The Scientists, Engineers, Academicians, and Research scholars will assemble on a common platform to exchange their ideas and experiences, and later enumerate the research finding in the field of mechanical engineering, as these are critical technologies that serve people.

I am assured that this one day conference will provide the organizers and experts to identify the upcoming trends in the field of Mechanical Engineering

I wish the programme a grand success.

Fr.Gigi P Abraham
Director
MBCCET, Peermade

MESSAGE

Science and technology development has contributed to the socio-economic development of Kerala during the past several decades. Science education has an important role to play in the all-round cultural and societal development of a civilized society. Engineering Education is the foundation for scientific and technological advancements and nurturing young talents to use their knowledge for the benefit of society. In this knowledge economy, innovation and ideas are the key drivers and is expected to come out from engineering college and from similar other technical institutions. Kerala has a rich legacy of Science & Technology where new ideas, innovations, inventions and technological development attracted the world attention. The focal theme selected is “Advances in Mechanical Engineering” and is very relevant in this context. I sincerely hope that the presentations and plenary sessions would benefit the research community by way of new knowledge, innovations and also should be capable of re-moulding the system to inculcate scientific temper among students. While congratulating the organisers in bringing out Proceedings, I wish all success and bright future to all the delegates and participants. I also take this opportunity to congratulate staff members of Department of Mechanical Engineering in hosting these events.

Dr.Pradeep C
Principal
MBCCET, Peermade

MESSAGE

I am immensely pleased to know that the Department of Mechanical Engineering, MBCCET, Peermade is organizing the Second National Conference on Advances in Mechanical Engineering (NCAME 2020) on 05th May 2020.

I have come to know that the objective of this conference is to enrich and strengthen the knowledge in the field of Mechanical Engineering through research findings and input of the knowledge of the experts and I fully endorse this noble objective.

Engineers and Scientists works for the betterment of society. Mechanical Engineers contribute immensely to the well-being of the society by creating wealth and employment in abundance and affluence. I am sure that the National Conference will provide a forum for all committed teachers, technocrats, and researchers to discuss the advancements in the area of Mechanical Field.

Mr.K. A. Abraham
Bursar
MBCCET, Peermade

Separation stress analysis of bottom up stereolithography process based on cohesive zone modeling

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Abstract: Stereolithography being the first developed additive manufacturing technology is still widely used in the industry for polymer based applications due to its high accuracy and surface finish. The process is divided into two, namely top down approach and bottom up approach. The bottom up approach is the most widely used technique in stereolithography process since it has better vertical resolution and material filling rate. But during the pulling up process, significant stress is developed on the cured layer due to attachment force generated between the cured part and the coating material which can cause damages to the part. In this work, the pulling up process is modeled using ABAQUS by using the cohesive zone modeling technique and studied how the maximum stress developed on the cured part vary with the velocity of pulling, thickness of the coating material and the material of the coating. Minitab software is used for capturing and analyzing the variation of maximum stress developed with the depending parameters. The minimum stress value of 0.165 N/m^2 is obtained using PDMS coating material at velocity 0.2 mm/s and thickness 1 mm.

Keywords: *Bottom up approach, Cohesive zone modeling, Separation stress, Stereolithography,*

VRF Refrigeration

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Abstract: Refrigerators had been integral part of our human life. Refrigerators are used for house hold, commercial, industrial and food preservation applications. We use different refrigerators for different applications. Refrigerators especially in commercial sector use different refrigerators for different temperature applications, which occupies higher floor space, which also increases electrical consumption. So there is a need of refrigerator that can store food products at different temperatures at same time. That is it can maintain different food products to their required temperature.

So we are designing a VRF refrigerator which operates multiple evaporator cabins operating at different temperature using single compressor, condenser and multiple expansion valves. Our system works on VCRS cycle, the refrigerant used is HFC R-134a. For proper control of evaporator cabins operating at different conditions, we use individual thermostat which is controlled by respective solenoid valves, such that sufficient compactness is achieved.

Keywords: *HFC, R-134a, VCRS, VRF*.

TiC Coating on Aluminum by Tungsten Inert Gas (TIG) Cladding Process

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Abstract: In recent times aluminium and it's alloys attracted considerable attention for aerospace and automobile industries due to its high strength-to-weight ratio and low specific weight. However, its prolonged use is limited in many industrial applications owing to its poor tribological properties. Titanium carbide (TiC) as a coating material has different applications in industries because of its high electrical and thermal conductivity, high melting temperature, low density, and excellent tribological properties. Surface modification of aluminium by depositing TiC could enhance their tribological properties and thereby enhance its scope of applications. In the present work, hard and wear resistant TiC deposited on aluminium alloy substrate by using tungsten inert gas (TIG) cladding process (an alternative to expensive laser cladding). Effect of TIG current on coating was evaluated using the photographs of the coating developed. Further, dilution of TiC on work-piece surface and mechanical properties evaluated for coating produced at different TIG current conditions. The micro-hardness of the coating was measured using Vickers micro-indentation hardness tester. The average micro-hardness of the coating varies with in the range of 225–292 $HV_{0.5}$ which is 4 to 5 times higher than the uncoated Al alloy substrate (50 $HV_{0.5}$).

Keywords: *TIG cladding, TiC coating, Al alloy, Microstructure, Micro-hardness*

Fan blade angle dimensioning and sorting setup

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Abstract: A ceiling fan works with a simple motor that runs on electricity and rotates the blade attached to it. The blades are designed in a preset fan blade angle setting that pushes the air down during a high speed movement. These angles are important because it defines the air volume that a blade can sweep. Thus blade angle have major contribution on ceiling fan's efficiency and smooth running of fan without creating noise and vibration while pushing the air down. So the main aim of our project is to fabricate a fan blade sorting setup which is efficiently suitable for ceiling fan production industries to verify does the efficiency of each fan they are producing is meeting their standard based on blade angles. This is done in a non-contact manner so angles can be measured without much time during large scale production. Sorting setup is to save time in the production line to separate blades based on angles manually by worker to avoid delay in despatch.

Keywords: *air volume, blade angle, efficiency, vibration*

An Alternative Nano-Fuel to Diesel in a Compression Ignition Engine Obtained By Pyrolysis Method from Waste Plastics

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Abstract: Depletion of conventional fossil fuels, due to their increased consumption, demand for urbanization especially in underdeveloped and developing countries all around the world and the strict emission norms, yearning us to search an alternative fuels for automotive engines. Alongside, a serious challenge give rise to the environment by the plastic waste accumulation in terms of its nondegradability is intimidating the human sustainability. Both these issues can be convey by converting the waste plastics into useful energy using pyrolysis method. This research paper describes the production and comparison of the use of diesel oil and blended plastic pyrolysis oil with diesel at different proportions (10%, 20% and 30%), in the assessment of engine performance such as Brake Thermal Efficiency and Specific Fuel Consumption and emission characteristics such as carbon dioxide, unburned hydrocarbon and nitrogen dioxide are determined at all operating load conditions in a diesel fueled engine, without any engine modifications. It was found that, the diesel blended plastic pyrolysis oil at higher proportion (30%) offers better engine performance and reduced emission characteristics. The prepared, modified fuel was mixed with the mass fraction of 25ppm of cerium oxide nanoparticles, with the help of an ultrasonicator. Then the investigation was carried at diesel engine at constant speed. The nanoparticles in the modified fuel acts as an oxygen contributing medium, which influence the air-fuel ratio. Though the experimental results shows notable improvements in the performance characteristics and considerable reduction in the emission characteristics with the modified nanofuel compared with the neat diesel fuel. Thus, the attempt to convey the problem of plastic waste disposal and short-age of conventional fuel for a better tomorrow.

Keywords: *alternative fuel, pyrolysis, plastic, diesel, blend, engine, fuel*

Consumer Behaviour and Brand Loyalty of Packaged Milk in Kottayam District

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Abstract: This paper helps in understanding consumer behaviour and its effect on brand loyality of packaged milk in Kottayam district. The consumer behaviour has emerged as a separate discipline which intends to analyze what, when, where, why and how people decide to purchase or not purchase the products or services. A consumer of Packaged Milk may be an individual or a household taking decision to purchase or consume the product. First a survey has been conducted among the consumers of packaged milk. After the response collection, they are included in the analysis. The current literatures used the Statistical package for social sciences (SPSS) application for data analysis. From the literatures, it is observed that Brand Awareness, Brand Image, Purchase Intention, Packaging, Purchase Decision, Customer Satisfaction, Brand Loyalty are the factors connecting with consumer behavior. The customer of Packaged Milk is considered as and when the consumer buys for his own consumption. Here in this study, the term customer of milk refers to the person who regularly consumes Packaged Milk. The customer covers both individual and household consumers of Packaged Milk. Brand Loyalty is a major factor which influences customer based brand equity.

Keywords: *Brand Awareness, Brand Image, packing, purchase intention, purchase decision, Customer Satisfaction, Brand Loyalty*

"The Extricator" - An all-terrain amphibian flood rescue vehicle

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Abstract: Flood, the most devastating natural disaster cause severe damage to human life. Rescue operations are made but still the execution of the rescue operation has undergone many harsh situations. There are many emergency requirements for rescue and medical assistance. The ordinary vehicles cannot meet the same. So we designed an amphibious vehicle with simple design, is proposed for the purpose of aiding in rescue operation which is capable for these emergency. The vehicle has an all-terrain capability brought by its constructional features. The vehicle will be attached with a detachable part to make the vehicle compatible to float on water at the same time to provide motion to the vehicle using specially designed fins. Also by equipping a GPS system the vehicle could function for locating and tracking activities during rescue operations in floods and natural calamities. It also provides a wheel chair access into it. The vehicle can carry light loads and goods and in turn can make medical assistance and food supply. The vehicle can also feature a hybrid engine or a fully electrical engine.

Keywords: *All-terrain, amphibian, flood, hybrid engine, rescue vehicle*

Solar Powered Automated Grass Cutter

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Abstract: In this Report, fully automated grass cutting robotic machine powered by solar energy that also avoids obstacles and is capable of fully automated grass cutting without the need of any human interaction is presented. The grass cutter system puts forth a completely automated lawn mower mechanism. The system uses 12V battery (4v*3) to power the vehicle movement motors as well as the grass cutter motor. We also use 2 solar panels each of 5W to charge the battery so that there is no need of charging it externally. The grass cutter and vehicle motors are interfaced to Arduino UNO microcontroller that controls the working of all the motors. It is also interfaced to an ultrasonic sensor for object detection. The microcontroller moves the vehicle motors in forward direction in case no obstacle is detected. On obstacle detection the ultrasonic sensor monitors it and the microcontroller thus stops the grass cuter motor to avoid any damage to the object/human/animal whatever it is. Microcontroller then turns the chassis as long as it gets clear of the object and then moves the grass cutter in forward direction again. The robotic vehicle is equipped with a grass cutter blade that allows for grass cutting at high RPM (upto3000rpm).The system has a smart functionality that it can be controlled by a Bluetooth system using the Device (mobile phone, laptop, tablet, etc.) as a Bluetooth module is induced in the electronic part.

Keywords: *Solar Energy, Arduino UNO, Fully Automated, Ultrasonic Sensors*

Industrial Safety Analysis Using Analytical Network Process

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Abstract: Infrastructures and industries are being built nationwide to meet the ever-increasing growth of living demand. Industry working and construction in the growing urban is more dynamic, risky, variable and challenging. Furthermore, industries and construction sites often have a poor reputation for dealing with risk and uncertainty adequately, resulting from failure in meeting scheduled deadlines and budgets, and potential loss. While implementing these safety checks, numerous decision alternatives have to be considered. This will be a tedious task. In order to ease this task, the need for an appropriate tool is realised. In this context, the contribution of the ANP process is noticed with interest. ANP has been used as a tool to solve crucial decision-making problems .During the research work reported in this paper, the method of making industrial safety analysis suitable for a typical organisational culture using Analytic Network Process (ANP) has been examined The existence of accidents, accident factors and existence of ANP in the present era could be integrated to form a relation between each of them, thus to increase the reliability and also increase thus the quality of industry safety. The framework provides a decision tool for the decision makers to determine the adequate accident/injury prevention investments while considering the funding limits. The proposed safety risk framework is illustrated using a real-life construction project and the advantages and limitations of the framework.

Keywords: *Industrial safety, Accident , Industrial accident, Analytical Network process*

Multi - Objective Green Supply Chain Management for Milk Procurement: A case Analysis

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Abstract: Implementing green principles in difference process of supply chain have been motivated by environmental concerns of manufacturing operations. In last few decades traditional logistics management has not given enough attention on environmental concerns during designing and optimizing of food supply chain networks. However, environmental protection is one of the main factors that should be considered. Our aim is to optimize three objectives simultaneously: minimization of the total cost, minimization of the total CO2 emissions released from transportation, and maximization of the total capacity utilization of facilities of Malabar Dairy industry. A robust solution approach is presented with a particular focus on the dairy industry for the design of a capacitated procurement network for a two-layer supply chain involved in the procurement of milk. In particular this green multi-objective optimisation model minimises CO_2 emissions from transportation and total costs in the procurement chain. Genetic algorithm (GA) is proposed methodology to solve the problems.

Keywords: *Dairy supply chain, Green supply chain Management, Green routing Problem, Multi-objective Programming.*

Vapour Compression Refrigeration System Using Diamond Nanoparticles- An Experimental Analysis

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Abstract: Recently reducing the energy consumption of refrigerators was basically focused on enhanced mechanical components and creation of new refrigerants until the use of nanoparticles in existing refrigerants opens us a new sector of nano-refrigerants. The purpose of this study is to investigate the enhancement in refrigerator's performance with the addition of diamond nanoparticles with mass concentrations 0.1 wt.% and 0.2 wt.% to the R134a grade 68 POE/compressor oil. The diamond nanoparticles used in the compressor oil have a size of less than 100nm along with oleic acid as surfactant. To investigate the performance enhancement, tests like power consumption tests and refrigeration tests were conducted on the experimental test rig with and without nanoparticles. The results obtained are increased coefficient of performance and less power consumption. Further studies and experiments are required to establish and develop an efficient refrigeration system using the new nano-refrigerant.

Keywords: *Coefficient of Performance, Compressor Oil, Diamond Nanoparticles, Domestic Refrigerator, Nano-refrigerant, Power Consumption*

Thermal Cycling Stability and Heat Storage Performance Analysis of Organic Neopentyl glycol PCM for Electronic Cooling

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NCAME20

Abstract: In this paper the effect of latent heat storage ability and thermal cycling stability of Organic Phase Changing Materials (PCM) for efficient temperature management of electronic equipments. They provide much higher thermal energy storage density than that of sensible heat storage materials. This work discusses the experimental study on the effect of using solid – solid Phase Change of Neopentyl glycol (NPG) in electronic cooling applications. Heating of devices like mobile phones, laptops will adversely affect the life leading to serious illness and accidents. PCMs can be used as passive thermal storage materials for high efficient cooling of electronic devices. NPG is subjected to thermal cycle characterization to study its thermal and chemical stability and thermal performance study in electronic cooling application. The organic NPG is subjected to 100, 250 and 500 thermal cycle. The stability of pure and thermo cycled NPG samples will be tested by various characterization techniques such as DSC, TGA, & FTIR. Temperature -History analysis were performed for experimentally finding the properties such as thermal conductivity and specific heats of both pure and thermal cycled samples. Temperature -history results shows that the thermal properties were not significantly affected by the thermal cycling. To experimentally study the heat storage performance, a heat sink of required dimension was developed and on application of NPG, heat sink (device) temperature found lesser when compared with that without NPG. There will be enhancement in operating time, life of the device and the temperature of the device can be made almost constant with the use of NPG.

Keywords: *NPG, PCM, Stability, Temperature.*

Design and Analytical Study of Block Tyre for Vibration Reduction

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NCAME20

Abstract: "CODEX TYRE" is going to be revolutionary tyre, "Codex" which means block in Latin. The main objective of this tyre is to reduce vibration so as to give comfort to the rider. This paper deals with the idea of reducing impact forces from the road substantially which is mainly based on giving maximum suspension. To do this (imagine going on an uneven road) the force given is divided and absorbed by the tyre and then it is released back. This divided force takes the shape of blocks. Hence maximum suspension can be obtained. This is solved by dividing the normal tyre into six to eight individual blocks with suitable vibration reduction equipment's such as air spring, viscoelastic materials and so on. So that the impact forces from the contact surface is reduced to some extent. This is achieved by absorbing that force to that particular block which is contact with the uneven surface. If any damage occurs to the block then that particular block can also be replaced easily. This vibration reduction and smoothness of wheel is made into effect by considering the analytical and dynamic behavior of both tyres. On an analytical aspect the block tyre is capable of reducing the direct impact force up to a range of 60% - 80% of total force. The remaining residual force would be just absorbed by the bike and it wouldn't cause any discomfort since the remnant force felt by the user might be negligible. The spin rate of tyre for respective bikes might alter so we will be only focusing on bikes which are of an average power.

Keywords: *block, Codex, suspension, tyre, viscoelastic*

Power Generation from Waves

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NCAME20

Abstract: This project presents a brief overview about the design, benefits, risk, and environmental impact of a sea wave power plant. The intention of this accomplishment is to serve society without hampering environmental ecology. This task is based on the renewable sea wave energy. Burning fossil fuel causes global warming. Again wastes of nuclear power plant are very hazardous. Accident of this plant yields great turn of human lives. The power generation from sea wave has growth a huge potentiality. The price of fossil fuel is rising day by day because of its scarcity in nature. As the operating cost of sea wave power plant is low and uses a renewable source of energy, it is possible to produce power at low price. Existing hydrostatic power plant needs dam. This is very harmful for environmental ecology and lives diversity. But this proposed plant does not require any dam or any other hazardous construction and this also reduces the installation cost. However it is reliable, sustainable, environmentally friendly power extraction procedure from sea wave.

Keywords: *Hydrostatic power plants, Renewable energy, Sea wave power plant, Wave energy*

Tranquilizer Drone

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NCAME20

Abstract: Deforestation,lack of natural prey and habitat loss has forced wild animals of India to live closely with human settlement and prey on domestic livestock.There are number incident have been reported about wild animal attacks on humans in India, Maximum human wildlife conflict situations has been recorded in Karnataka, Kerala,Maharashtra, Gujarat and Uttarakhand. Unmanned Aerial Vehicles, or drones, are aircrafts that can be navigated without a human pilot on board the aerial vehicle. Drones can be navigated via control from the ground, using a GPS tracking system.In this project a Quadcopter drone is made with a camera and an Animal Tranquilizer crossbow. Mostly used Animal Tranquilizers are Telazol (tiletamine hydrochloride 50 mg/mL, zolazepam hydrochloride 50mg/mL).The drone can be used to tranq the animals which enter a populated area, and the animals can be taken back to the forest. The basic construction is that a crossbow which can be loaded with a tranquilizer dart.The aiming of the cross bow is done by using a laser pointer The feed of the camera is shown in the screen and can be navigated and aimed at the animal.When the firing button is pressed the tranq-Crossbow shoots the dart to the aimed point. Thereby tranquilizing the animal

Keywords: *Tz: telazol, Hcl: hydrochloride, GPS: Global Positioning System and tranq: tranquilizing drug*

Design and Fabrication of Eye-Blink Sensor Based Automatic Braking System

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NCAME20

Abstract: The technology of pneumatics has gained tremendous importance in the field of workplace rationalization and automation from old-fashioned timber works and coal mines to modern machine shops and space robots. It is therefore important that technicians and engineers should have a good knowledge of pneumatic system, air operated valves and accessories. To maintain optimum efficiency of pneumatic system, it is of vital importance that pressure drop between generation and consumption of compressed air is kept very low. The accidents due to drowsiness can be prevented with the help of eye blink sensor using IR rays. The aim is to design and develop a control system based intelligent electronically controlled automotive braking system called "Eye Blink Sensor Based Automatic Braking System". The eye-blink sensor in this system is used to sense the eye blinking of the driving person. If the eye blinking of the person is abnormal the eye blink sensor senses and then it sends the signal to the control unit, which receives the signal and actuates the solenoid valve. If the solenoid valve is activated, the compressed air passes to the Single Acting Pneumatic Cylinder. The compressed air activates the pneumatic cylinder and moves the piston rod. If the piston moves forward, then the braking arrangement is activated. The braking arrangement is used to brake the wheel gradually or suddenly due to the piston movement. The breaking speed is varied by adjusting the flow control valve. The solenoid valve is also activates another single acting piston arrangement, which is used for the bumper arrangement. When the solenoid valve is actuated, it opens the path for the compressed air to pass through both the cylinders for the actuation of it.The whole system has been fabricated which helps to achieve the braking and the bumper action of the vehicle automatically based on the eye blinks using the pneumatic systems. By using more techniques, they can be modified and developed according to the applications.

Keywords: *Solenoid Valve, Pneumatic, Class I sensor, Buzzer, Vibration*

REGENERATIVE SUSPENSION SYSTEM

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NCAME20

Abstract: A shock absorber is a device which absorbs shock which is developed in automobiles. The energy required to damp these vibrations is wasted in the form of heat. Regenerative shock absorbers (RSS) with the same arrangement and utilize this energy to increase the overall efficiency of the system. The significant characteristic of the suspension is that vibration energy from the road excitation can be regenerated and transformed into electrical energy while satisfying performance could be maintained. Here the suspension system is considered to be a free vibration system and the maximum displacement that it can undergo upon traversing over a pothole or road unevenness has been found. This displacement was found with the combined use of Matlab and ANSYS Workbench. The mechanism which is used for the production of electrical energy here is the rack and pinion coupled with a generator. The rack is attached to the suspension and the pinion is coupled with a gearing mechanism. When the vehicle travels over a pothole there will be a vertical movement in the suspension. Since the rack is attached to the suspension, a similar movement will be seen in the same. This movement gets converted to the rotating motion of the pinion and the RPM is increased by using a gearing mechanism. The output shaft of the gearing mechanism is connected to the DC motor, which produces electric power. The energy produced so can be used for the running of auxiliary lights or charging the battery in an electric vehicle (EV).Thus the efficiency and range of the vehicle can be increased.

Keywords: *Regenerative suspension system, Electric vehicle, Direct current, Rotation per minute*

A Modified Bit-Wise Mutation Algorithm for Mixed-Model Production Sequencing Problem

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NCAME20

Abstract: Mixed-model production (MMP) is used as a just-in-time (JIT) tool to get balanced production in a demand based system. In MMP, instead of batch production, products are produced in a mixed sequence. Product sequencing in a mixed-model production (MMP) system is NP-hard. This brings the importance of non-traditional optimization methods to solve it in a reasonable time. This study proposes a modification to the bit-wise mutation algorithm that was developed by Nazar et al (2015). The sequencing problem with the objective of minimizing PRV is considered. The result shows that a significant improvement in the computational time. We considered three problem set each consisting of 9 problems.

Keywords: *bit-wise mutation algorithm, just in time (JIT), mixed-model production sequencing, product rates variation (PRV), bit-wise mutation algorithm*

Online Convenience Dimensions and their relationships with Customer Satisfaction: Empirical Findings from the Indian Firms

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NCAME20

Abstract: Service convenience is the ease that attracts the customer towards a particular service and it reduces the time and effort of the customers. Ease of service is very important for online customers. As consumers spend less time on purchase related endeavors, their desire for convenience is developing, and their attention is often turned to virtual purchases as an alternative. While shopping online, customers need time and effort for locating a website, wait for the web page, navigate, wait for their purchase & deliverer and to make post purchase responses. This paper explores the relationship between the seven dimensions of online convenience with the customer satisfaction. Indicators of the electronic word-of-mouth (e WOM) and the behavioral intentions of the customers are measured by a structured questionnaire and the data of online convenience indicators are analyzed for revealing the structural relationships. A sampling frame is identified among the users of online consumers of domestic products. The validation of the data has been done by referring to the previous literature. SPSS – AMOS is used to test the hypotheses formulated. Exploratory and Confirmatory factor analysis results and the structural relationships are discussed. The managerial implications of this analysis will be useful to the online marketers to improve the customer focus and business.

Keywords: *Customer satisfaction, E – wom, Factor analysis, Online convenience, Structural equation model*

Tuber Harvester

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NCAME20

Abstract: This project mainly aims at bringing one of the easiest solutions for uprooting of tubers, especially it deals with tapioca (cassava) and elephant yam. Thus, we have designed a machine that is efficient, cheap, affordable and simple for harvesting tubers. It mainly includes analysis of existing tuber harvesting methods and machines. Our equipment mainly deals with the difficulties that is been faced in uprooting the underground products. It is equally important to obtain the tubers with minimal damage; this device is designed with soil loosening properties so that soil loss along with harvesting tubers is also addressed. Mobility problem is another important problem as the terrain is different in different areas. It is also solved by this device. Minimum tillage system of farming could be a viable alternative for a large-scale farming to obtain optimum root crop yields as well as mitigating soil loss due to root crop harvesting. Velocity model of the tuber lifting shows that manual pulling velocity model is not uniform. Hence, we have to use a mechanism to uplift tubers which is been incorporated in this design (as an application of slider crank mechanism). Advantages of this design include faster uprooting with less energy expended, high productivity, reduction in the risk of health hazards of developing blisters in the palms, callus palms, arched spinal cord and waste pains over time etc.

***Keywords:**, Efficient, Health hazards, Mobility problem, Soil loosening, Tubers, Uplift*

IMPACT OF EI IN FIRST TIME RECRUITMENT PROCESS AMONG FRESH ENGINEERING GRADUATES IN KERALA

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NCAME20

Abstract: The persistent flow of fresh engineering graduates makes Indian job market competitive. Enabling this fresh engineering job aspirants to acquire a befitting job is a challenge to stakeholders in education. There is a need to understand nuances of search and recruitment process and also engagement of first time job aspirants. This project focuses on studying emotional intelligence and found out a three factor structure for emotional intelligence is formed among fresh engineering graduates. While four ways of coping are mainly employed by fresh engineering graduates of Kerala. Relations shows that EI influences Coping strategies employed by job aspirant.

Keywords: *Coping Strategies, Emotional Intelligence, Fresh Engineering Graduates, Stake Holders.*

Analysis of dynamic characteristics of magnetorheological fluid enhanced with Nano Iron particles

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Abstract: Magnetorheological (MR) fluids are suspensions of micron-sized magnetizable particles dispersed in a nonmagnetic carrier fluid. They exhibit controllable rheological behavior in the presence of a magnetic field. The components of the prepared MR fluid are- Carbonyl Iron particles (627 nm) OKS Spezialschmierstoffe GmbH 1050/0 silicone oil, silicone grease (stabilizer), Oleic acid (surfactant). In this research work, a silicon based magnetorheological fluid is prepared and is tested to find out the shear rate and sedimentation stability mathematically for different compositions of the components. These dynamic characterizations - shear rate found through newton's laws and the sedimentation stability is found out through stokes law, help the prepared MR fluid to be optimized for MR damper applications in automotive industry and provide the proof that Nano fluids are preferable when compared with micro fluids.

Keywords: *Carbonyl Iron particles, Magnetorheological Fluid, M R damper, Nano fluids, Sedimentation stability, Shear rate, Silicone Oil.*

An Analysis of the Supplier Selection Process in Chennai Automobile Sector

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NCAME20

Abstract: Strategic alliance with ameliorate suppliers' needs to be moulded to improve quality, flexibility as well as to reduce lead time. The "voice" of firm ally has to be deliberate so that supplier selected may provide what the company wants to sustain their competitive position in market. So that a qualified supplier is a key element and purchase mangers are pay more attention for supplier decision. This project aims to investigate the gap between purchase managers ranking of the perceived importance of the supplier selection attributes and actual choice of supplier in a speculative setting among the purchase managers of Chennai automobile sector. For this two investigative methods are used; a Likert scale AHP rating questions to ascertain importance of supplier attributes; and a discrete choice analysis (DCA) assay, to probe the actual choice of supplier. The outcome from this study betoken that albeit purchase managers in Chennai automobile sector say that, Product Quality is the most dignified weighty attribute for a supplier, they in-point of fact choose supplier based predominantly on Cost and Delivery Performance.

Keywords: *Analytical Hierarchical Process, Discrete Choice Analysis, Supply Chain Management, Selection Attributes, Selection Tools, Supplier Selection.*

A Structural Equation Model Linking the Organizational Performance and TQM Practices of Construction Industry

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NCAME20

Abstract: This study explores the impact of TQM on the performance of the Indian construction firms. Abundant literature explains the linkage of TQM practices and manufacturing sector firms. Very less is reported from the construction sector. A framework and model exploring TQM usage in the manufacturing sector is selected as the base line and a model applicable to the construction sector is framed by incorporating few modifications. Data is collected using questionnaire survey tool. Respondents are grouped into managerial staff and workers. The firms included in this study are selected from the registry of contractor's and PWD license. Questionnaire items used for the manufacturing / service sector are proven for content / construct validity and are adapted in this study. Structural Equation Modeling is used to test the hypothesis formed, from referring to the previous research papers. IBM SPSS Statistics and AMOS 25 are used for the analysis. This study agrees with the previous research findings, by establishing positive linkage between TQM constructs and the indicators of Organizational Performance. The areas where the model linking TQM and manufacturing / service firm performance differ from that of the model linking TQM and construction firm performance are identified and the differences are interpreted. This paper concludes with the listing of the practical ways to link TQM more effectively to improve the construction industry performance.

Keywords: *TQM; Construction industry; Organizational Performance; hypotheses; questionnaire survey;*

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INFLUENCE OF DIE TEMPERATURE ON DIE STRESS ANALYSIS USING DEFORM 3D

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NCAME20

Abstract: Forging is a core process of the manufacturing industry. Being a primary metal forming process, it defines the mechanical properties of the part in the initial stage of manufacture. An aligned grain flow pattern and a sound metal flow define a good forging. It is a complex non-linear process that is vulnerable to various manufacturing anomalies such as variation in billet geometry, billet temperature, material properties, work piece and forging equipment positional error. The aim of this work is to study the effect of important machining variables on performance characteristics and the influence of initial die temperature on die stress in hot forging process. A 3-D model of the die was prepared using ONSHAPE, and analyzed in Finite element software DEFORM 3D. In this analysis, the die stress analysis is done by varying the temperature patterns of the die and by keeping the temperature of the work piece as a constant. These results will be useful for tool developers for the complete understanding of the material properties without performing costly and time consuming experiments in the hot forging industry.

Keywords: *DEFORM 3D, Die temperature, Die stress, Forging, ONSHAPE.*

Causes and Effects of Rework in Construction Projects

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NCAME20

Abstract: Rework is the activity that should be done more than once or the activity that removes previously installed work. Therefore, rework could be a persistent drawback in construction that results in time delay, increased cost, quality issues and nearly each criteria of project success. Most of the reasons of rework remain largely unknown and construction companies are unable to manage the effects of rework properly. Through a comprehensive literature review conducted in some major construction sites in the state of Kerala, a total of 58 causes and its effects were identified. A questionnaire survey was conducted to prioritize the causes and effects of rework. Finally, seven major causes were identified through factor analysis. By considering the cause and effects of rework, measures to be taken to reduce rework are also discussed in this paper.

Keywords: *Causes, Construction Projects, Effects, Factor analysis, Quality, Rework.*

Design and Fabrication of Pepper Threshing and Grading Machine

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Abstract: Processing of pepper involves different unit operation such as threshing, cleaning, grading and packaging. The threshed and dried black pepper has many matters like spent spikes, pin heads, soil particles …etc. Cleaning is done by winnowing and hand picking which removes some of the impurities. In this method the final product obtained still consist of some impurities and there are no proper cleaning methods available for the removal of impurities. The manual method used for cleaning is time consuming.

Objective of this work is to design fabricate and analysis of a machine for the purpose of threshing the peppers. For thousands of years grain was separated by hand and it was very time consuming. Apart from this, in many industries even now the peppers are separated manually. However, during this manual process in industries there is a huge wastage of money as well as time. In order to avoid this wastage a model pepper thresher machine is designed. The main components of this machine include a rotating drum, hopper, vibrator and grading system. The graded peppers are get collected separately. A vibratory mechanism and tray system are used which results in rich grade of pepper is collected in separate chamber and small size pepper (weightless pepper) and dust is collected in bottom tray.

This project aims at reducing human labour and time involved in the traditional way of cleaning. The machine can also be used to separate varieties of agricultural products. Just one person is capable of carrying out the entire separation and cleaning operation.

Keywords: *Cleaning, Grading, Thrshing, Vibrator*

SHAPE OPTIMIZATION OF SOLAR VEHICLE

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NCAME20

Abstract: It is a well-known fact that bluff bodies induce augmented drag on the vehicle surface. Hence, aerodynamic design is inevitable for vehicles for its better power and performance. The project work is focused on the transformation of the present shape of the SSET's solar electric vehicle (SEV) from a bluff model to aerodynamic model. The major contributor to the drag is by the housing of the vehicle that is the top most roof so necessary modifications are made. Using CFD (Computational Fluid Dynamics), many shapes are analyzed and one with lowest drag is selected. This resulted in improved efficiency and proper management of the solar power. Hence, these results will be very useful for designing solar powered automobiles that are highly efficient and robust.

Keywords: *Drag, Bluff bodies, CFD, Solar electric vehicle, Aerodynamic design*

SOLAR WATER WEED CUTTER AND PLASTIC COLLECTOR

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Abstract: The main concept of this project is to build machine which can be used for clearing the backwater lettuce and the other backwater weeds which grow very often at water bodies and to remove the plastics accumulated. The clearing of these backwater weeds and plastics is a difficult process and consumes lot of time when done manually. Also it is impossible to work under critical situations where the depth of the water is high. This machine is made so simple such that when it is switched on, it moves automatically and the weeds are trimmed off and collected in a tray along with plastic which can be later removed and disposed manually. Another advantage of this machine is that they can be operated by the solar powers. Also the battery power can also be made used. Hence this is a dual power project such that the power from the battery can be used and also the solar energy can be used for powering up the machine. The controlling of the system is done with the help of a remote control which can be operated manually from the ground.

Keywords: *weed cutter, backwater lettuce, backwater weeds, solar power*

Food Waste to Manure Converter

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Abstract: The combination of high food consumption rate and very low food waste recycle rate, results in mountains of food dumped into landfills where they get burned and therefore produce harmful gases. The increasing amounts of food wastage and accumulation generated per annum due to the growing human population worldwide often associated with environmental pollution issues and scarcity of natural resources. Food waste requires proper management and recycling techniques in order to minimize its environmental burden and risk to human life. In this paper, we are introducing a practical solution for every household/flats to recycle the food waste instead of sending it to the landfill. The solution is to design an eco-friendly machine that converts food waste to manure. The use of recycled food waste as compost improves the soil health and structure, increases drought resistance and reduces the need for supplemental water, fertilizers and pesticides. The composting process is consists of several steps such as heating and grinding under controlled environmental conditions to fasten the process. A mechanism is designed to reduce food waste volume by over two-thirds. Also, the aesthetics aspect was considered by designing an elegant and socially accepted machine with a suitable size to be placed in any kitchen.

Keywords: *Food Waste, Grinding, Heating, Manure, Recycle*

Investigations on mechanical behavior of hybrid auxetic sandwich structure

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NCAME20

Abstract: Sandwich structures have excellent energy absorption capabilities, combined with good mechanical properties and low density. Auxetics are structures or materials that have a negative Poisson's ratio. Such materials and structures have high energy absorption and fracture resistance properties. Three major auxetic structures are re-entrant honeycomb structure, triangular (double arrowed) structure and chiral auxetic structure. Hybrid auxetic sandwich panels are created by combining these structures in two layers. Three hybrids are created from the base structures (re-entrant honeycomb-triangular structure, re-entrant honeycomb-chiral structure and triangular-chiral structure). The behavior of hybrid auxetic sandwich structures under compressive, bending and impact loading conditions are studied. Three-dimensional geometrical finite element model of the hybrid auxetic sandwich structure was developed using ANSYS. The mechanical behavior of the hybrid structure under compression, bending and impact loading were studied using simulation tools in ANSYS software. An additive manufactured model of the hybrid structure with the best orientation obtained from simulation was created and its properties were studied. In compression test Re-entrant honeycomb-triangular structure shows least deformation of 0.000694m.Physical test gave a deflection of .00095m.Triangular-chiral structure is least deflecting in bending test with a deformation of 0.0031175m. Re-entrant honeycomb- triangular structure also gives very similar deflection .Impact test shows that Re-entrant honeycomb-triangular structure gives best deformation resistance. Re-entrant honeycomb- triangular structure shows best deformation resistance in compression and impact loading. Higher Impact resistance makes these hybrids good for impact energy absorber applications.

Keywords: *Auxetics, Re-entrant honeycomb structure, Triangular auxetic structure, Chiral auxetic structure, Hybrid auxetic structures.*

Comparative study of the physico-chemical properties of Biodiesel from high FFA rubber seed oil enhanced with Nano particles.

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NCAME20

Abstract: Forging is a core process of the manufacturing industry. Being a primary metal forming process, it defines the mechanical properties of the part in the initial stage of manufacture. An aligned grain flow pattern and a sound metal flow define a good forging. It is a complex non-linear process that is vulnerable to various manufacturing anomalies such as variation in billet geometry, billet temperature, material properties, work piece and forging equipment positional error. The aim of this work is to study the effect of important machining variables on performance characteristics and the influence of initial die temperature on die stress in hot forging process. A 3-D model of the die was prepared using ONSHAPE, and analyzed in Finite element software DEFORM 3D. In this analysis, the die stress analysis is done by varying the temperature patterns of the die and by keeping the temperature of the work piece as a constant. These results will be useful for tool developers for the complete understanding of the material properties without performing costly and time consuming experiments in the hot forging industry.

Keywords: *DEFORM 3D, Die temperature, Die stress, Forging, ONSHAPE.*

WORK-LIFE BALANCE AND ITS IMPACT ON JOB SATISFACTION OF FEMALE NURSES IN PRIVATE HOSPITALS WITH SPECIAL REFERENCE TO PATHANAMTHITTA DISTRICT

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NCAME20

Abstract: Nursing is a profession which needs greater deal of cooperation and responsibility because they are dealing with human life. In present environment there is high completion between private hospitals, so the nurses working there have to take multiple responsibilities in a single working day. The multiple responsibilities and continuous work without adequate break often leads to job stress. So there should be a balance between work life and professional life. Work life balance is considered with maintenance of equilibrium between professional and personal life of the employee. The main purpose of the project is to analyse the factors affecting work-life balance of the employees. If the quality of work life is low, the productivity will be low. The article is all about identifying the factors that affect the work-life balance of the employees and also to find out the effect these factors on work-life balance. Since employees are the most valuable resources of every organization, only effective human resources can contribute effectiveness to the organization. The primary data is collected using questionnaire survey with a sample size of 383. The effects of work schedule, working hours, work overload, supervisory support, and overtime work are examined.

Keywords: *Flexible working schedule, Job satisfaction, Life satisfaction, Private hospitals, Work-life balance.*

Impact of TQM on quality performance of Indian hospitals

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Abstract: This paper explores the concepts and models relating the applications of TQM as reported in the production research literature and extends a model for exploring the same among the hospitals. The key success factors of TQM and performance measures in the manufacturing context are used to form a structural equation model linking the TQM constructs with the performance outcome of hospitals. The model is tested with empirical survey data. The responses are collected using a structured questionnaire from the respondents working in the hospital .The linkage of factors of awareness, intention and procedures of quality management concepts with the performance outcome are tested by the hypothesis formed. Data is analyzed with SPSS- AMOS statistical package and results are validated using Exploratory and Confirmatory factor analysis. Findings may be useful to the health care industry for improving the TQM for a better performance outcome.

Keywords: *Factor Analysis, performance outcome, Structural Equation Modeling, Total Quality Management (TQM).*

MEDIATING THE EFFECT OF JOB SATISFACTION OF IT PROFESSIONALS

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NCAME20

Abstract: Job satisfaction is described as a pleasurable or positive emotional state resulting from the appraisal of one's job or job experiences. Lack of job satisfaction may lead to labour turnover and will affect the company in many ways. This study analyses the effect of personality traits, professional commitment, and work commitment factors on the job satisfaction and organizational commitment in the IT sector companies. In this study the work related perceptions and attitudes of employees with their organizational commitment and their intension to leave the job is analysed and create a multivariate model through which the effects of the personality traits, job satisfaction, professional commitment and organizational commitment of the employee is investigated and tested using the structural equation modelling method and recommendations will be offered.

Keywords: *Mediating effect, Organizational commitment, Job satisfaction, Work commitment.*

AN AUTOMATED SELF-ADJUSTING RAMP TO ENTRAIN AND DETRAIN FOR DIFFERENTLY ABLED IN INDIAN RAILWAY SYSTEM

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NCAME20

Abstract: For most differently abled people, public transport is a strenuous option. With lack of basic facilities be it ramps, wheelchair access, lifts and a non-adapting public makes it impossible for them to navigate. The scenes of struggles one witnesses by them to entrain and detrain the "Differently abled compartment" in Indian trains made us think hard on how we can make a small step towards making our nation & one of its facilities more inclusive and also ensure reduction of accidents.

Our work attempts to address this marginalized group within infrastructure and how our solution can impact their lives & well-being. The highlight of the work will be the automation of the operating system. Utilizing the rack and pinion mechanism the system will adjust to desired level as per height of platform. The slight angle is maintained at 15 degrees which will ensure adequate ergonomics & comfort. The system consists of three sliding frames. Properties of various materials were studied and aluminum is chosen for its strength, ability to sustain friction and machinability.

Necessity of the work was defined after a survey done at randomly selected railway stations across South India. The maximum and minimum range of platform to train floor height was recorded as 75 cm and 35 cm respectively. But in a wider observation this figure changes and in some stations in Andhra Pradesh, the platform and railway tracks are at same level. This will prove difficult for a differently abled person to entrain and detrain. The project thus provides an adaptable ramp for easy movement of wheelchairs into the train. Automated means the system will self-adjust to any platform to train floor height within the designed operating range.

Structural analysis of ramp material is done initially. Deformation under the load is also studied. When the system is switched on, the motor rotates the rack and pinion to move the ramp outside. As it moves, the second frame will adjust automatically with a hinged support to the desired slant angle. At the same time the final frame will come out from the second frame so that the entire system will adjust itself to ramp the wheelchair.

Keywords: *Automated ramp, differently abled, Ergonomic design, hinged support, Rack and pinion, Slant angle.*

Interrelationship among the Critical Factors of Work Flow Reliability in Construction Projects

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NCAME20

Abstract: Work flow in construction project has a significant influence on project performance. Work flow is the movement of materials, information, labor, equipment etc. during the construction process. Unreliable work flow will lead to waste creation and poor labor productivity. A reliable work flow can improve the project performance. In this study nineteen variables which affect the reliability of the work flow were identified from various literatures. A questionnaire was prepared to collect the data. Factor analysis was applied to identify the critical factors of work flow reliability and hypotheses were put forward. The respondents were grouped into project managers, foremen, and workers. The result of this study will help project managers better understand work flow and to take effective measures for improving work flow reliability, which in turn contributes towards the successful implementation of construction projects.

Keywords: Construction, Reliability, Construction Management, Workflow, Critical factors

Design and Fabrication of Road Maintenance Machine

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NCAME20

Abstract: Potholes are one of the most visible and annoying forms of distress associated with bituminous pavement deterioration for a road user. Potholes have always been a problem for road maintenance agencies because their repair is costly and time-consuming. The objective of this newly designed machine is to have an economical and user-friendly system for the repair of potholes on Indian roads. Many times potholes are repaired by non-scientific-antiquated techniques and non-standard materials.

Keeping this in mind, our project group has proposed a technological demonstration of a machine to repair the potholes on damaged roads. It is much cheaper than rebuilding the roads again. The proposed machine consists of a compressor, air and tack-coat storage tank, mixer unit, burner, vibrator and water pump, all these parts are attached to an MS angle frame. The machine will clean the potholes, deposit the mixture of tar-gravel to pothole and levels the road. The machine perform using a 12v DC battery. We can place the machine above the pothole using roller wheels after that, all the operations of the machine can controlled by switches till sealing the pothole. The model of the machine will repair potholes of at most 30cm diameter. This invention will find applications for the repair of rural roads because of its small size. But regardless of its small size, it provides effective results and its efficiency can match any machines serving the same purpose.

Keywords: *compressor, pothole, road maintenance, tack-coat*

DESIGN AND FABRICATION OF MECHANICALLY DRIVEN NUTMEG MACE SEPARATOR

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Abstract: Nutmeg is one of the main cultivation in India, especially Kerala. Nutmeg as a spice have many medicinal values as well as they are widely used in the food, cosmetic and pharmaceutical industries. Mainly, the nutmeg as a fruit contains two parts. The nutmeg seed and a flower shaped covering over the seed known as Mace (commonly known as jathipathri). The market for mace depends on the quality of it. Processing of mace is done by bare hands which is however tedious, time consuming and needs skilled labours. To overcome these drawbacks, in this paper, a Mechanically Driven Nutmeg Mace Separator is introduced. Our solution is aimed mainly for common farmers. A pressing mechanism is introduced which detaches the mace from the nutmeg seed. The size of the perforation, the pressure needed to be applied, as well as the rubber-type material, determines the major working of our design. There are two trays in the separator. We are holding our Nutmeg in the lower tray and the upper tray does the pressing with the help of a gear motor. A layer of silicone rubber is incorporated on the upper tray to provide improved tear strength while the process takes place as well as for easy separation. The pressing is done with constant speed and constant pressure thereby making it most suitable technique. We are able to separate the mace of 19 units in 15-20 seconds time, which is very low when compared to the time taken for separating a single nutmeg in an existing way (using hand). The result of this solution is easy separation of mace with comparatively very low defects. The separated mace is of good export quality which gives more income to the farmers.

Keywords: *Nutmeg Mace, jathipathri, Nutmeg Mace Separator*

Airship implimented drone for advanced surveillance

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Abstract: Drone's find wide applications in government and military agencies due to its warfare capabilities. Nowadays these winged devices finds its market from toys for kids & teenagers to wide range of applications mainly to photographers, videographers, farmers, chemical industries and just about anyone who can benefit from a viewpoint in the skies around them. This article proposes a new design which may replace a normal drone in long time advanced surveillance. The design resembles a scaled model of an airship. Proposed model is light weighted and have high positional stability than normal drones. Research article include steps in design and fabrication of the model along with detailed analysis carried out along with its experimental validation. Airship implemented drones are energy efficient and possess better accuracy.

Keywords: *Airship, Blimp, Drone, LTAV, Hydrogen*

Recent developments in Friction stir welding of dissimilar aluminium alloys

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Abstract: Nowadays, energy-efficient and eco-friendly metal joining techniques have been employed all over the world to overcome the difficulties in conventional fusion joining methods. Friction stir welding (FSW) is a comparatively new emerging solid-state welding process used for joining various similar as well as dissimilar metals, which were difficult to weld using conventional welding techniques such as arc welding and gas welding. FSW can be treated as an environmentally friendly and energy-efficient technique since there are no toxic gas emissions during the process and weld is created without the usage of flux. Aluminium alloys are extensively used in automobile, aerospace, construction sectors and marine applications, due to excellent physical and mechanical properties such as high corrosion resistance, low density, high thermal conductivity and high strength to weight ratio. The joining of dissimilar materials provides significant benefits including overall weight reduction of parts and a reduction in harmful gas emissions. A comprehensive study of the research in the area of friction stir joining of dissimilar aluminium alloys in the past few years is presented. The review enumerates different configuration of FSW, the effect of FSW parameters on mechanical properties and evolution of macro and microstructure, temperature generation in the weldments, the effect of pre and post-weld heat treatment, grain refinement and addition of nano-particles. This investigation also aims to document different trends that have occurred in the arena of dissimilar FSW of Al alloys during the period.

Keywords: *Dissimilar Aluminium alloys, Friction stir welding, Mechanical properties, Microstructure, Solid state welding.*

Oxy-Hydrogen Production by Electrolysis for the Use in Vehicle Engine

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Abstract: The use of non-renewable resources lead to the drastic increase in the pollution levels and even in the exhausting of natural resources. This made us to realize the need for a new fuel which does not cause pollution. The sustainability of fuel and production of cleaner and safe exhaust by-product help us to think about Oxy - Hydrogen (HHO) generator and its use in vehicle engine. It can be even used with other fossil fuel for combustion and helps to get more efficiency and cleaner by-product.

Oxy-Hydrogen (HHO) is a mixture of Hydrogen (H2) and Oxygen (O2) gases. In our project it is produced by electrolysis of water. Here for the electrolysis process, we have made generator that consist of a main part with steel plates arranged in a parallel rows that act as a cathode and anode respectively. The generator is supplied with a battery of 12 volt and this act as primary source of energy. It is estimated as approximately 2.5 litres of Oxy- Hydrogen is generated in 1 minute from the generator. The so obtained HHO gas was added to the intake system of the vehicle engine.

Even when adding Oxy -Hydrogen with other fossil fuels the concentration of unburned Hydrocarbons (HC) get reduced from 20% to 40%. When using Oxy – Hydrogen as the primary fuel, the by-product from it is water itself. The Carbon monoxide (CO) rate can also reduced by the use of Oxy-Hydrogen generator. So it is cleaner and safer fuel to the environment.

Keywords: *HHO Generator, Electrolysis, Engine Performance, Emissions*

Reduction of defects in steel industry

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Abstract: Global competition leads customers to demand high quality product, product variety had a major impact on manufacturing industries. This paper focused on identification of waste and its causes in a steel industry. Quality assurance is inevitable for all industries, it includes regulation of the quality of raw materials, assemblies, products and components, services related to production and management, production and inspection processes. For this 100% quality control is maintained in this industry. Quality control is a system of maintaining standards in manufactured products by testing a sample of the output against the specification. Inspection is a major component of quality control, where physical product is examined visually. Product inspection will be conducted with lists and descriptions of unacceptable product defects. Now a day's most of the waste generated in the steel industries is in the form of rework which lean considers it as its waste.Lean manufacturing is a technique employed to increase the value of a product by eliminating wastes. Here critical defect of the products is identified using pareto chart. The causes and sub-causes of the wastes are then analysed with the help of fishbone diagram.Sigma value is calculated before and after improvement. The suitable remedies and improvements are suggested.

Keywords: *Defects, fishbone diagram, pareto chart, quality, steel industry.*

Experimental investigation of solar chimney power plant combined with desalination process

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Abstract: The project is the physical and mathematical models of wind turbine power plant combined with seawater desalination by indirect condensation freshwater production .Shortage of energy and freshwater resources are two problems facing the whole world. Higher cost of producing fresh water, use of pollution free and easily available energy source and maintenance cost of conventional desalination systems are the main objectives.Sea water desalination is one of the prevalent methods of obtaining large amounts of fresh water.Making use of solar energy to desalt sea water or brackish water and setting up vertical turbine systems can solve the above mentioned problems to some extent .The project is the comparison of vertical turbine power plant ,vertical turbine power plant combined with seawater desalination by indirect condensation freshwater production was conducted. It was found that the ingenious and special condenser combined in the integrated system could preheat the seawater and realize the full utilization of the latent heat of condensation released by water vapor. Besides, the wind from the atmosphere strikes the vertical turbine blades which is attach on the top of the desalination system, thus the turbine rotates and thus electricity is produced. Vertical turbine power system with integration of sea water desalination has been introduced for the production of electricity and fresh water. Through theoretical analysis, it has been demonstrated the integrated system can significantly improve the solar energy utilization efficiency as well as the land resources utilization efficiency, at the same time, the economic, social and ecological benefits can also be significant.

Keywords: *desalination, solar, vertical wind turbine, seawater*

Characterization of the Small Paper Craft Entrepreneurs Perceptions of Success and the Factors Affecting Success

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Abstract: This study explores the key success factors of small paper craft entrepreneurs. Abundant literature explains the linkage of key success factors and the performance of craft retailers. But very less is researched among the Indian firms. Small paper craft entrepreneurs are part of the micro SME sector. Like other small crafts, small paper craft retailers operate in a competitive environment with many constraints and pressures. Based on the research literature, a characterization of the small paper craft retailer's self-ratings of success and comparative evaluation of the groups based on their competitive strategies are done. To group the definitions of self-ratings of success and to identify the variables of success such as competitive strategy, demographic variables, motivation, environmental characteristics, ethics etc, a structured questionnaire was devised. Questionnaire items used are already validated by previous researchers. The firms included in this study are the small paper craft entrepreneurs doing retail business online. Snowball sampling is used to collect data. The data was statistically tested for revealing the correlation between the self-ratings of success and the variables contributing to success. Structural Equation Modeling, regression and correlation are used for statistical inference. IBM SPSS Statistics and AMOS 25 are used for the analysis. This study contributes to the micro SMEs by giving a realistic classification scheme, significant correlations and logical explanation to the individual firm's self-ratings of success. Study highlight appropriate strategies to improve the confidence of small paper craft entrepreneurs.

Keywords: *Correlation, paper craft, questionnaire survey, self-ratings of success.*

Automated Decapping Machine for the Removal of Safety Caps from the LPG Cylinder

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Abstract: Automation of different processes in the industries is of huge importance due to the benefits attained by the industries through automation. Therefore, we intend to automate the manual process of removing caps of LPG cylinders in the Bottling plant. The decapping of LPG cylinders done manually is a time-consuming process as well as results increase in labor cost that leads to a hike in-cylinder price. Therefore, automation through a machine will considerably reduce the production cost of cylinders. The machine with a high rate of safety cap removal per hour can increase the functional efficiency of the plant and more cylinders are secured and sealed using a safety cap. The machine consists of two units, one which captures the image of the upcoming cylinder in the conveyor belt such that the position of the metallic pin on the safety cap is known. This process uses image recognition and data abstraction. The second unit has another two parts, the pneumatic system which controls the airflow and also the movement of the decapping head. The other part consists of the decapping head connected to the pneumatic actuator which removes the safety cap from the LPG cylinder.

Keywords: *Automation, LPG cylinder, safety cap, pneumatic system*

Nano Enhanced PCM for Thermal Comfort in Riding Helmets

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Abstract: The thermal comfort of motorcycle helmets during hot weather is an important factor as it can affect the physical and mental condition of the rider. This project presents a new method of helmet cooling system. This is done using phase change material (PCM) to absorb the heat produced due to solar radiation so as to provide comfort for the wearer. Solid-solid state phase change of Neopentylglycol (NPG) is made use for providing thermal comfort. And for improving thermal conductivity of organic NPG, it is added with CuO, Al2O3 and TiO2 nanoparticles in 1% by mass. Upon heating the pure and nano enhanced samples for 100 thermal cycles, the characterization methods such as FTIR, XRD, DSC, TGA and T-history were done to analyse the thermal and chemical stability and the changes in thermal conductivity and specific heat of the PCM after the addition of nano particles and thermal cycling. And from the results found that NPG+0.1%CuO has good thermal and chemical stabilities and also better thermal conductivity and specific heat compared to pure and other nano enhanced PCMs. By conducting an experimental analysis using two identical helmets, it was found that the interior surface temperature of the helmet with PCM was comparatively very less than the helmet without PCM i.e. about 19.6% reduction of the helmets interior surface temperature. And the PCM incorporated helmet can maintain this temperature inside the helmet at a comfort level for a sufficient time in standstill conditions.

Keywords: *Helmet cooling, nanoparticle, phase change material, solid-solid state.*

ANALYSIS OF BACKWARD FACING STEP FLOW

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Abstract: The aim of the present study is the numerical investigation of velocity, reattachment length in a 3-Dimensional, step flow channel. In the step flow due to the backward flow the eddies will generate and it causes variation in the flow parameters. The numerical works, design etc. are carried out by the software ANSYS. The analysis is done by the Fluent which is a commercial computational fluid dynamics package. It uses finite volume method to solve the equation. Geometry is done with the help of ANSYS workbench. The working fluid flow property is laminar in this study. This investigation is done with varying the expansion ratios as 2, 3.

Keywords: *Ansys Software.*

Borewell Child Rescue System

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Abstract: Open bore wells are always a trap. And the accidents can't be avoided till now. Therefore, an efficient and practical rescue system becomes necessary. But still the techniques are impractical. This project aims at designing a system which is capable of rescuing the child with ease, safe, and within less time. There are methods or techniques which can save the child from borewell. But it may be impractical to do it with a single method. Therefore, this project consists of multiple rescue methods, which provides a possibility of choosing the best method to save. In our project we plan to combine the various methods of rescuing, some of which do exist today. The design system is adaptable to the diameter of the bore well which varies from 4 inches to 12 inches. The project is intended to reduce the time taken to rescue and risk involved in the operation. Using sensors and camera, the depth, position, and state of the child is monitored. The system is then controlled to choose the appropriate robotic arm. With the help of it the child is prevented from falling into depth again. And the inflated balloon cushion is used to raise the child. The child is raised into rescue bag to avoid further scratches. Then the whole assembly is raised with the child safely.

Keywords: *balloon cushion, borewell, rescue bag, robotic arm.*

Experimental investigation of Solar Water Cooler

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Abstract: Using solar energy for cooling The cooling is done using Vapour Absorption Refrigeration System The heat required is obtained by harvesting solar energy Solar energy is harvested using vacuum tubes Same as the solar water heater. Supplying cold drinking water at public places where electric connection is not available. Reducing electrical energy consumption for cooling water

Combining vapor absorption refrigeration system with solar energy. Solar heat concentrators are used for harvesting heat from sun. This heat is used in the generator for separating ammonia from the ammonia water solution. The heating fluid is then recirculated for heating.

Keywords: *desalination, solar, vertical wind turbine, seawater*