ROHINI

COLLEGE OF ENGINEERING AND TECHNOLOGY

Approved by AICTE and affiliated to Anna University,(An ISO Certified Institution)

International Conference on

Advances in Mechanical Engineering and Research

ICAMER 20

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The "International Journal of modern Trends in Engineering and Research" (IJMTER) is a peer-reviewed, monthly, online international research journal, which publishes original articles, research articles, review articles with top-level work from all areas of Engineering Research and their application including Computer Science, Cyber Security, Neural Network, Computer Network, Mechanical, Civil, Electrical, Chemical, Electronics etc. It's a leading e-journal, under which we encourage and exploring modern ideas of emerging trends in Engineering by publishing papers which containing pure knowledge. It's started with noble effort to help the researchers in their field and also share knowledge and research ideas. The journal reviews papers within two weeks of submission and publishes accepted articles on the internet immediately upon receiving the final versions.

JUNE 25
2020

ROHINI College of Engineering and Technology
Department of Mechanical Engineering

INTERNATIONAL CONFERENCE ON ADVANCES IN MECHANICAL ENGINEERING AND RESEARCH

ICAMER'20

(25th June 2020)

CONFERENCE PROCEEDINGS

ROHINI COLLEGE OF ENGINEERING & TECHNOLOGY
Near Anjugramam Junction, Kanyakumari Main Road, Palkulam, Variyoor P.O - 629401
Kanyakumari Dist, Tamilnadu., E-mail : admin@rcet.org.in, Website : www.rcet.org.in
DEPARTMENT OF MECHANICAL ENGINEERING

ABOUT THE COLLEGE

Rohini College of Engineering and Technology (RCET) - a temple of learning, is an ISO certified institution was founded in the year 2012 by the great Industrialist and Philanthropist, Shri. K.Neela Marthandan and now managing by his son Dr.N.NeelaVishnu. It is located at Palkulam near Anjugramam junction & Kanyakumari, the southernmost town in India. RCET is about 5 km from the Kanyakumari railway station and 14 km from Nagercoil junction. RCET is approved by All India Council for Technical Education (AICTE), New Delhi & affiliated to ANNA University, Chennai since 2012. The main feature of the college comprises world-class infrastructure with experienced and talented faculties, excellent pass percentage, good placement records and society-oriented products/projects developed by the students. The main objective of our college is to advance the knowledge base of the engineering professions and to influence the future directions of engineering education and practice.

RCET - Best Engineering College in Nagercoil, Kanyakumari District. We believe not only in educating the students but also in grooming characters, with moral and ethical values to build the nation. Since the beginning, the college has been providing world-class facilities & infrastructure in education and learning. The emphasis is on transformational leadership rather than directional leadership. We aim to establish new trends, introduce innovative training methodologies, and thus guide students towards the road to success.

ABOUT THE DEPARTMENT

The Department of Mechanical Engineering started in the year 2012 with an initial intake of 60 students to the B.E Program and increased to an intake of 120 students from 2013 and 180 students from 2014. The Department offers ME - Thermal Engineering programme from 2015 with an intake of 24 students. The Department is a recognized research centre by Anna University Chennai from the year 2019. The department accomplishes outcome Based Education which helps the students to learn, develop and serve to the society. The Department has experienced and dedicated faculty

with a wide range of specialization namely Thermal Engineering, Engineering Design, Manufacturing Engineering, Energy Engineering, CAD/CAM, Industrial Engineering and Mechatronics.

The faculty members have published more than 100 papers in National/International journals/Conference and had written books, filed patterns during the last 3 years and received many awards. The students were motivated by providing a lot of opportunities like a technical presentation in Symposium, conferences for skill development. The department provides value-added knowledge to undergraduates and postgraduate students. Apart from curriculum students were motivated to participate in sports. The department has well-established laboratory facilities to conduct research work on different specialized areas like Material Science, Renewable Energy, Thermal Science. The students of the department have received external research funding from Tamil Nadu State Council for Science and technology in recent years. The students of the departments have joined in reputed industries through placements and some of them are turned to be an entrepreneur.

ABOUT THE CONFERENCE

Engineering as a major innovative and creative area for the necessary of the nation. every day to day life becomes a challenge due to technology development availability of resources and its utilisation. mechanical engineering please a vital role in the present scenario due to design fabrication and Research it motivates the researches and Industrial Estate for developed efficient Technologies to reduce time cost and increases the efficiency to sustain the world for better excellence.

The objective of International Conference on Advances in Mechanical Engineering and Research (ICAMER'20) is to provide an intellectual forum for the professionals and exports of different environments to expose its and Emphasis the application of science in tutorial practical existence of human life. the conference offers a chance for leading researchers, engineers and scientist to exchange their thoughts and its relations with the latest technology and to find Global experts to work together for the betterment of society.

CONFERENCE MESSAGE BY A PATRON

Warm and Happy greeting to all. I am immensely happy that the department of Mechanical engineering of our college is organizing an International Conference on Advances in Mechanical Engineering and Research (ICAMER 2020) on 25.06.2020 and presented collection of various technical papers in the proceedings.

Under the able guidance of our management, RCET continues to march on the way of success with confidence. The sharp, clear-sighted vision and precise decision-making powers of our management have benefited our college to say competitive.

The dedicated faculty members and disciplined students of RCET are the added features of our college. I also congratulate the faculty members, students of Mechanical departments, Participants from our colleges and other colleges for their efforts in organizing and participating in this conference and wish the conference all the success.

Best Wishes,

Dr.R.RAJESH, M.E., Ph.D.,
Principal
Rohini College of Engineering and Technology,
Kanyakumari, Tamilnadu, India.

CONFERENCE MESSAGE BY THE CONVENER

This Second International Conference on Advances in Mechanical Engineering and Research (ICAMER 2020), organized by ROHINI College of Engineering and Technology, Kanyakumari, Tamilnadu, India. is an attempt to focus the attention of all concerned professionals to discuss at length concerned with the Emerging trends in engineering & technology, to seek solutions wherever possible and identify areas, where further are research, are needed. Invited contributions from experts on various topics with separate divisions on Energy, Aerospace, Marine, Composite Materials, Material Science & Alternative Fuels are presented in the proceedings.

Around 50 participants have confirmed their registration and presentation at the conference. The issue of the proceedings contains 35 papers accepted and presented in the conference. New materials with fascinating possibilities are being explored. Conducting polymers to smart materials would offer enormous shortly. Micro and Nanomaterials are likely to change our lifestyle and become part of our daily life and not just the subject of seminar or talks.

Information provided in various papers and reproduced in the proceedings is aimed at benefiting the Engineers and professionals. It is expected that the purpose would be served satisfactorily through in-depth discussion and interaction among participants during the conference. I take this opportunity to record my heartfelt appreciation and gratitude to all the authors, delegates, and all others participating.

Best Wishes,

Dr.D.PRINCE SAHAYA SUDHERSON, M.E., Ph.D.,
Professor/Head,
Department of Mechanical Engineering,
Rohini College of Engineering and Technology,
Kanyakumari, Tamilnadu, India.

CONFERENCE MESSAGE BY THE ORGANIZING SECRETERY

As the Research Director of RCET the Second International Conference on Advances in Mechanical Engineering and Research - ICAMER2020, I would like to cordially welcome all interested academicians, researchers and engineers in the broad disciplines of Mechanical Engineering to attend and/or present at this conference. The topics cover research in the area of solid mechanics, fluid mechanics, thermodynamics and heat transfer, aeronautical engineering, automotive engineering, material science, marine and ocean engineering, manufacturing engineering, control and automation, industrial and systems engineering and also mechanical design as well as other related topics. Originally, this international conference is intended to boost the publication of our Mechanical Engineering staff as well as becoming a platform for UG/PG students and research scholars to learn some experience in presenting technical articles in an international virtual conference. However, this virtual conference is also open to all postgraduate students, faculties and researchers throughout the world to share their research findings. It will be a good research findings forum and is expected to be an annual event of the mechanical department in the future.

The conference will be held on 25th June 2020 at Imperial Hall, Rohini College of Engineering and Technology, Kanyakumari, Tamilnadu, India. I hope you all will have a good deliberation in the virtual conference during this COVID-19 pandemic period and wish you all success in your research. Looking forward to your participation in ICAMER2020.

Best Wishes,

Dr. S. INDRAN, M.E., Ph.D.,
Director - Research,
Rohini College of Engineering and Technology,
Kanyakumari, Tamilnadu, India.

CONFERENCE MESSAGE BY PUBLICATION CHAIR

On behalf of the organising committee of this International Conference on Advances in Mechanical Engineering and Research 2020 (ICAMER2020), We would like to extend our warm welcome to all the presenters and participants, in particular. We would like to express my sincere gratitude to our plenary and invited speaker. The highlight of the conference was the keynote address given by **Dr.K.SUDHAKAR, Senior Lecturer, Faculty of Mechanical and Automotive Engg & Technology, Universiti Malaysia Pahang, Malaysia** on Advancement of Solar Technologies.

The International Conference (ICAMER2020), organized by the Department of Mechanical Engineering, Rohini College of Engineering and Technology is an ISO certified organization, affiliated to Anna University Chennai, approved by AICTE, is intended to be the first step toward their top-class Conference on Mechanical Engineering and its research. We believe that the International Conference will give opportunities for sharing and exchanging original research ideas and opinions come on gaining inspiration for future Research and broadening knowledge about various fields in advances in mechanical engineering

The proceedings of this conference (ICAMER2020), contains a total number of 36 papers which have been selected from a total of 70. The selected papers will be presented during the conference by virtual mode, because of pandemic COVID-19. We like to express our sincere appreciation to the members of the program committee for their critical review of the submitted papers as well as the organizing committee for the time and energy they have devoted to editing the proceedings and arranging this conference. We also like to give appreciation to the others who have submitted their excellent works at the conference. Last but not least, We would like to extend our gratitude to the Managing Director, Chief Financial Officer, Principal, Research Director, Head of the mechanical department, my dear colleagues of Rohini College of Engineering and Technology.

Best wishes,

MANOJ.J.K
Assistant Professor
Department of Mechanical Engineering,
Rohini College of Engineering and Technology,
Kanyakumari, Tamilnadu, India

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DEPARTMENT OF MECHANICAL ENGINEERING

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ICAMER'20

(25th June 2020)

Agenda

10:25AM	***:***	***National Anthem***
10:30AM	***:***	*Welcome Address* **Dr.PRINCE SAHAYA SUDHERSON** ***Head of the Department, Rohini CET***
10:35AM	***:***	*Presidential Address* **Dr.R.RAJESH** ***Principal, Rohini CET***
10:40AM	***:***	*Introductory Speech About the Chief Guest* **Prof. J.K.MANOJ** ***AP/Mech, Rohini CET***
10:50AM	***:***	*Inaugural Address by the Chief Guest* **Dr.K.SUDHAKAR** ***Senior Lecturer,*** ***Faculty of Mechanical and Automotive Engg & Technology,*** ***Universiti Malaysia Pahag, Malaysia***
11:05AM	***:***	*Vote of Thanks* **Dr.S.INDRAN** ***Director- Research, Rohini CET***
11:10AM	***:***	*Presentation Sessions*

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Paper ID: ICAMER20/01

IMPROVED SEQUENCE TO MINIMIZE TOTAL TIME OF SERVICE OPERATION IN AUTOMOBILE SERVICE STATION- CASE STUDY

***Khan Irtekaz Iqbal*[1], *Y. U. Sahte*[2]**

[1]*Scholar, Department of production Engineering, Government Engineering College Aurangabad, Maharashtra, India.*

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In automobile sector, the after manufacturing sales services is as big sector. In order to grow service sector of automobile stations, it is important to have a very efficient network of after sales services. For the improvement of after sales services, it is crucial to know the impact of design parameters and factor level combination. In India sales rate of auto vehicles have been continuously increasing, the growth of auto service sector leads to customer dissatisfaction due to poor quality after sales service. A Research has been taken out in four wheeler service centres to find the need for improving process sequence of the different service activities. This research presents improved sequence to minimize total time. The optimal solution generated as taking problem as travelling salesman problem (TSP) and solving by using lexicographic approach.

Paper ID: ICAMER20/02

MULTI ASPECTS OPTIMIZATION ON SPARK EROSION MACHINING OF INCOLOY 800 BY TAGUCHI GREY APPROACH

Padamatinti Anusha

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Incoloy 800 is one among the difficult to machine nickel based superalloy and comprehensively used in high temperature environments. It has better strength and lower thermal diffusion that leads to deprived machining by traditional methods of machining. To overcome such kind of shortcomings, nontraditional approach of material removal processes have been developed and expected to be a suitable substitute method for traditional methods of machining. Wire Electrical Discharge Machining (WEDM) is one of the variant evolved from the perception of Electrical Discharge Machining process that is predominantly employed for machining of hard materials and also for making complex shaped components. In this study, an experimental study has been done on WEDM of nickel based super alloy and primarily focusing on optimizing the process variables for machining of Incoloy 800 by using Taguchi's analysis. The experimental runs are planned by Taguchi's DoE approach. The experiments have been performed by considering the process parameters such as pulse on time, pulse off time and peak current at three various levels. Material Removal Rate (MRR), Surface Roughness (SR) and Overcut (OC) are the desired performance measures considered in this present analysis. Taguchi's analysis and Analysis of Variance (ANOVA) has been used to determine the significance and influence of independent variables on the desired dependent variables. Taguchi - Grey methodology has been adopted for the WEDM process and combination of process parameters are determined for obtaining improved multi performance characteristics. The performance of the selected machining processes has been improved by proposed approach.

Keywords: WEDM; Superalloy; Incoloy 800; Taguchi's method; Grey analysis; Optimization; Interaction Analysis; ANOVA.

Paper ID: ICAMER20/03

EXPERIMENTAL STYDY TO ENHANCE CONDENSATE WATER QUANTITY FROM AIR CONDITIONER

Dr. R. Satya Meher

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At present the world is facing shortage of fresh water. To overcome it, water vapour in the air can be extracted through condensation by cooling the air below its dew point i.e. water can be obtained when air passes through evaporator coil in the air conditioner. The condensate water produced by an air conditioner is usually not utilised and thrown into the environment. And also the produced condensate water quantity is less. So through this work the quantity of condensate water is increased by adding steam to atmospheric air through boiler before the evaporator coil of air conditioning (A/C) system and also using compressed air as fresh air inlet to evaporator instead of atmospheric air for the normal air conditioner. The quantity of condensate water generated from air conditioning system appears to be quite significant than the normal running conditions of A/C system. The extracted water can be purified further for drinking water or for other purposes. Recycling of condensate water could reduce water demand from city water supply system particularly during the hot and humid months of the year, thus reducing pressure on precious ground and surface water resources. This type of technique is most efficient in areas where the availability of water is less.

Paper ID: ICAMER20/04

DESIGN AND FABRICATION OF COMPONENT INSPECTION AND CONVEYOR USING IOT

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Our project deals with the design and fabrication of the inspection conveyor using the Internet of thing. The main aim of our project is the component Inspection, its various application. We use sensor that are used to measure the component inspection. The sensed signals by the sensors are sent to the control unit and the control unit gives the appropriate signals to the dc gun motor. With the advancing technology, every field is shifting towards making systems automated, portable and easy to use. Supporting the change in time, the project proposes a technique for real time monitoring of conveyor automation with each other in a smart network and for theft analysis using IOT. The objective of the project is to collect the desired items by ultrasonic sensor and dispose the unwanted work piece using rejection mechanism. The work piece is moved from one place to another with the help of Belt conveyor.

Paper ID: ICAMER20/05

PRODUCTION OF BIO-OIL FROM COCONUT LEAF STALK USING PYROLYSIS

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Due to envisaged fossil depletion as a result of increasing energy consumption per capital and environmental degradation resulting from its global warming, there is necessity of long-term alternative energy sources. In this project we are going to investigate the properties bio oil from coconut leaf stalk. The bio oil of coconut leaf stalk is produced by the pyrolysis method. Pyrolysis bio-oil is a second-generation biofuel that could be used in mobile and stationary applications or as source of valuable oxygen-containing chemicals.

In the industrial-scale tests, bio-oils have been demonstrated to be a good option to replace heavy petroleum oils in distinct heating applications. In this project we are going to test the physical properties and ultimate analysis of coconut leaf stalk oil. The physical properties such as density, flash point, fire point, pH value and kinematic viscosity were found out for this shell oil. The ultimate analysis like carbon, sulphur, moisture, nitrogen oxygen content present in the coconut leaf stalk oil. For the extraction of oil, the slow type pyrolysis is taken account to produce the high yield of oil from the coconut leaf stalk. The maximum yield of extraction of oil at the temperature range from 300^0C to 500^0C. In this report, the detailed discussion about the coconut leaf stalk oil properties for any further application for Engineering Application.

Paper ID: ICAMER20/06

STUDY ON MECHANICAL AND FRACTURE BEHAVIOUR OF PARTICLE REINFORCED COMPOSITE MATERIALS

G.Raja Vinoth

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There is wide scope to study the properties and performance of different composite materials for proper selection of specific material for desired application. The fracture behaviour of composite materials and structures is quite complex with respect to metals and it is difficult to predict fracture modes. The life expectancy of composite structure requires a clear understanding of the material's response to the growth of interlaminar delamination under Mode I, Mode II, Mode III and Mixed Modes. Fracture testing of fiber reinforced composites is an active area of research. The new aspects in the experimental studies of interlaminar and intralaminar fracture toughness of polymer matrix composites are seldom investigated. One of the most effective means to enhance the interlaminar properties of polymer resins can be attained by inclusion of nanoparticles in resins. Enhancement on the interlaminar fracture toughness of composite materials by adding nano-fillers are to be studied. Strengthening mechanisms and the mechanical behavior of the composites are to be analysed. The effect of addition of Nano fillers on interlaminar fracture toughness is to be studied

Paper ID: ICAMER20/07

EVALUATION OF MECHANICAL PROPERTIES OF RICE HUSK AND NANO SILICA REINFORCED COMPOSITE

R.Arunkumar

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Natural-fibers with thermoplastic and thermoset matrices have been embraced by car manufacturers and suppliers for door panels, seat backs, headliners, package trays, dashboards, and interior parts. Earlier FRP's are used in automotive for their light weight, high stiffness and strength for many applications. Due to the environmental considerations, cost reduction, and high performance of engineering application, the demand of natural fibers is increasing day by day. Between these natural fibers, the rice husk has been extensively exploited. Therefore, this work is aimed to investigate rice husk and nano silica composites in terms of mechanical properties. Mould has been prepared to make five specimens of composites. Tensile test, impact test, flexural test and water absorption test are conducted. Based on the test results, this composite material can be recommended for making switch board box and door panels.

Paper ID: ICAMER20/08

OPTIMIZATION OF WEAR PARAMETERS ON DISC BRAKE PAD USING TAGUCHI TECHNIQUE

R.Mohamed Abdul Gani[1], J.Aldrin raj[2]

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Department of Mechanical Engineering, Government College of Engineering, Tirunelveli.

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Most significant safety aspect of an automobile is its braking. Brakes are subjected to wear in severe conditions. Hence it is necessary to analyze the tribological behavior of brake pad. In this work, wear analysis of disc brake is carried out using experimentation and theoretical approach. The contact pressure, von misses stress, shear stress are calculated theoretically, experimentally and using ANSYS. The results of theoretical, experimental and ANSYS values to select the best combination of speed, braking pressure and sliding velocity. A good agreement between theoretical and ANSYS analysis results showed that model provided a reliable prediction of the tribological characteristics.

Paper ID: ICAMER20/09

FINITE ELEMENT ANALYSIS OF FULL FEMUR IMPLANT USING DIFFERENT BIOMATERIALS

Paul Sahaya Doss.R

PG Scholar (Engineering Design), Department of Mechanical Engineering, Government College of Engineering, Tirunelveli.

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In biomedical applications, biomaterials are commonly used to modify the natural bone structures of the bones in case of failure or breakage of bone. The diseases such as osteoporosis, osteoarthritis, bone tumour and trauma are the reasons for joint replacements. The femur is the longest and largest bone in human body. The breakage of femur due to accidents and bone diseases leads to replacement of fractured bone using artificial surgical implants. Femur is connected to the hip forming a natural ball and socket joint in most cases bone breakage occurs in such areas. The femoral implant is an excellent alternative for patients suffering from femur bone joint failure. So that implant model of human bone is designed using bone substitute materials which are mechanically strong and has good biocompatibility with natural bone has to be designed. The success of implant in human body depends on material properties and design of implant structures.

In this project the hip-femur implant is designed using standard dimensions of human bone by CATIA 3D modelling software. The suitable implant biomaterials are carefully evaluated and selected based on its mechanical and biocompatibility properties to support human bone. The selected materials are analysed in Finite Element Analysis software ANSYS WORKBENCH. Under suitable boundary and loading conditions. Each femur

carries half of the human body weight hence for average human body weight of 75kg, each femur carries 500N of load. Evaluation is carried out for maximum load conditions for four different implant materials titanium alloy,316L stainless steel, cobalt chromium alloy and hydroxyapatite. The finite element results showed implant deformation and equivalent von misses stresses for selected material the analysis showed promising results. Of which Cobalt chromium material has better mechanical properties been found in analysis. In contrast to alloys Hydroxyapatite a newer ceramic based biomaterial material for implant showed better deformation behaviour compared with alloys. The output from Ansys indicates equivalent Von misses' stresses and total deformation. Maximum and minimum values were obtained.

Paper ID: ICAMER20/10

THERMAL ANALYSIS OF VARIOUS TYPES OF PISTON WITH DIFFERENT ALUMINIUM ALLOYS

H. Hebin Raj[1], D. Prince Sahaya Sudherson [2], M.Ezhilan[3]

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Piston as one of the most important component in an engine, its thermal load always causes fatigue failure. A piston is a component of reciprocating engines, reciprocating pumps, gas compressors and pneumatic cylinders, among other similar mechanisms. It is the moving component that is contained by a cylinder and is made gas-tight by piston rings Piston that transfer the combustive gases power to the connecting rod. Failure of piston due to various thermal and mechanical stresses. This paper describes the thermal distribution of the single cylinder engine piston by using FEA. Creo Computer Aided Design (CAD) software was used to design the existing piston. The main objectives is to investigate and analyze the temperature distribution of piston at the real engine condition during combustion process. The Aluminium Alloy Al(6063) and Al(4032) have been selected for thermal analysis of piston and piston rings. We applied temperature 262^{o}C on piston crown. Finally choosing which one is the bestalloythat can be used as the piston material to improve the efficiency. Design of the piston is carried out using creo software, thermal analysis is performed using Finite Element Analysis Method in Ansys Software.

Keywords *– Piston, Aluminium Alloy, Al6063, Al4032, I.C. Engine, Types Of Pistons*, etc.

Paper ID: ICAMER20/11

DESIGN AND FABRICATION OF SELF RECHARGEABLE ELECTRIC VEHICLE

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The Self Rechargeable Electric Vehicle deals with Automobile Technology in Mechanical Engineering. Normally the automobiles are made with petrol engines or diesel engines or gas engines. Recently the electric motors are substituted to the engines due to fuel scarcity and to reduce the pollution caused due to fuels. Commonly the distance travelled by a electric vehicle for one recharge is nearly 150 to 200 kilometers with the maximum speed range of 25 to 30 kilometer/hour. The battery in the electric vehicles need minimum 4 to 5 hours to get fully recharged. Now a day continuously recharging for 4 to 5 hours is not easy. But in our project the process of recharging is made when the vehicle is in motion, when the vehicle moves the battery is recharged according to the speed of the vehicle with less capital.

Paper ID: ICAMER20/12

TRIBOLOGY ANALYSIS OF FRICTION SURFACED SAMPLES

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The developed AA5083 cadmium alloy when alloyed with varies propositions of 0%,2.5%,5% cadmium were manufactured using stir casting process. From the casted samples tensile, compression and hardness test samples were prepared according to the various ASTM standards and tested. The tensile specimens were prepared as per the ASTM E8-04 standard from the casted alloy. And it is tested using universal testing machine. From the collected result it empathizes that the better tensile strength is obtained for a sample contains 5% weight of cadmium. In addition, it deals that while adding the total weight percentage of cadmium its leads to improve the tensile strength. The compression specimens were prepared as per the ASTM E9 at room temperature from the casted alloy. And it is tested using universal testing machine. From the results, it is identified that the maximum compressive strength is obtained for a sample contains 5% weight of cadmium. The increase in the weight percentage of cadmium increased the compressive strength as noted form the results. The Vickers hardness specimens were prepared as per the ASTM E-384 standard. The Mitutuyo HM-210/220 machine was employed to evaluate the hardness value of the specimens. The micro hardness results obtained for casted samples are noted. The results shows that there is a gradual improvement in the micro hardness of the casted samples, which indicates that AA5083 alloy with 5 % cadmium possess higher the hardness value.

Paper ID: ICAMER20/13

MECHANICAL CHARACTERIZATION OF BORASSUS FIBRE COMPOSITES

Sahaya Saju.J[1], Indran.S[2], Sagai Francis Britto.A[3], Serjius Joe.M[4]

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The composites manufactured using long unidirectional fibers has been shown to have better performance than short randomly distributed fibers. However, the length of natural fibers that suitable for the manufacturing of fiber composites is 5 feet and this length may not be enough for manufacturing long fiber reinforced plastic (FRP) plate. In this project work, hybrid borassus/Jute fiber composite is fabricated using compression moulding method. A rectangle plate of specified dimensions is fabricated in order to conduct testing. Further, specimens are cut through in the plate by following ASTM standards. The specimens are tested for tensile, flexural and impact strength that is carried out and compared with the existing fiber composites.

Paper ID: ICAMER20/14

DESIGN AND ANALYSIS OF BATTERY MANAGEMENT SYSTEM FOR ELECTRIC VEHICLES APPLICATIONS

Bibin Joseph[1], Manoj.J.K[2], G.Pradeesh[3]

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After nearly a century with the internal combustion engine dominating the personal transportation sector, it now appears that the electric vehicle is on the verge of experiencing rapid growth in both developed and developing vehicle markets. As the Electric vehicles come in to the picture Lithium batteries plays a vital role. Lithium batteries, which have the advantages such as high energy density, long cycle life, and low self-discharge rate, have attracted more and more attention in recent years. They have been widely used as power source of EVs and HEVs. Nevertheless, Lithium batteries generate a large amount of heat when the EVs run, especially in the climbing and other high load operating conditions. If the heat dissipation can't proceed timely, it may lead to thermal runaway. The best operating temperature of Li-ion batteries is between 25C and 40C.Thermal management system is essential for lithium-ion batteries in electric vehicle to control operating temperature and temperature differences. A Complete Literature review is done on Battery management system to deliberately finalize the best method to control the temperature of battery. In phase one of this project, A proposed methodology is defined and models are designed. Both the Air Cooling and PCM Cooling methods are chosen to overcome the temperature effects of battery. In Air cooling, comparing both the aluminum and CRF Composite

materials battery material to reduce the thermal content of the battery. In PCM, the Paraffin with Copper foam and paraffin with Graphene based composite material is compared to give best results.

Paper ID: ICAMER20/15

DESIGN AND FABRICATION OF TRICYLIDER COMPRESSOR

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The Tri cylinder Compressor is a very powerful natural resource and man has used this energy to power his crafts across the oceans for thousands of years. This project eliminates the use of fossil fuels like petrol, diesel & electricity and save us from the high oil and power price hike. "TRI CYLINDER AIR COMPRESSOR" is an eco-friendly air compressor, which does not pollute the world. The main reason for creation of this project is to ride an air compressor without spending extra money.

Paper ID: ICAMER20/16

DESIGN AND FABRICATION OF WATER TRASH REMOVER USING TURBINE

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Water is the basic need for the existence of life on earth. In spite of 70% water on earth majority of water is not suitable for drinking purpose. There is a huge demand of clean water as it is used for a variety of purpose such as drinking, bathing, cleaning, cooking etc. Impurities present in water can cause serious health issues that can damage the life of human beings. The chief function of the automatic drainage system is to collect, transport, as well as dispose the solid waste. Impurities in drainage water can lead to blockage of the drainage system. In order to avoid such situation these impurities are needed to be taken out time to time for the continuous flow of drainage water. Drain can be cleaned continuously by the help of model using the drive system to remove the solid waste and threw it into waste bucket. This project automatically cleans the water in the drainage system each time any impurity appears, and claws which are driven by chain sprocket grasp the solid waste and threw it into the waste bucket to avoid blockage. It even reduces the cost of manual labour as well as reduces the threat to human life. Moreover, here machine is operated by turbine rotation.

Paper ID: ICAMER20/17

AIR COOLER USING WASTE HEAT OF AUTOMOBILE ENGINE

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The current worldwide trend of increasing transportation is responsible for increasing the use of internal combustion engines. I.C engines, the devices with a high energy usage and low efficiency because roughly 75 % of the energy produced during combustion is lost in the exhaust and in the coolant of the engine in the form of heat. As a huge amount of energy is lost, there is urgent need to design a advice to trap this loss. This paper proposes and implements a waste heat recovery system using a thermoelectric generator (TEG) designed for four stroke I.C. engine. The system converts the waste heat from the exhaust manifold into electrical energy using a TEG. The output is then boosted by a Joule Thief converter to run the required load or to charge a battery. This battery also used to cooling purpose. The experimental results demonstrate that the proposed system recovers considerable amount of waste heat which can be used to power some auxiliary automobile devices.

Paper ID: ICAMER20/18

CHARACTERIZATION OF WELDED ALUMINIUM ALLOY(AA2219)

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Aluminium alloys are extremely useful for many industrial applications, especially automotive and aerospace, because they are relatively light weight and have an excellent strength-to-weight ratio. Because of their low density, the use of aluminium alloy in automotive application is steadily growing. This is because, the weight reduction results in an improvement in fuel efficiency. The joining of aluminium alloy components is however still limited. Unfortunately, the conventional fusion welding of aluminium alloys often produces porosity and hot cracks in the welded joint. This deteriorates both the mechanical properties as well as corrosion resistance. Hence, it will be extremely beneficial if a solid state joining process, i.e., one which avoids the bulk melting of the base materials hot cracking and porosity, can be developed and implemented for the joining of aluminum alloys. Gas metal arc welding (GMAW), sometimes referred to by its subtypes metal inert gas (MIG) welding or metal active gas (MAG) welding, is a welding process in which an electric arc forms between a consumable wire electrode and the work piece metal(s), which heats the work piece metal(s), causing them to melt and join. Along with the wire electrode, a shielding gas feeds through the welding gun, which shields the process from contaminants in the air.

Paper ID: ICAMER20/19

EXPERIMENTAL INVESTIGATION OF HEAT TRANSFER ANALYSIS OF COOLING SYSTEM FOR BUILDING ROOF

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Roof-top cooling systems have been developed and implemented to reduce the heat gain through roofs so that conventional cooling systems can be reduced in size or eliminated. Currently, roof-spray systems are achieving greater effectiveness due to the availability of direct digital controls. The objective of this project is to develop a new model of the heat transfer through a roof with copper tube enclosed at the top for circulating the coolant. The coolant may be used as water or some specific type. Cooling roof that predict the heat transfer based on existing weather data and roof heat transfer characteristics. The heat transfer rate of existing roofing system is compared with this proposed model by analyzing the obtained output heat transfer rate. This may yield moderately good predictions of heat transfer through the roof experimental results for the roof top cooling condition.

Paper ID: ICAMER20/20

FABRICATION AND INVESTIGATION OF ALUMINIUM SILICA SAND HYBRID COMPOSITES FOR AUTOMOBILE APPLICATIONS

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In order to conserve natural resources and economize energy, weight reduction has been the main focus of automobile manufacturers in the present scenario. The introduction of metal alloys was made it possible to reduce the weight of specimen without any reduction on load carrying capacity and stiffness. The objective of this paper is to compare the structure and weight savings of aluminium alloy specimen with that of steel specimen. Fabrication of the aluminium matrix composite specimen will be done in this project. The suspension specimen is one of the potential items for weight reduction in automobiles as it accounts for 10% - 20% of the weight. This achieves improved riding qualities.

Paper ID: ICAMER20/21

ANALYSIS OF INTERNAL COOLING SYSTEM OF INDUSTRIAL GAS TURBINE

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Cooling of gas turbine blades is a major consideration because they are subjected to high temperature working conditions. Gas turbines play a important t role in the today's industrial society, of the demands for power. the power output and thermal efficiency of gas turbines should conjointly increase. fashionable high-speed aero-engines operate at elevated temperatures concerning 1700 K to attain higher cycle efficiencies. However, the presently accessible alloys cannot resist temperatures abundant on top of 1350 K. Internal cooling techniques for gas turbine blades have been studied for several Decades. The designers need detailed hot gas path heat transfer and temperature distributions along with the detailed flow and heat transfer data to understand the flow physics and to improve the current internal cooling designs. Gas turbine blades are cooled internally by passing the coolant through separate cooling channel passages to remove heat from the surface of the turbine blade. This technique used to increase the heat transfer from the airfoil walls. Size of the Cooling channel, geometry, computational flow and heat transfer results are presented and reviewed at improving the internal cooling of turbine blades. In this exercise, solved the temperature distribution in the 6 mm thick turbine blade and 2.5 mm x 6.5 mm & 3 mm x7mm rectangular cooling channels with 2-D heat conduction problem by using ANSYS.

Paper ID: ICAMER20/22

POWER REDUCTION OF THERMAL AIR CONDITIONING SYSTEM USING MATLAB SIMULINK MODEL

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In this paper, we propose an air conditioning system with electrical energy management by adjusting the temperature with different set point values inside the building. Air conditioners are commonly used in home and other buildings. Since air conditioners consume high electrical energy therefore, the management of their electrical energy consumption is also important. The air conditioner model is simulated using Simulink. The simulation results are compared with the results from measuring instrument.

Paper ID: ICAMER20/23

CFD ANALYSIS OF HEAT PIPE USING DIFFERENT MODES OF COOLING

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The heat pipe is a device, which does not require any external power to transport heat over a large distance, with minimal temperature difference. The simplicity of design, and ease of manufacture and maintenance of heat pipes have made them applicable in various fields of industry, such as energy conversion systems, cooling of nuclear and isotope reactors, cooling of electronic equipment, and high-performance space applications. In the present work, three heat pipes of the same dimensions of 1 m length and 0.031m outer diameter will be constructed with some modifications in the condenser section, in order to provide three different modes of cooling, via air cooling, water cooling and cooling with extended surfaces in the condenser section. Experiments will conduct to determine the surface and vapor temperature distribution, at steady and transient conditions for all the above said three modes of cooling in the condenser section. In addition, the effective thermal conductivity of the heat pipe is also to determine and report.

Paper ID: ICAMER20/24

THERMAL ANALYSIS OF DIFFERENT STRUCTURE OF FINS IN ELECTRICAL MOTOR

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With the ever increasing pressures on electric motor manufacturers to develop smaller and more efficient electric motors there is a trend to carry out more thermal analysis in parallel with traditional electromagnetic design full stop it has been found that attention to the thermal design can be rewarded by major improvements in the overall performance. thermal analysis can be done in the electrical motor fins to optimize the heating released by the motor thereby increasing the performance the electrical motor fee structure can be changed to different shapes such as straight cross and angular. The fins can be designed in creo 3.0 and analysed in ansys. the thermal result.

Paper ID: ICAMER20/25

DESIGN AND THERMAL ANALYSIS OF FRICTION SURFACE IN BRAKE DRUM USING DIFFERENT MATERIALS

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The break drum is a critical component that experiences high temperature and develop thermal stresses during application of brakes. In addition, the application of shoe pressure gives rise to mechanical loads. So the analysis take in to account both the thermal stress and mechanical stress together. Drum modeled here is, of the internal expanding type brake. The shoes of this kind of break are contained with the drum and expand outwards when the break applied. Such a kind of break is used in medium heavy duty vehicles. The brake drum is generally made of a special type of cast iron that is heat conductive and wear resistant. It rotate with the wheel and axle. In this project cast iron is replaced by aluminum alloy 6351, Nickel chromium molybdenum steel. A 2D drawing is drafted from the specification. A parametric model of break drum is modeled using creo2.0 software. Analysis is carried out by using ANSYS software. Finte element analysis of brake drum is done by considering four materials, Viz..Aluminum alloy 6351, Nickel chromium molybdenum steel and cast iron, and Thermal analyzing is also done on this materials using ansys.

Paper ID: ICAMER20/26

THERMAL AND SENSITIVITY ANALYSIS OF COUNTER FLOW COOLING TOWER

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Cooling tower is an open system direct contact heat exchanger, where it cools water by both convection and evaporation. Usage of exergy concepts in evaluating the performance of energy systems are increasing nowadays due to its clear indication of losses at various locations which is more informative than energy analysis and method of exergy analysis aims at the quantitative evaluation of the exergy destruction associated with a system since the values of the rates of exergy destruction provides direct measure of thermodynamic system inefficiencies. So, this necessitates the requirement of further investigation to utilize work potential of the cooling tower completely. In this work, thermal and sensitivity analysis of power plant counter flow wet cooling towers using both the first (Energy) and second (Exergy) law of thermodynamics is carried out. Mathematical model based on heat and mass transfer principle is developed and solved using an iterative method. The mathematical model is used to find the outlet condition of water and air, which will be further used in both Energy and Exergy analysis. Simulation on the tower is carried out to investigate its performance. The model is validated with experimental results and error is within 0.5%. A parametric study is carried out to determine heat and mass transfer characteristics of counter flow wet cooling tower as a function of various input parameters such as inlet dry and wet bulb temperature, water temperature and water flow rate.

Paper ID: ICAMER20/27

EVALUATION OF MECHANICAL PROPERTIES OF METAL MATRIX COMPOSITE

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Materials are frequently chosen for structural applications because they have desirable combinations of mechanical characteristics. Development of metal matrix composites has become an important area of research interest in materials science. In view of this, the present study focuses on the formation of aluminium -SiC and aluminium titanium nitride hybrid metal matrix composites. The present study is aimed at evaluating the physical properties of aluminium in the presence of silicon carbide and titanium nitride at varying compositions. Consequently, aluminium metal matrix composite combines the strength of the reinforcement with the toughness of the matrix to achieve a combination of desirable properties not available in any single conventional material. The compositions were added up to the ultimate level and stir casting method is used for the fabrication of aluminium metal matrix composites. The mechanical behaviours of metal matrix composites like density, tensile strength, yield strength, elongation, hardness tests, impact test and wear test were as curtained by performing carefully designed laboratory experiments that replicate as nearly as possible the service conditions.

Paper ID: ICAMER20/28

DYNAMIC ANALYSIS OF SINGLE POINT CUTTING TOOL BY USING ANSYS SOFTWARE

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Metal cutting or machining is the process of producing workpiece by removing unwanted material from a block of metal, in the form of chips. This process is most important since almost all the products get their final shape and size by metal removal, either directly or indirectly. The major drawback of this process is loss of material in the form of chips. A large amount of heat is generated during machining process as well as in different process where deformation of material occurs. The temperature that is generated at the surface of cutting tool when cutting tool comes in contact with the workpiece is termed as cutting tool temperature. Heat is parameter which strongly influences the tool performance during the operation. We know the power consumed in metal cutting is largely converted into heat. Temperature being developed during cutting it is of much concern as a result heat are mainly dependent on the contact between the tool and chip, the amount of cutting force and the friction between tool and chip. Almost all heat generated is transferred into cutting tool and workpiece material while some portion is dissipated through the chip. During machining the deformation process is highly concentrated in a very small zone and the temperatures generated in the deformation zone affect both the workpiece and tool.When machining metals and alloys

most of the energy required to form the chips is converted into heat. Therefore, the temperature generated in the cutting zone is an important factor to take into consideration. This factor is of a major importance to the performance of the cutting tool and quality of the work piece. Temperatures in cutting zone depend on contact length between tool and chip, cutting forces and friction between tool and work piece material. A considerable amount of heat generated during machining is transferred into the cutting tool and work piece. The remaining heat is removed with the chips. The highest temperature is generated in the flow zone. Therefore, contact length between the tool and the chip affects cutting conditions and performance of the tool and tool life.

Paper ID: ICAMER20/29

THE MECHANICAL BEHAVIOUR OF NATURAL FIBER REINFORCED POLYMER COMPOSITES

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In this project natural fiber is ahead of synthetic with their low cost, low density, stiffness, fairly mechanical properties, high specific strength, non- abrasive, ecofriendly and biodegradable characteristics. In our country much amount of coconut coir fiber and banana fiber are obtainable which have good tensile strength and flexural strength. Similarly, large amount of egg shells are also on hand as wastage from food industries which normally produces pollution. But this egg shells are having good compressive strength. Hence the present work is concentrated on coconut coir fiber, banana fiber and egg shell composites. The strength of the composites depends on the compositions of the ingredients. So, to obtain new composite materials in 30% proportions of coconut coir, banana fiber and egg shell powder is added and the mechanical properties of all the components are evaluated. From our project we concluded that using natural fibers as a reinforcement agent increases the flexural, tensile and impact strength of composite material.

Paper ID: ICAMER20/30

DESIGN AND ANALYSIS OF HYDRAULIC JACK

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Now a day, infrastructure development is very fast growing, for that the use of R.C.C construction machinery is very widely used, but in any R.C.C construction machinery proper Mixing of raw material for Concrete is major problem. Proper mixing of raw material is important task in any construction, for that we are use latest equipment which are mechanically and hydraulically combined operated mostly. Design of open hydraulic jack and analyses is one of them which are operated by two prime movers one prime mover is use for hydraulic system operation for operating the hoper and other for operating drum for proper mixing of concrete. The work presented herein is mainly divided into the three chapters. The first chapter introduces the concrete benching mixing machine with problem formulation and provides motivation for the project. The second chapter presents the current state of mixing machine research as presented in the form of scientific literature review.

Paper ID: ICAMER20/31

DESIGN AND ANALYSIS OF COOLING SYSTEM IN REUSABLE LAUNCH VEHICLE

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Reusable Launch Vehicles (RLV) are space vehicles designed to perform multiple missions. Today attention is being focused towards Reusable Launch Vehicles in order to reduce the cost of launches. Reusable Launch Vehicle has winged body and vertical tail configuration, is controlled by the aerodynamic control surfaces like elevon, rudder and body flap during its ascent and re-entry. In order to meet the above objectives, certain technologies and infrastructure were developed. The entire subsystems were integrated and a large number of flight measurements were made in the maiden successful flight of Reusable Launch Vehicle Technology Demonstrator. Accordingly in present study an attempt has been made to design a reusable launch vehicle using creo and thermal analyse using ANSYS to analyse the temperature and heat flux. instead of conventionally used Silicon based Thermal protection systems.

Paper ID: ICAMER20/32

CFD SIMULATION AND VALIDATION OF DOUBLE PIPE COUNTER FLOW HEAT EXCHANGER

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Heat exchangers are used in industrial processes to recover it between two process through it all the heat exchangers are designed based on the function and it fulfilled in a process then necessary equation for heat transfer and the pressure drop in a double pipe counter flow heat exchanger or available using this equation the validation of the design is laborious. In this paper the analytical design of the heat exchanger has validate based on the results obtained from this CFD analysis. in this paper CFD analysis is based on the Standard K Epsilon model. the solution of the problem is the optimum values of inner pipe diameter, outer pipe diameter and utility flow rate to be used for double pipe heat exchanger of a given effective length when a specified chlorate of process dream is to be treated for a given in letter to outlet temperature.

Paper ID: ICAMER20/33

THERMAL ENERGY RECOVERY SYSTEM FROM WASTE WOODEN PARTICLES

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Development of a substitute fuel for conventional fuels, such as wood, coal, charcoal and Liquefied Petroleum Gas LPG, is important. Briquette production technology, a kind of unpolluted coal technology, will facilitate to prevent global warming and serve to conserve forest resources. The main ingredients of biomass briquettes are agricultural wastes (such as straw, sugarcane bagasse, maize stalk, coconut husks and leaves, groundnut shells and rice husk), sawdust and the waste papers from the municipal waste, which mainly act as a binding agent. Briquettes are very cheap as they are manufactured from waste. They are additionally used as a substitute fuel for cooking purposes and several other heating processes. The experimental work focuses on developing a method to manufacture briquettes of consistent quality at low pressures by employing a wet technique. The impact of process variables like shape, density, moisture content and calorific value on briquettes with different combinations were studied. The usage of briquettes instead of firewood results in preventing deforestation and reducing greenhouse effect. In this situation, briquettes could potentially offer a means of waste management while providing a new fuel business opportunity for the local economy.

Paper ID: ICAMER20/34

PREPARATION AND EXPRIMENTAL ANALYSIS OF NATURAL ADHESIVE MATERIAL FOR COOLING APPLICATION

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In modern life, people started dreaming with their dream houses that are made up of cements. The latest technologies and innovations are out in to the modern world and researchers are working on cement and concrete in different aspects. They are highly chemical based which pave the way for radiating heat and increasing the temperature. The quality in construction with salient features such as more sustainability, more durable, thermal permeability etc are obtained with the natural materials that are used instead of cement. This help in temperature reduction of a room.

Paper ID: ICAMER20/35

INVESTIGATION ON MICROSTRUCTURE AND MECHANICAL PROPERTIES OF DIFFUSION BONDING

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A study has been conducted to identify the effects of fabrication temperature, pressure, times and other variables on strength of diffusion bonding joints between dissimilar metals low carbon steel and copper interface was integrated layer by layer by means of scanning electron microscopy and the result show bonding could not be bonded at a temperature lower than 800 c even at holding time of 20 min. However, 850 c successful joint was achieved at all holding time. The bonding quality of the joint was examined by various testing and additionally SEM analysis were taken

Keywords: Diffusion bonding, Hot Press bonding, pressure bonding, solid state bonding, friction bonding

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International Conference on

ADVANCES IN MECHANICAL ENGINEERING AND RESEARCH

ICAMER 2020

Organized by

MECHANICAL ENGINEERING ASSOCIATION

Department of Mechanical Engineering
Rohini College of Engineering and Technology

VISION

To inculcate competence in the field of mechanical engineering for the students by providing quality education and learning opportunities to become an ethically strong engineer for the development of the society.

MISSION

To seek continuous improvement in the teaching learning process to enhance the students' technical skills.

To inspire the students with the leadership qualities, ethical values and a spirit of team work.

To encourage the students to involve themselves in research work through continuous learning and to build skills beyond the curriculum.

ABOUT THE COLLEGE

Rohini College of Engineering and Technology is an ISO certified institute was founded by the great industrialist and philanthropist, Shri. K. Neela Marthandan. The main objective of our college is to advance the knowledge base of the engineering professions and to influence the future directions of engineering education and practice.

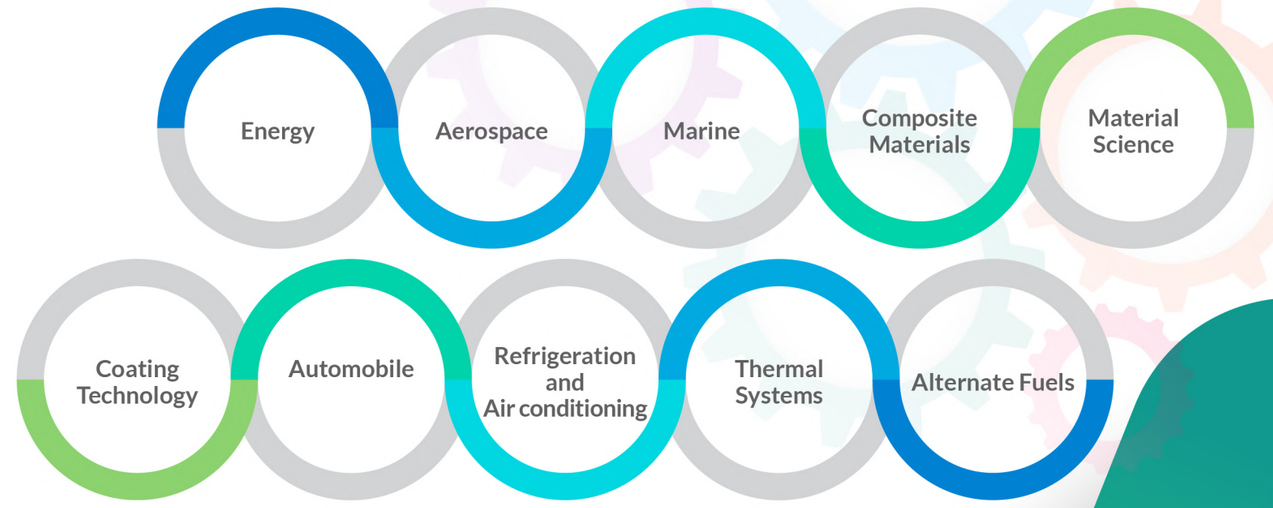
RCET - Best Engineering Colleges in Kanyakumari District believes not only in educating the students, but in also grooming characters, with moral and ethical values, thus building the nation. Since the beginning, the college has been providing world-class facilities & infrastructure in education and learning. The emphasis is on transformational leadership rather than directional leadership. The aim is to establish new trends, introduce innovative training methodologies, and thus guide students towards the road to success.

ABOUT THE DEPARTMENT

We have strong undergraduate and postgraduate level programs in mechanical engineering, including B.E. and M.E – Thermal Engineering respectively. The sanctioned students' strengths of B.E. and M.E. are respectively 180 and 24 per year. Department of Mechanical Engineering of RCET have been approved an Recognized as Research Centre of Anna University. For the overall development of student; department of mechanical engineering is associated with memberships of professional bodies such as SAEINDIA, Institution of Engineers (India), ISHRAE. We formulated Mechanical Engineering Students association for conducting technical events. Various activities of these chapters provide students to gain knowledge and interact with students and staff of other colleges / universities as well as Industry Engineers. The Product Development center in Rohini college of Engineering and Technology is a central facility available with the Mechanical Engineering Department.

CALL FOR PAPERS

Original research papers are invited in the following technical areas.



IMPORTANT DATES

Send the abstract and papers to the following Email:
icamer2020@gmail.com

Last date for Paper Submission : 15th June 2020
Acceptance Intimation : 16th June 2020

The extended version of the selected papers presented in the conference will also be considered for publication in the peer reviewed international journals.

SCOPE OF THE CONFERENCE

Engineering is a major innovative and creative area for the necessary of the nation. Every day to day life becomes challenge due to technology development, availability of resources and its utilization. Mechanical Engineering plays a vital role in present scenario due to design, fabrication and research. It motivates the researchers and industrialists for develop efficient technologies to reduce time, cost and increases the efficiency to sustain the world for better excellence.

The objective of International Conference on Advances in Mechanical Engineering and Research (ICAMER 2K20) is to provide an intellectual forum for the professionals and experts of different environment to exposit and emphasis the application of science into real and practical existence of human life. This conference offers a chance for leading researchers, engineers and scientists to exchange their thoughts and its relations with latest technology and to find global experts to work together for the betterment of society.

www.rcet.org.in

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