CONFERENCE PROCEEDINGS

FOR

2nd NATIONAL CONFERENCE ON AUTOMOTIVE SYSTEMS DESIGN, MANUFACTURING AND INTEGRATION

(ASDMI 18)

ON

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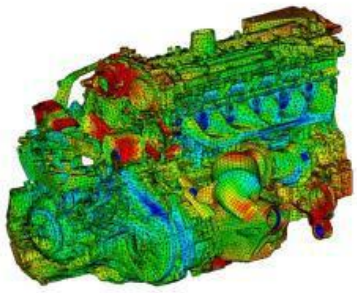

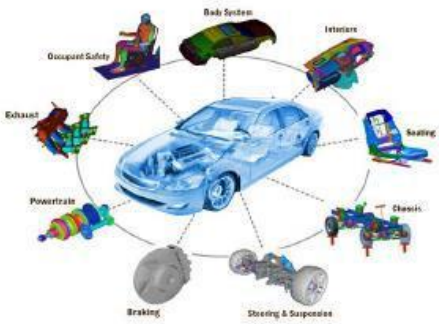

ORGANIZED BY

DEPARTMENT OF AUTOMOBILE ENGINEERING KUMARAGURU COLLEGE OF TECHNOLOGY COIMBATORE

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ABOUT KCT

KCT is an autonomous institution established in 1984, under the aegis of Ramanandha Adigalar Foundation, a charitable trust of the Sakthi Group. KCT is accredited by NAAC and affiliated to Anna University, Chennai. KCT is among the top ranking engineering institutions in South India with more than 5500 top quality students guided by over 350 experienced and dynamic academicians in 14 engineering and management streams with undergraduate and postgraduate programs. KCT situated in a 150 acre campus in the IT corridor of Coimbatore city has good infrastructure and facilities to aid academic research and study. Apart from its excellence in academics, the college also excels in co-curricular and extra-curricular activities. KCT imparts Gandhian philosophy and Indian values and ethics to its tech savvy students.

ABOUT DEPARTMENT

The department of Automobile engineering is committed in developing a resource pool of graduates and socially committed individuals, who are well-honed in various aspects. We have created state of the art laboratories and testing centres for practical training in the areas of Automotive Chassis, Engine performance, Vehicle Design & Dynamics, Automotive Electronics, Vehicle Maintenance and Vehicle Testing Track. We focus on industry exposure to the students and train them through Internship/Industry projects in the following Thrust Areas, Automotive Design, Automotive Electronics and Retail management. Our placement continues to hold an envious track record and research has found pride of place amongst students and faculty alike. Our department facilitates a good learning environment with newly updated labs, which provokes the students to pursue their degree in a practical manner.

ABOUT CONFERENCE

The ASDMI-18 conference provides a platform to understand the recent advancements in the field of Automotive Industry such as Electric and Hybrid vehicles, Dynamics of Vehicles, Noise Vibration and Harshness, emission control in IC engines etc. This is an opportunity for researchers and students to exhibit their research potential to the technical community. The conference aims to bring industry experts, academicians, scientists, research scholars and students to share inspiration and knowledge towards development of the society. The selected papers will be published in the Scopus indexed journal "**International Journal of Vehicle Structures and Systems**"

Dr. S John Alexis
HOD - Automobile Engineering

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Improved Mechanical properties of AA5083 reinforced with CNT for Automobile applications

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Abstract

Aluminium alloys are widely used in automobile applications due to its good mechanical, corrosion and wear resistance properties. The production cost of these materials is low and it was strongly consider for variety of applications. This work mainly focuses on the enhancement of mechanical properties of (Aluminium alloy) AA5083/MWCNT composites using a semi-solid state route (compo-casting method) and compare with the conventional AA5083 alloy. AA5083 and MWCNT microstructures were examined using Field Emission Scanning Electron Microscope (FESEM) and EDX analysis. The experimental results shows the enhanced Ultimate Tensile Strength (UTS) and Yield Strength (YS) for the composite compared to the corresponding values of AA5083. The hardness of the composite was tested using Brinell Hardness Tester (BHN) and the values are increased significantly.

Keywords— AA5083, Field Emission Scanning Electron Microscope, Ultimate Tensile Strength, Multiwall Carbon Nanotube, Yield Strength

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Comparative Approaches for Fatigue Life Estimation of Aluminium Alloy for Aerospace Applications

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Abstract

The objective of this paper is to estimate the fatigue life behavior of Al 7075-T6 using experimental and numerical methods for the purpose of aerospace applications. In this paper, initially static properties for the specimens are determined using Universal Testing Machine (UTM) under tensile loading. The cyclic bending load is applied on the material using fatigue test and the dynamic properties are determined. An experimental and numerical study is carried out to determine the fatigue strength and endurance limit values of Aluminium Alloy 7075 – T6 at different types of loading. The fatigue strength and structural integrity of the Aluminium Alloy 7075 – T6 are investigated using S-N Curve. In numerical simulation, the reference model of this paper has been modelled by CATIA and thereby it imported into Ansys Workbench 16.2 to investigate the stress distribution and number of cycles to failure of an Aluminium Alloy 7075 – T6 under tensile loading. The mechanical properties are evaluated using both the approaches and finally the comparative study is carried out.

Keywords: Aluminium Alloy 7075-T6, Tensile Test, Fatigue Test, S-N Curve, Endurance Limit, Goodman Equation

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Numerical Study on Stress Distribution in Ultrasonically Welded Electrical Contacts used in Automotives

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Abstract

Numerical stress analysis is vital while joining an electrical contact comprising of copper wire and copper sheet using ultrasonic metal welding process in many of the automotive applications to envisage the strength of the joint before actual manufacturing resulting in enhancement of the reliability of the automotive products. During ultrasonic metal welding, shear and normal force act at the interface between the welded specimens. These forces are the result of ultrasonic vibrations transmitted by sonotrode onto the welded specimens. In this work, the distribution of the stress developed at the interface and the correlation of the developed stress with strength of joint are studied. The theoretical stress values are determined using various levels of ultrasonic metal welding process parameters such as clamping force, vibration amplitude and weld time to validate the results of stress obtained from finite element analysis. The results of stress from numerical analysis are found to be in good agreement with that of results obtained from the theoretical calculations.

Keywords: Ultrasonic metal welding, weld strength, finite element method, stress distribution, solid state welding, clamping force, vibration amplitude, weld time, normal force, plastic deformation.

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An Experimental Analysis of Hybrid - Pyramid type Solar Desalination with Concentric Parabolic Collector (CPC)

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Abstract

Solar energy is a suitable green technique for purifying brackish water and also for rejecting salts from saline water. This paper deals with the experimental studies and performance analysis of Hybrid pyramid type Solar Desalination with Concentric Parabolic Collector (CPC).The data have been collected for the composite climate condition of Coimbatore. In this paper, we made comparisons and the performances of still with the collector and without the collector. To increase the distillate output of the solar still is our ultimate aim and this can be achieved by either increase the water temperature or decrease the condensing cover temperature. Here we are increasing the water temperature by using parabolic collector. The still with the collector gives higher productivity than still without collector and it is the best solution for lack of potable water in remote regions.

Keywords: Solar still; Hybrid desalination system; solar energy; Pyramid solar still; concentric parabolic collector

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Effect of Premixed Diesel Fumigation (PDF) on Performance and Emissions Characteristics Lean Burn HCCI Engine

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Abstract

This study analysis the effect of premixed diesel fumigation on performance and emissions characteristics of Homogenous charge compression ignition (HCCI) engine and optimise the diesel fumigation temperature. The experimental investigations were carried on single cylinder, four stroke, water cooled, port injected kirloskar SV1 engine. For this research, the engine was modified as HCCI engine with electric air heater, fixed at suction pipe. During the experimental investigation the diesel fuel was premixed by the port injector and vaporised or fumigated the fuel by heated suction air. After hearing process, the diesel has change their phase and mixed with air and form partially homogenous mixture. During the test, the engine was operated with different diesel fumigation temperature such as 100^{0}C, 110^{0}C, 120^{0}C, 130^{0}C, 140^{0}C and 150^{0}C and observed the performance and emissions characteristics of the engine. From the results, to identify the effective diesel fumigation temperature for creating better homogeneous charge based on HCCI engine performance. From the results, it is observed that the diesel fumigation made the huge impact on NOx and smoke formation. The level of NOx and smoke emissions were decreased simultaneously as 10% and 16% compared to compression ignition (CI) engine. At the same time, the HCCI engine has emitted high CO and HC emissions at low fumigation temperatures and it has been reduced at high fumigation temperatures, because of improved combustion temperature. The suction air temperatures of 120^{0}C and 130^{0}C operated HCCI engine were registered low NOx and smoke emissions. In the performance point of view, the HCCI engine consumed much more fuel due to low volumetric efficiency and it was slightly doped in brake thermal efficiency (BTE) as well.

Keywords: Lean burn engine, HCCI engine, Diesel fumigation, Low NOx, Suction air heating.

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Experimental Investigation on Effect of Humidity on Condensation Process in Vapour Compression Refrigeration System

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Abstract

Cold chain transportation had been evolved in l940s. In today's world the developed countries are rely on the refrigerated vehicles (reefer) for the transportation of cold chain products. In India this technology was introduced in late 1980s but the growth was very slow compared to other countries and failed to match the international trends. However recently, with fast development of roadways, urbanisation and connectivity the reefers gets a massive response the reefers has several advantages but it consumes considerable amount of electrical energy to operate. Reefers works based on vapour compression refrigeration cycle in which Condenser is an important device. This condenser uses fan-blown atmospheric air over it to `remove heat of vaporization from refrigerant. The temperature of refrigerant after condensation has effects on cop of refrigeration system. This temperature can be altered by the relative humidity of air. The results of our project shows that the increase in air humidity by 18.60% increases the COP by 11.37% and also it reduces the power consumption.

Keywords – Reefer, cold chain, Refrigeration, condenser, humidity.

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Design and Fabrication of Box Transport Mechanism

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Abstract

The main aim of this concept is to transport boxes and time savings in industries by converting the manual work into automation using mechanisms. Here we have fabricated the Box Transport machine. This is the mechanism used for transporting material automatically. It is the simple and efficient method. This project consists of the following parts like Spur gear, Bevel gear, rotating disc, bearing, frame and DC motor.

Keywords – Box transport machine, gears

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Mathematical Modeling and Attitude Control of Quadcopter Based on Classical Controller

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Abstract

The development of vertical take-off and landing (VTOL) aircrafts has been increasing in recent years due to growing demands in various sectors for critical missions and time saving purpose. There are number of configurations exists for VTOL airframe such as single-main- rotor, tandem rotor, coaxial rotor, tri-rotor, quad-rotor, hexa-rotor. Among various configurations quad-rotor and hexa-rotor configurations have been chosen frequently for various applications through miniature aircrafts. The components and subsystems of such configurations have been widely available for easy integration and flight tests. In addition to that, classical control methods such as proportional-integral- derivative (PID) controllers have been widely employed for better control of such aircrafts with stable operation. Even though the control methods are available with high performance flight controller boards, the attainment of quicker attitude response and better stability will be a major problem during the flight testing phase for quadcopters and hexacopters. Therefore, instead of directly going into the development of quadcopters, there should be a need for simulating their responses with models of actual configuration. In this paper, a quadcopter dynamics for roll, pitch, and yaw have been modeled as mathematical equations and its response have been simulated in MATLAB using classical control tools. The results have shown that the modeled dynamics respond faster with better stability.

Keywords – Quadcopter, Dynamic response, Stability analysis, Classical Control, MATLAB.

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Numerical Investigation of pressure drop for various models of catalytic converter to Capture CO2 Emission using Activated Carbon

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Abstract

Internal combustion engines are found to be extensively used in both mobile and stationary applications. The major drawbacks in diesel engines are the release of harmful gases like HC, CO, NOx and PM into atmosphere. There is several pre combustion and post combustion techniques are available to control these emissions effectively. Although CO2 emissions from I.C engines considered as a regulated emission but it is a leading contributor towards Green house gases. In this work a numerical investigation on backpressure was carried out by varying porosity factor of activated carbon. Activated Carbon seems to be viable substance to capture CO2 emission from diesel exhaust. To evaluate the backpressure a analysis was carried out using CFD Ansys fluent software. In the present investigation an analysis is carried out by placing activated carbon at three different variations. Then the analysis are done by varying three different porosity percentages 30,35 and 45 by placing activated carbon at three different locations. Final study reveals that activated carbon placed at PC35-3 layout shows optimum backpressure and high filtration efficiency while compared with other two layouts.

Keywords— Carbondioxide, backpressure, Filtration efficiency

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Drilling simulation of Fibrous Composite

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Abstract

Drilling of composite material is more complex than conventional drilling. As material removal of isotropic material is uniform than composite material. The cutting edge of drill bit will damage the composite material and removes the fibre in indefinite manner. Improper holes in composite material will cause improper assembly and even can cause premature failure of components made with composite material such as CFRP, Carbon fibre, glass epoxy. By estimating optimal machining parameter such as Feed rate and cutting speed, machining of improper holes in composite material can be eliminated. Optimal machining parameter can be estimated by simulation of composite material. Simulation is performed with help of Abaqus/Explicit software from Simulation.

Keywords—Abaqus, Composite, Lamina, Laminate, Ply, Failure, Fibre, Braid, Delamination, VUMAT

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Fabrication, Analysis and Testing of Smart Adaptive Composite Beams

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Abstract

The presented research involves two types of Smart adaptive composite beams (SAC). The study was conducted on smart composite beams composed of LY5210 and EPOLAM 2063 resin systems respectively. The fabrication of composite beams involved embedding SMA wires in between layers of 0/90 woven glass fiber in the respective resin systems, followed by suitable curing and post curing cycles. Suitable mould was designed and manufactured to facilitate the required pre-straining of SMA wires. Both static and dynamic tests were done on the SAC specimens to study the behavior of these SACs. Static and free vibration analyses were carried out using MSC Nastran and Hypermesh. There has been good agreement between the results of finite element analysis and the experimental results.

KEYWORDS: Smart composites, free vibration, Modal analysis, Natural frequencies, Shape Memory Alloys

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Geometrical Optimization of Bumper Beam profile made of Advanced High Strength Steel

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Abstract

Bumper is commonly known as cross beam, attached to the Front and Rear end of the vehicle to absorb more energy during vehicle crash, also to prevent from permanent deformation in the BIW and other sub systems like engine, cooling system, radiators etc. Bumper is also used to improve the crashworthiness during vehicle crash. Bumper system plays a significant role during low speed impact when the vehicle moves slowly in heavy traffic or while parking. Inconsistent structural design of bumper can cause more damage and increase the cost of reparability, since it does not absorb more energy during vehicle crash causing damage in BIW. In this paper we are going to study about shape and material optimization of the bumper beam to improve the efficiency during the low speed impact and also to reduce the mass of the bumper beam using Non-Linear Programming by Quadratic Lagrangian technique. CAE method has been used to validate the performance of bumper beam using low speed impact test regulation proposed by Insurance Institute for Highway Safety.

Keywords: Bumper, vehicle crash, CAE

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Experimental investigation and optimization of Abrasive Water Jet machining of Aluminum Alloy using SiC abrasive particles

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Abstract

Investigation on the parameters variation over the Abrasive water jet machining of aluminium 2014 alloy was studied using the Taguchi Technique. Traverse speed, standoff distance, pressure and mass flow rate were considered as the process parameters and were varied at three levels. Depth of cut was taken as the response and it was measured and analyzed statistically. The optimal parameters to achieve the maximum depth of cut was identified with the main effect plot. Most influencing parameters over the depth of cut was identified with the analysis of variance and response table. Mathematical relationship was developed to predict the depth of cut out of the design.

Keywords - AA2014, Taguchi methodology, Depth of cut, Optimization.

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Comparison of Performance and Emission Characteristics of a CI Engine Fueled with Dual Blends: Palm, Sesame oils and Diesel

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Abstract

Biodiesel can be considered as a clean, renewable and domestically produced diesel fuel. At present, a lot of research is being carried out to make biodiesel more efficient so that it can be substituted for conventional diesel. Biodiesel falls under physical/chemical standards of diesel, it does not emit Sulphur on burning, is bio-degradable, environment friendly and non-toxic. Anything which improves the performance of engines with biofuels is a boon to the present world. In the present investigation biodiesel is extracted from palm and sesame oil by trans-esterification method. The different properties of biodiesel like flash point, fire point, density, viscosity, pour point, cloud point and calorific value are measured. The obtained values are meeting the standards of biodiesel. This dual biodiesel were blended with diesel (0-40%) and were tested in a 4 stroke single cylinder diesel engine at different loads. The performance characteristics like thermal efficiency and BSFC are compared for different blends with diesel for different load. It shows that the Specific fuel consumption increases and thermal efficiency decreases with percentage increase in blends at higher loads. But at part load biodiesel blends are more efficient. Emission contents like carbon monoxide, carbon dioxide, Hydrocarbon, oxides of nitrogen and smoke density are recorded and for B10 and for B20 blends these contents are more compared to diesel.

Keywords- Biodiesel, methanol, sodium hydroxide, palmoil, sesame oil, free fatty acid, transesterification

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Evaluation of Human Exposure to Vibrations using Semi–Active Suspension

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Abstract

Exposure of human body to vehicular vibrations in transit may lead to the human discomfort. Ride comfort is one of the major issues in design of automobiles. Magnetorheological (MR) dampers are emerging as most feasible solution for various applications in controlling vibrations. An MR damper is a semi active device, which will offer the advantages of both active and passive suspension. In this study, the MR damper based semiactive suspension system for a car is analysed for ride comfort of 7DOF model human body lumped mass, considering head, upper torso, lower torso and pelvis, seated over a seat of a quarter car model and is compared with that of similar system using passive damper. A MR damper is fabricated and is filled with MR fluid made of Carbonyl iron powder and Silicone oil added with additive. Modified Bouc-Wen Model developed by Spencer is used to model the behaviour of MR damper. All the parameters of this model are identified using data acquired from experiments conducted to characterise MR damper. Further, using the Spencer model of MR damper, the human body seated over quarter car is simulated by implementing a semi-active suspension system for analysing the resulting displacement and acceleration of the human body. The ride comfort performance of vehicle model with passive suspension system is compared with corresponding semi-active suspension system. The simulation and analysis are carried out using MATLAB/SIMULINK.

Keywords- Magnetorheological dampers, Suspension systems, Spencer model, human body.

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Automobile safety systems – A review

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Abstract

Automobiles are an integral part of our life. They were initially intended for efficient transport of people and goods. This eventually led to the increase in the demand for more efficiency which in turn resulted in the increase of the speed of transportation. While this may sound very advantageous, it has overshadowed the risks involved in high speed driving. This has resulted in an increase in the number of accidents. In the light of these accidents many researches started to progress in the field of safety – of passengers, goods and the vehicle itself. But this doesn't mean high speed driving is the sole cause for accidents. Accidents can happen because of various unexpected events as they depend on various factors like quality of the components used in the vehicle, driving skill of the driver, environmental conditions and so on. Therefore, accidents themselves can be of various classifications. As for the safety systems involved, some of them are focused on certain type of accidents and most of them are focused on frontal collisions. A new trend observed in the safety systems now a days is that a certain amount of it is also being focused on pedestrian safety. But the capital involved in the development of such safety mechanisms is high and hence most of the advanced safety mechanisms tend to be present only in the premium vehicles. This bluntly means that such safety features never reach the entry level markets as the products in this segment are relatively cheap. This increases the risk of accidents. However, in recent times this problem is gradually being recognized and many regulations are being implemented to mandate some necessary safety features in all vehicles. This paper will focus on the existing safety systems that are currently in use and their effectiveness.

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Thermal characteristics of a cylindrical heat pipe using multi-layer screen mesh wick

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Abstract

Heat Pipe is the most widely used heat exchanging device in removal of heat from any given system at a faster rate. The thermal characteristics of heat pipe with single and multi-layered screen mesh wicks have been observed with two working fluids water and acetone. Heat pipe of length 250 mm and 12.7 mm outer diameter, made of copper material is used in all the trials of with and without wick structure. A 100 mesh stainless steel screen wire mesh is chosen as wick structure. Experiments were conducted at different heat loads and various inclinations with 100% fill ratio in evaporator. And the performance is measured based on total thermal resistance and overall heat transfer coefficient. The heat pipe is found effective at 60^{o} inclination with acetone as a working fluid and with four layered screen mesh wick. Uncertainty in thermal resistance and heat transfer coefficient is calculated for a heat input of 10W at 0^{o} and 60^{o} inclinations.

Keywords—heat pipe; screen wire wick; multi-layer screen mesh, uncertainty

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An approach to optimize the passenger seating capacity and other facilities of coaches in Indian Railways

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Abstract

Among different modes of transportation, travel through train is very comfortable and enjoyable especially for people those who are travelling long distance. Population of people increases day by day and hence the requirements also increases in par with the population. Due to increase in population, most of them are not getting the seats at times. In order to overcome this, number of seats could be increased without modifying the outer dimensions of the coach which will be helpful and beneficial for the required people. The proposed idea is to increase the passenger carrying capacity of coaches of Indian Railways from 72 to 84 per coach. 12 seats per coach is increased when compared to existing non-AC 3- tier sleeper coach. Separate ladder provisions for climbing on to the upper compartments, additional windows, power socket for each seat are also provided.

Keywords— passenger carrying capacity, Comfort journey

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Performance and Emission study on Diesel engine using waste cooking oil with methanol as additive

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Abstract

Day by day, the number of vehicles used for transportation are increasing. Due to this, the environment is degrading and the fossil fuels are depleting. In this paper, an attempt has been made to reduce the pollution by mixing diesel and waste cooking oil with methanol as assistive. Performance and emission study has been done in various proportions. The properties such as the flash point, fire point, kinematic viscosity and the calorific values of the blends with and without additive are determined. Then all the biodiesel blends are used as fuel separately in the diesel engine. The engine performance as well as emission characteristics have been determined and compared at different blends. The blends with additive showed better properties and reducing in emission characteristics compared to neat blends. It is observed that, emission of CO is decreasing with increasing waste cooking oil and methanol quantity in the blends. Fuel consumption was more for the higher percentage blends with respect to increasing brake power. The emission of UBHC and NO x is reduced significantly with addition of methanol to fuel mixture due to higher oxygen content and heat of vaporization.

Keywords— Waste cooking oil, CO, NO x, UBHC, Methanol

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Development of Park and Reverse Assist and Automatic Side View Mirror Folding System

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Abstract

Vehicle automation, autonomy and connectivity is a subject of mechatronics integrating many engineering disciplines including electrical, mechanical, control, and computer engineering (and technology). It is fundamentally changing the concept of automobile transportation and manufacturing. Therefore, developing new, technologically progressive curricula and hands-on lab as well as student project materials is desired to prepare for the future workforce needs of autonomous cars in the automotive industry. This "Automatic Vehicle Parking System" is a research and concept-proving project that will be prepared and extended to develop teaching materials for courses and students project on the subject of vehicle automation, autonomy and connectivity. In this project, an RC (remote-controlled) toy car is modified by integrating ultrasound sensors and Arduino with a high current shield to control the vehicle movements and the parking processes. Parking strategies and the corresponding algorithms are explored and programed through Arduino. During testing, the car is able to move to detect the imitated "roadside" environment, judge a space suitable for parking or not, and then drive to park automatically. This paper proposes vacant parking slot detection and tracking Collision accidents often occur during parking or reversing cars. In allusion to this point, this paper conducts a review of literatures on automatic parking. To begin with, a brief introduction of automatic parking including its background and significance is given. Then its commercial application, research status and latest progress are summarized which include visual perception, ultrasonic sensors and radar technology, path planning, control algorithms based on fuzzy theory, neural network, image processing and recognition technology, and digital signal system that fuses sensors.

Keywords: Parking Assist System, IR Sensor, Micro Controller.

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DEVELOPMENT OF FUEL MEASURING DEVICE

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Abstract

Theft in petrol bunk is widely happening throughout the country, which could not be found exactly by the customers while refilling. Moreover increasing fuel prices adds to the frustration of a fuel theft. This project focuses on the fuel theft problem and puts forward an effective solution for this problem. It senses the amount of fuel in tank and visually displays it to the user. It successfully detects fuel thefts using a unique method. It consists of a flow sensor which is being placed in passage of fuel tank, it helps to measure the exact amount of fuel refilled It actively keeps the record in the vehicle in the petrol bunk.of the fuel entering the tank and the fuel present in the tank at any given time in the dynamic memory of the arduino and is displayed using LCD display. If the fuel is low, the system suggests the commuter to refuel as soon as possible. If the fuel gets critically low, the system alarms the commuter to refuel immediately. This proposed method can identify petrol theft and is useful to people who opt for long rides. This system is designed to cut down the cost and increase the level of accuracy.

Keywords— Flow sensor, fuel gauge.

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DEVELOPMENT OF AUTOMATIC FRESH AIR INTAKE AND WINDOW OPENING SAFETY SYSTEM FOR FOUR WHEELERS

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Abstract

The main aim of the project is to maintain the availability of oxygen in the cabin of the car by controlling the carbon dioxide level to prevent the passengers from unwanted experience like dizziness, lack of breathing, headache etc. by switching the air intake mode on the air conditioning system on the car. Even more if the passengers are more than the car the oxygen level will not be sufficient so in that case the window of the car is opened automatically by a control unit which gets its input from the Gas sensor which is placed inside the car, is the two operations involved in this project. The main process involve the detection of the carbon dioxide level inside the car when on two operating modes which is the recirculation mode and fresh air intake mode, in this process mainly in the recirculation mode the amount of CO2 content gets increased due to large amount of exhalation by the passengersat 553ppm this is dangerous for a human's body so to prevent this a gas sensor is placed in the car's cabin to detect the level of carbon dioxide in the overall cabin space of the car which gives the signal to the controller that the carbon dioxide level is increasing fast and countermeasures should be taken in this case the fresh air intake mode is turned on by the signal of the controller with the car's ac system. In some rare cases even, this mode change is not enough for the amount of CO2 produced to the rate of supply, like when the passengers over all air intake is higher due to their height and age factor they may suffer even more lack of oxygen that means at 700ppm of CO2, in that case the windows are lowered by the control unit by the input of sensor to the control unit. This the overall working of the project we work on.

Keywords— Oxygen Sensor, MQ135, Air Conditioning.

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DESIGN AND FABRICATION OF SHUTTLE VEHICLE FOR DIFFERENTLY ABLED DRIVERS

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Abstract

The main aim of the project is to design and fabricate a shuttle vehicle for the comfortable driving of differently abled persons. It uses an IC engine with high mileage performance(about 35 km/ litre) and low emission rates. It will be useful in providing employment opportunities for differently abled persons as drivers. The Vehicle uses handle bar steering system which makes a comfortable driving experience for the differently abled persons. It is cost efficient and involves simple manufacturing process. Suspension system is designed in favor of differently abled persons that absorbs maximum shocks that provides comfortable riding. The hand controlled styling offers stability with a wider base support and also provides increased independence to the driver by overcoming the balancing issues. Scrap materials are largely used up for the fabrication, so the cost of the product is minimized to a larger extent and which gives financial freedom for the further development of the project.

Keywords— Shuttle vehicle, handle bar steering, cost efficient, differently abled persons.

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COMPARISON OF REACTION TIME USING CONVENTIONAL AND SINGLE PEDAL MECHANISM

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Abstract

The purpose is to predict the driver's reaction time in switching from accelerator to brake in both conventional and single pedal system. Reaction time is the time taken for a person to respond to an event, in this case it is the time taken for the driver to lift his foot from accelerator pedal and apply the brake pedal. It gives an idea about how quickly a person reacts to a change in the environment and measures the time taken for mental operations to become practical operations. The measure of reaction time is very important in driving a car which require rapid responses. Slower braking reaction while driving a car can result in dangerous consequences. So, a survey on pedal design is done and the single pedal system is designed on the basis of survey. An experimental setup with a timer circuit is designed and constructed for both the conventional and single pedal system and the investigation on reaction time for both the systems is done by virtually creating the road traffic environment.

Keywords— Accelerator pedal, brake pedal, cost efficient, braking.

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Modelling of cavitation and aeration effects on a Gerotor pump of a Lubricating System in Automobiles

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Abstract

In an internal combustion engine, lubrication system acts as an auxiliary system, proper operation of it is essential for optimal performance of an engine. Mostly, positive displacement pumps are used for pumping the lubricating oil at constant flow rate at a given speed. In that, Gerotor pump is a commonly used pump. Cavitation effects the volumetric efficiency of the pump, which in turn influenced by operating conditions like speed of the pump, suction pressure etc. The current study using 3-D pump flow simulation tool, Simerics-MP+ [1] revealed that the cavitation bubbles form near the teeth of the rotors on the suction side. The location at which the bubbles expand, and collapse are correctly predicted at two different configurations and its effect on the performance is validated with the experimental data.

Keywords — Gerotor pump, Cavitation, Vapor mass fraction, Total Gas mass fraction, Volumetric efficiency

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Development of park and reverse assist and automatic side view mirror folding system

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Abstract

Vehicle automation, autonomy and connectivity is a subject of mechatronics integrating many engineering disciplines including electrical, mechanical, control, and computer engineering (and technology). It is fundamentally changing the concept of automobile transportation and manufacturing. Therefore, developing new, technologically progressive curricula and hands-on lab as well as student project materials is desired to prepare for the future workforce needs of autonomous cars in the automotive industry. This "Automatic Vehicle Parking System" is a research and concept-proving project that will be prepared and extended to develop teaching materials for courses and students project on the subject of vehicle automation, autonomy and connectivity. In this project, an RC (remote-controlled) toy car is modified by integrating ultrasound sensors and Arduino with a high current shield to control the vehicle movements and the parking processes. Parking strategies and the corresponding algorithms are explored and programed through Arduino. During testing, the car is able to move to detect the imitated "roadside" environment, judge a space suitable for parking or not, and then drive to park automatically. This paper proposes vacant parking slot detection and tracking Collision accidents often occur during parking or reversing cars. In allusion to this point, this paper conducts a review of literatures on automatic parking. To begin with, a brief introduction of automatic parking including its background and significance is given. Then its commercial application, research status and latest progress are summarized which include

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visual perception, ultrasonic sensors and radar technology, path planning, control algorithms based on fuzzy theory, neural network, image processing and recognition technology, and digital signal system that fuses sensors. The parking slot occupancy classification stage identifies vacancies of detected parking slots using ultrasonic sensor data. Parking slot occupancy is probabilistically calculated by treating each parking slot region as a single cell of the occupancy grid. The parking slot marking tracking stage continuously estimates the position of the selected parking slot while the ego-vehicle is moving into it. During tracking, In the experiments, it is shown that the proposed method can recognize the positions and occupancies of various types of parking slot markings and stably track them under practical situations in a real-time manner. The proposed system is expected to help drivers conveniently select one of the available parking lots and support the parking control system by continuously updating the designated target positions. Automatic parking technology has become a popular research topic. Automatic parking technology can complete parking operations safely and quickly without a driver and can improve driving comfort, while greatly reducing the probability of parking accidents. An automatic parking system based on parking scene recognition is proposed in this paper to resolve issues with existing automatic parking systems. Collision accidents often occur during parking or reversing cars. In allusion to this point, this paper conducts a review of literatures on automatic parking. To begin with, a brief introduction of automatic parking including its background and significance is given. Then its commercial application, research status and latest progress are summarized which include visual perception, ultrasonic sensors and radar technology, path planning, control algorithms based on fuzzy theory, neural network, image processing and recognition technology, and digital signal. Both of the rocker switches inside the power mirror switch are constantly connected to the vehicle's electrical ground circuit with the switch at rest. When you press the switch in any mirror direction, the switch connects one of the two wires of a motor to power (12 volts DC) while

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keeping the other circuit connected to ground. Electricity then flows through the switch to the DC motor and the mirror head moves in the intended direction. If you press the same switch to the opposite direction, you are reversing the electricity to the mirror motor and the mirror moves in the opposite direction.

Keywords — Parking Assist System, IR Sensor, Micro Controller.

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Design Of Energy Efficient Building Using Phase Change Material

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Abstract

Energy efficient building is a eco-friendly approach to minimize the energy utilization for like natural lighting, thermal comfort, ventilation. This energy efficient building construct to the passive system used for cooling purpose of the building. This concept mainly reduces the roof temperature of the building by using phase change material insulation. Basic building is construct concrete roof and this type building construct insulated phase change material (paraffin c22-c45) roof. The sun rays directly penetrated to the roof to be avoided. The roof heat is absorbed by the phase change material when day time and release the heat from night time through the atmosphere. Every month whether data to be using calculate the maximum temperature. That temperature to apply the building roof and analysis the indoor and outer temperature. Maximum indoor temperature is reduced and provide comfort cooling for humans .so avoid for external energy utility for cooling .in this type of technique mostly use the commercial , apartment building . It is avoid the energy utility loss and carbon- di-oxide emission.

Keywords— RCC concrete, Phase Change Material, Insulation material, Heat gain.

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Design And Fabrication Of A Piezoelectric Energy Harvester

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Abstract

The purpose of Energy harvesting for powering the wireless electronic sensors systems has developed enormously in the last few years. The most common piezoelectricdevice which uses the piezoelectric effect for cantilever beams at the resonance condition toharvest power from the mechanical force or the ambient vibrational energy. The geometrydesign of piezoelectric cantilever beam will affect its vibrational energy harvesting. Thevibrational energy harvesting in the most widely recognised as the useful for saving energy.An energy harvesting device with a zinc oxide thin film was formed by a silar technique onthe steel substrate. Vibration in the vertical direction, which induces the bending vibrationalstress on the cantilever, was applied to the device and the output voltage was measured byconnecting load resistances. It is shown that the harvester energy has significantly increasesby optimizing the piezoelectric harvester design.

Keywords— ZnO thin film, piezoelectric, nano materials.

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Parametric Optimization Of Abrasive Water Jet Machining Using On Inconel X750 Alloy By Taguchi Methodology

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Abstract

The high strength alloy inconel x750 alloy used in gas turbine blades, seals, combustors, turbocharger rotors, electric submersible pump shafts, pressure vessels, heat exchanger tubing, steam generator and core components in pressurized water reactors have good toughness is difficult for machining using traditional method. This study deals with abrasive water jet machining of inconel x750 alloy by varying the input variables such as pump pressure, traverse speed and standoff distance on the material removal rate was calculated. in this experiment, abrasive flow rate, nozzle diameter and abrasive particle size kept constant. The input parameters such as pump pressure, traverse speed and standoff distance varied in three different levels and the results were found. It is concluded that the material removal rate will be increased when the pump pressure, and traverse speed increased and the material removal rate will be decreased, when standoff distance increased. In the present paper an attempt has been made to optimize the awjm process parameters of inconel-750 using taguchi methodology.

Keywords— Abrasive water jet machining, Inconel x750, Taguchi method

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Evaluation of Tribological behavior of LM24 Reinforced with Nano Alumina

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Abstract

Metal Matrix Nano composite material differs from the conventional composite material for offering high surface to volume ratio of the reinforcing phase. In this research work, liquid metallurgy route says, stir casting technique employed to fabricate the nano composite material. The fabrication of nano composite material was conducted with the distribution of 1.5 wt% of nano aluminium oxide powder in the molten aluminium alloy of LM24. Wear behavior of the nano composite was evaluated using the pin on disc wear testing machine based on Design of Experiments approach. Experimental parameters such as applied load (10,20and30N), speed (300,400,500 rpm) and track diameter (60,70,80cm) were varied for three levels. Signal to noise ratio and Analysis of variance were also performed. Wear plots of the experiments revealed that wear was increased with increase in load and decrease with increase in speed. Signal to noise ratio plot showed that load was the significance over the wear rate followed by the speed and track diameter. Inverted microscopy was adopted to analyze the worn surface and from micrograph, it showed that the abrasive wear mechanism subjected to the wear experiment which was performed.

Keywords— Wear, Nano Alumina, Taguchi method, Nano composite material.

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Development of fuel measuring device Effect of Equal Channel Angular Pressing (ECAP) on Mechanical Properties of Al-5052 Alloy

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Abstract

Equal channel angular pressing of aluminium alloy leads to enhance the strength and grain refinement. ECAP has been effectively used in the Microstructural refinement of almost all thee structural materials. In the present work, an aluminium was processed by ECAP via route BC using a die formed by two channels connected at an angle Φ=90◦. The grains were significantly refined after 2 passes for ECAP processed billets. Before the ECAP Process, Al 5052 alloy was subjected to the annealing treatment to relieve the thermal stresses was introduced during the machining. The ECAP specimens were analysed using tensile property and microhardness measurements. The experimental results revealed the increase in yield and tensile strength and microhardness values as compared to the base material.

Keywords— Aluminium alloy 5052, ECAP,Tensile properties, Microhardness.

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Design Of Controller For Braking System In Vehicle

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Abstract

A electric vehicle has a steering motor and adriving motor for each wheel, for a total of eight motors. Almost all of the existing path-trackingcontrollers for this vehicle are designed by viewing the mathematical model of the vehicle as the system of equations and are mathematically sophisticated. In contrast, this work presents a block diagrammatic representation of the model and exploits the natural feedback loops revealed through this representation to develop two novel and useful results: (a) a mathematically simpler path-tracking controller that promises to be easier to tune, and (b) a constraint on the wheel accelerations that helps constrain the wheel slips to a desired value. Simulations illustrate this solution.

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Noval approach of implementing Effortless maneuverability in Vehicle for physically challenged

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Abstract

Automobile is a comprehensive invention whichbecame a basic need for every human. But some modificationswere necessary in Automobile Design in case of differently abled person. The existing vehicle comprises with usual hand twist acceleration, hand lever braking and handlebar steer control. Conventionally, three wheeled rear axles are used by physically challenged person. If the physically challenged person is about to park his vehicle then he should get down to move the vehicle. Hence a reverse drive feature is proposed in our vehicle which can help them to move in reverse direction when they are in seating position. In our proposed vehicle, the acceleration can be controlled either by right hand twist accelerator in handlebar or by foot pedal. The acceleration switch determines the working of accelerators. For left hand impairment, they can switch to foot pedal acceleration. Here the rear braking is applied by left hand brake lever or foot brake pedal (to apply rear brake if they are left hand impaired).

Keywords—automobile; reverse drive; acceleration; footpedal

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Emission Reduction in SI Engine by Preheating of Catalytic Converter using Glow Plug

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Abstract

Automobile vehicles emit substantial quantities of hydrocarbons (HC), carbon monoxide (CO), Nitrogen Oxides (NO_X) and particulate matter. Catalytic Converters implemented in motor vehicles have aimed substantially at reducing harmful emissions from motor vehicles. The Catalytic Converter does an excellent job at converting the gases, but it's efficiency can still be improved to a larger extent. One of its biggest shortcomings of the converter is that it activates only at the light-off temperature (i.e.) 400 degree Celsius.Thus, at cold start and idling conditions, the Catalytic Converter is inactive and the gases are passed straight through it. Preheating the Catalytic Converter is a suitable and quick way to reduce emissions. The easiest way to preheat the Converter is to use an Electric Coil (or) an Electric Heater. The heating element supplies heat to the Converter. But, adopting this technique can be quite a tricky task as the positioning of heater is not easy and this may affect safety.The easiest way to preheating is the usage of Glow Plugs. These plugs are placed by the drilling holes in the Converter. The number of Glow Plugs directly determines the rate and rise of temperature of the Converter. The Converter quickly reaches the light-off temperature level due to the heat supply from the Glow Plugs and the sensible heat of the exhaust. This in turn helps the faster light off of the Converter and reduction in HC and CO emissions.

Keywords—emission, catalytic convertor, preheating

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