ISSUE-7 | JUNE – NOV 2019

MACHINEDGE

A NEWSLETTER PUBLISHED BY DEPARTMENT OF MECHANICAL ENGINEERING, CMRIT

QUICK HIGHLIGHTS

8+ INDUSTRY CONNECT

8 GUEST LECTURES

6+ JOURNAL PUBLICATIONS

7+ CLUB ACTIVITIES

3 TECHNICAL SEMINARS

1 PHD

CELEBRATING 25 YEARS

CMRIT

CMR INSTITUTE OF TECHNOLOGY, BENGALURU.

ACCREDITED WITH A+ GRADE BY NAAC

Message from Principal

MachinEdge reflects the passion of the students and faculty of Department of Mechanical Engineering by elaborating on various curricular and co – curricular activities and reflects upon their various achievements. This helps in the overall development of our students. I am delighted to present the seventh edition of MachinEdge and would like to take this opportunity to thank the Editorial Team, faculty, trustees and all the other contributors of this edition of MachinEdge.

-Dr. Sanjay Jain

Message from HOD

Greetings from the department of Mechanical Engineering, CMR Institute of Technology, Bengaluru. With close to ten years of its existence, the department has evinced continuous and successful growth in terms of adaptation and gaining competency in handling the new enhanced B.E. curriculum; in initiating new research avenues out of the two centers of excellences coming under its folds; and in its efforts to boost innovation and entrepreneurship activities primarily driven by the students. The department has done well through publication of research articles in international journals of repute, and bagging a funding for research (approximately 34 Lakhs) from the prestigious Naval Research Board, DRDO, Ministry of Defense has helped us to maintain and modernize our research infrastructure.

As always, our faculty have walked an extra mile by extending every possible academic assistance to students to ensure that each student emerges with excellence in the forthcoming VTU exams. The mentors have done well in motivating their mentees in excelling in their studies, mini-projects and in various club and sport activities.

Come July, the department is excited about hosting the forthcoming faculty development program in Additive Manufacturing, which is fully sponsored by AICTE, New Delhi. This event will enable fruitful interaction between scientists from research laboratories and institutes; the user community of this novel manufacturing method; and the faculty participants hailing from all over India.

-Dr. Vijayananda Kaup

1. Industry Connect & Guest Lectures

1. "Entrepreneurships' and changes in India's Growth"

The guest lecture series for the odd Semester of the Academic Session 2019-2020 was off to a Brilliant start with a session on **"Entrepreneurships' and changes in India's Growth''** by Dr. Ranganatha Officer ranked deputy Registrar- cooperative societies, quasi-Judiciary etc. Bangalore. The guest addressed pre-final year students and gave an insight on how projects can help them in their future and the various internship avenues they could peruse.

He enlightened students on being an entrepreneur and the challenges that came with it. He mainly he focussed on the capacity and willingness to develop, organize and manage business venture along with any of its risks in order to make a profit. He talked on different ways to create venture and students felt it to be a good and interactive session.

Speaker: Dr. Ranganath, Deputy Registrar

09 Aug 2019

Mechanical AV hall

02:00 PM

2. “Entrepreneurship and start-up”

The THE SME club of the Mechanical department, CMRIT had organized a guest lecture about ‘Entrepreneurship’ on day 4, 19 August 2019. The guest speaker was Mr. Siddalingappa Pujari. The guest lecture was focussed on 2nd, 3rd and 4th year students of the mechanical department. In his lecture, he gave us an insight about entrepreneurship. He discussed about the various entrepreneurs and their success stories. He also emphasized on the need for students to take up entrepreneurship. He briefed about investments, industries & commerce and on how one could start up his own business. He explained on how one could open up small and medium scale industries to rectify on problems we face today. He told the students on how the government supports budding entrepreneurs by providing funds and supporting them to take up different initiatives. In addition, he gave a vast explanation on how SC/ST students get 50 percent waiver on land to encourage people to take up innovation and explained about the Prime Minister and Chief Minister Generation program. He motivated our students by telling them that they being budding engineers can always find solution to never ending problems and can one day be successful Entrepreneurs themselves. He concluded by wishing our students the very best for their futures. The Mechanical HOD Dr.Vijayanada Kaup with a token of appreciation felicitated him.

Speaker:

Mr.Siddalingappa Pujari

13 FEB 2019

Mechanical AV hall

12:00 PM

3. “Industry Institute interaction”

Mr. Prasad Shetty, an engineer at Volvo Group India visited CMRIT to talk with the students and to ignite a spark of curiosity among the students. His lecture started with a brief introduction about Volvo Company.

He talked about the various projects they are currently developing. He explained as to how Volvo has made a huge mark in the Indian market when it comes to trucks and bus segment. He also talked about the electric trucks that they are developing and the autonomous truck. Although he could not divulge all the specifics because of obvious reasons, he explained as to how the system would work. The next half of the talk was completely learning based. He advised the students to get exposure that is more practical and to learn different technologies on their own. He also encouraged the students to aim high and to be confident in the interviews. He also urged the student to work towards the betterment of the society as a whole. At the end of the session, he answered the various questions that the students had. He explained each one of those questions in detail. He also offered to visit the college again and to have an interaction session with the students.

Speaker: Prasad J Shetty
CAE, Volvo Ltd, Bangalore

21 Sept 2019

Mechanical AV hall

11:00 AM

4. “Material structures”

Speaker: Mr. R. K. Ray Professor, “Distinguished visiting faculty” by AICTE

Professor R. K. Ray who serves as the “Distinguished visiting faculty” to the AICTE visited CMRIT for three days starting from 11/09/2019 to 13/09/2019. As a part of this program, Professor Ray covered the first module of Material Science subject during the course of his 3-part lecture.

On 11/09/2019, Professor Ray introduced the students to the world of material science. He discussed everything from the building blocks of a crystal structure to the various ways in which a material can deform. He impressed upon the students the need for the study of materials by a mechanical engineer. He made the sessions interesting by engaging the students actively in the discussions. He covered the following topics on the first day of his three-day lecture:-

1. Introduction to material science
2. Lattice structure, Unit cell, Crystal structure
3. Atomic packing factors
4. Common crystal systems.

11 Sept 2019

Mechanical AV hall

12:00 PM

5. “Mechanical behaviour of metal”

Speaker: Mr. R. K. Ray Professor, “Distinguished visiting faculty” by AICTE

Professor Ray as a part of his 3-day visit to CMRIT spoke to students on the topic of Mechanical behaviour of metals. As a part of this program, Professor Ray covered the first module of Material Science subject during the course of his 3 part lecture.

On 12/09/2019, Professor Ray dwelled upon the types of crystal imperfections. He explained all the topics with the help of neat, clear to understand diagrams. He made the sessions interesting by engaging the students actively in the discussions. He covered the following topics on the second day of his three-day lecture:-

1. Crystal imperfections.

2. Mechanical behaviour of metals

12 Sept 2019

Mechanical AV hall

11:30 AM

6.“Ductile to brittle transition”

Speaker: Mr. R. K. Ray Professor, “Distinguished visiting faculty” by AICTE

On the third day of his 3-day visit to CMRIT, Professor Ray explained the change of metal behaviour as the work environment and the conditions to which it is subjected change. He also discussed the reasons as to why diffusion in metals is a double-edged sword; it can help the engineer in many ways but can also haunt him in some cases. He made the sessions interesting by engaging the students actively in the discussions. He covered the following topics on the third day of his three-day lecture:-

1. Ductile to brittle transition.
2. Strengthening of metals
3. Diffusion.
4. Ways in which plastic deformation can occur

13 sept 2019

Mechanical AV hall

11:30 AM

7.“Automation and Robotics”

Speaker: Mohan Shamanna, Chief Executive Officer AAPL - AQMENZ Automation Pvt. Ltd. Bengaluru

The A seminar on Industrial Automation was organized by The Department of Mechanical Engineering under the supervision of Mr. Srinivas Reddy M conducted by Aqmenz Automation Pvt Ltd

The seminar was aimed at educating students about Industrial automation and how it could be used for their respective projects. The following points were covered.

- What is Automation
- Scope of Industrial Automation
- Introduction to PLC (Programmable Logic Controller) & PLC Types
- Advantages of PLC over Microcontroller
- Block diagram of PLC
- Advantages, Disadvantages and Applications
- Ladder Programming
- Breif introduction to Relays & Relay Logic
- Logic gates using Relay logic
- Latching Concept in Relay Logic
- Introduction to Ladder Diagram
- Rules of writing ladder diagram
- Concept of NO & NC in PLC
- Simple Examples of Ladder Diagram
- PLC Programming & Hardware Interfacing
- Introduction to DELTA DVP14SS2 PLC Kit
- Wiring concept of PLC Kit & I/O Kit
- PLC Software (WPL Soft 2.46) installation and working
- Execution of Simple Motor ON/OFF Program using Simulator
- Execution of Simple Motor ON/OFF Program using PLC Trainer Kit
- Fundamental commands of PLC (LD, LDI, OUT)
- P-1 Bottle Sorting project in Bottle Industry
- P-2 Staircase Application Project
- Latching Concepts

- Memory Coils
- P-3 Motor Interlock Project
- Timer and counters programming (TMR, CNT)
- P-4 Sequential Motor Control Project
- P-5 Simple Package Automation
- Data Registers and its usage
- Comparison Instructions with example (LD=, LD<, LD> etc.,)
- P-6 Car Parking Automation Project
- Step Ladder Programming

08 APR 2019

Mechanical AV hall

11:30 AM

8.“Advanced manufacturing Technology through Metal Forming”

Speaker: Dr. C. S. Krishna Prasad Rao, BTET, Mangalpally, Hyderabad

The lecture was about roll forming. Dr. Krishna Prasad started with the classification of missiles and their manufacturing methods. He gave a detailed overlook on today’s missile manufacturing technology and he gave detailed explanations including the parameters to be controlled during the production.

05 Oct 2019

Mechanical AV hall

11:30 AM

2. Journal Publication

1.

Title: Microstructure and Hardness behavior study of carbon nano tube in Aluminum nano composite

Faculty : Prashant S Hatti

Name of conference/journal: International conference on intelligent manufacturing and energy sustainability.

Publisher Name: Springer

Date: 2019-06-22

Abstract. In this study, the effect of carbon nanotube (CNT) amount in Aluminium (Al)-CNT composites produced by adding CNT to Al alloy in various amounts on microstructure and hardness of CNT reinforced aluminium metal matrix composites was investigated. CNT was added to Al matrix different weight percentages. Two different ball materials namely tungsten ball and aluminium oxide ball was used for same composition of Al-CNT composites. The milled powder as compacted inside the compaction die and then sintered using Microwave sintering process. In The Microstructural, analysis of CNT reinforced aluminium; nanocomposites ball milled powder is sintered and scanned using SEM. The Brinell hardness test is conducted for Al-CNT nanocomposite samples both 60 Kgf and 100 Kgf loads, it can be observed that the highest enhancement in hardness value has occurred in CNT 1.3 wt% reinforced into aluminium composites for both 60 Kgf and 100 Kgf load. Hence, it can be understood that the alumina ball milled samples have slightly higher improvement in hardness than compared to tungsten ball milled samples.

2.

Title: A New Computational Methodology for the Synthesis of Simple Jointed Kinematic Chains

Faculty: Dr. Vijayananda Kaup, Proff. Harish Babu, Proff. Manikandan Hariharan

Name of conference/journal: AIP Conference proceedings

Publisher Name: AIP Publishing

Date: 2019-08-07

Abstract. This paper deals upon structural synthesis of simple jointed kinematic chains (SJKC) having N′ links and possessing F′ degrees of freedom (DOF). The SJKCs generated are closed and connected; have multiple loops; will exhibit, for multi-DOF cases, total freedom, partial freedom and fractionated freedom (due to an existence of at least one separation link or due to the presence of at least one-separation pairs). The basic idea underlying the synthesis methodology proposed in this work is enumeration of chains with L loops by systematic expansion of chains with (L □ 1) The expansion is brought about by connecting predefined binary link string which adds NP links and JP simple joints to the chains having fewer numbers of links than the chains being synthesized. . Such chains are called parent kinematic chains (PKC).

3.

Title: In quest of a reliable and efficient isomorphism index for multiple jointed kinematic chains

Faculty: Dr. Vijayananda kaup, Proff .Harish Babu, Proff. Manikandan Hariharan

Name of conference/journal: AIP Conference proceedings

Publisher Name: AIP Publishing

Date: 2019-08-07

Abstract. Different computational techniques for the detection of isomorphism in multiple jointed kinematic chains (MJKC) have been published over the past few decades. There have been research articles that reported counter-examples for such a test. Taking this into consideration, and also to the fact that many of these tests required large computational efforts to arrive at the isomorphism indices, this present work proposes an isomorphism test that will express the given closed and connected MJKC in terms of several rooted-tree structures, which are in turn expressed in the form of a set of strings. These set of strings have been found to represent a MJKC in a reliable manner, and hence can be considered as the isomorphism index of the given chain. The entire procedure of converting the given MJKC through to its representation has been programmed in Python. The significance of the new test lies its robustness in the representation of the chain, simplicity in their computation and the flexibility it offers to handle a variety of elements in the chain.

3. Club Activities

1. “Auto Quiz”

Club: SME

Date: 26-08-2019

The SME CLUB, Mechanical Department, organised an event “Auto Quiz” on 26 August 2019, which provided a platform for students from all the branches to present their Auto knowledge. The quiz consisted of four rounds, namely, Identification of logo, Identification of car/bike, Tagline of the company and Question and answer round. Mr. B. Rajendra Prasad Reddy and Mr. Prashant Hatti, Department of Mechanical Engineering judged it. The quiz witnessed a huge number of participants from all the branches who enthusiastically took part in the competition. Vishnu Nair, Mohammed Mehajabeer and Tabrez Ahmed were awarded the first place while Akshay Madhusudan, Akshay G Raj and Abel Thomas were awarded the first runner’s up position. This event provided the students an opportunity to highlight their knowledge in automobiles and provided information on the various automobiles and its growing industry.

2. “Entrepreneurship and Start Up”

Club: SME

Date: 19-08-2019

THE SME club of the Mechanical department, CMRIT had organized a guest lecture about ‘Entrepreneurship’ on day 4, 19 August 2019. The guest speaker was

Mr. Siddalingappa Pujari. The guest lecture was for 2nd, 3rd and 4th year students of the mechanical department. In his lecture, he gave us an insight about entrepreneurship. He discussed about the various entrepreneurs and their success stories. He also emphasized on the need for students to take up entrepreneurship. He briefed about investments, industries & commerce and on how one could start up his own business. He explained on how one could open up small and medium scale industries to rectify on problems we face today. He told the students on how the government supports budding entrepreneurs by providing funds and supporting them to take up different initiatives. In addition, he gave a vast explanation on how SC/ST students get 50 percent waiver on land to encourage people to take up innovation and explained about the Prime Minister and Chief Minister Generation program. He motivated our students by telling them that they being budding engineers can always find solution to never ending problems and can one day be successful Entrepreneurs themselves. He concluded by wishing our students the very best for their futures. The Mechanical HOD Dr.Vijayanada Kaup with a token of appreciation felicitated him.

3. “Biker Workshop”

Club: SME

Date: 03-09-2019

The Department of Mechanical Engineering organized a workshop on bike maintenance and puncture under the supervision of Mr. Chidhananda R.S. conducted by Mr. Gopi Krishna G.

The workshop was oriented towards teaching the students about maintaining their own vehicles and repair their tyres in the event of a puncture. The following points were covered.

- Oil change – the grade used will depend on the manufacturer’s recommendation
- New oil filter
- New air filter
- New spark plugs
- Test/replace/top-up coolant as required
- Brake callipers removed and clean
- All fasteners – including engine mounting and chassis bolts – inspected and tightened as required
- Chain – adjusted and lubricated as necessary
- General lubrication
- Adjustment of throttle and clutch

4. “Expert lecture on Automation and Robotics”

Club: SME

Date: 14-09-2019

The Department of Mechanical Engineering organized a seminar on Industrial Automation under the supervision of Mr. Srinivas Reddy M conducted by Aqmenz Automation Pvt Ltd

The seminar was aimed at educating students about Industrial automation and how it could be used for their respective projects. The following points were covered.

- What is Automation
- Scope of Industrial Automation
- Introduction to PLC (Programmable Logic Controller) & PLC Types
- Advantages of PLC over Microcontroller
- Block diagram of PLC
- Advantages, Disadvantages and Applications
- Ladder Programming
- Brief introduction to Relays & Relay Logic
- Logic gates using Relay logic
- Latching Concept in Relay Logic
- Introduction to Ladder Diagram
- Rules of writing ladder diagram
- Concept of NO & NC in PLC
- Simple Examples of Ladder Diagram
- PLC Programming & Hardware Interfacing
- Introduction to DELTA DVP14SS2 PLC Kit
- Wiring concept of PLC Kit & I/O Kit
- PLC Software (WPL Soft 2.46) installation and working
- Execution of Simple Motor ON/OFF Program using Simulator

- Execution of Simple Motor ON/OFF Program using PLC Trainer Kit
- Fundamental commands of PLC (LD, LDI, OUT)
- P-1 Bottle Sorting project in Bottle Industry
- P-2 Staircase Application Project
- Latching Concepts
- Memory Coils
- P-3 Motor Interlock Project
- Timer and counters programming (TMR, CNT)
- P-4 Sequential Motor Control Project
- P-5 Simple Package Automation
- Data Registers and its usage
- Comparison Instructions with example (LD=, LD<, LD> etc.,)
- P-6 Car Parking Automation Project

5. “Technical Poster Presentation Competition”

Club: Prolab

Date: 30-09-2019

The Prolab club, department of mechanical engineering had organized a “technical poster making and presentation competition" on 30th of September at ME201 for first year’s students of CMRIT. The students were asked to participate individually or in-group of maximum three members. There were total 15 participants. They were given choice to select any topic of their choice from field of mechanical engineering.. Professor Manikandan and Professor Cyril did the evaluation in various criteria. The student coordinator was Mr. Shashwat and faculty coordinator Mr. Akhil C from Mechanical Department. Ms. Muskan, Mr. Sahil and Mr. Shashwat who presented bagged the first prize “four stroke IC Engine" and were awarded a cash prize of

Rs 1000. The second prize was bagged by Mr. Shreyas and Ms. Pooja who presented “Multi point fuel injection engines" and were awarded a cash prize of Rs. 500. The participants found the event to be helpful for their overall development and to understand the chosen topic in depth.

6. “Expert lecture on Automation and Robotics”

Club: SME

Date: 10-10-2019

Six groups consisting in 18 students in total attended the event. It started at 1.15pm and the students began getting busy with the various mechanisms they had in mind.

The competition’s main objective to educate the students and let them realize the difficulties in successfully building a mechanism

Students soon realized the difficulty in building mechanisms that could actually work

7. “Technical Talk on “Thermal and Mechanical Characterization of OMMT Nano clay Treated ABS Parts via Acetone Deposition Technique”

Resource person: Aditya Sreevasta K, 5th SEM
Date: 2019-10-11
Club: SME

3D printing is the most versatile Additive Manufacturing (AM) technique to craft 3D model with unique and complex structured with diverse properties.. Currently, the various AM techniques are, in practice wherein FDM technique has acquired the market due to its simple in use, economic and environmental friendly. To date, extensive research has been carried out on different thermoplastic materials for 3D printing and is tested for their structure, physical and mechanical properties. The polymers like PLA, ABS, Nylon and polymer composites are used for FDM process. ABS is most widely used polymer for engineering and commodity application. ABS comprises of poly-butadiene particles distributed partially embedded in a styrene/acrylonitrile continuous phase Parts fabricated by FDM technique possess poor mechanical properties as compared to injection moulded parts due to its poor fusion between layers and also, warping of printed part after cooling; hence it confines its application. In order to enhance the surface quality and mechanical strength, FDM printed parts needs to be undergoes post processing.
Presently, the Additive Manufacturing (AM) technique being used for the fabrication of end use products, but its application is restricted due to lack integrity in the surface quality because of its layer upon layer building technique. Hence, further improvement in the AM process are depends on the post processing of 3D printed parts and advancements in the materials being processed by AM technique. In recent years, use of Nano clay has gained considerable attraction due to its superior quality compared to pristine material. Montmorillonite Nano clay has versatile nanoparticles and has potential to enhance the part properties.

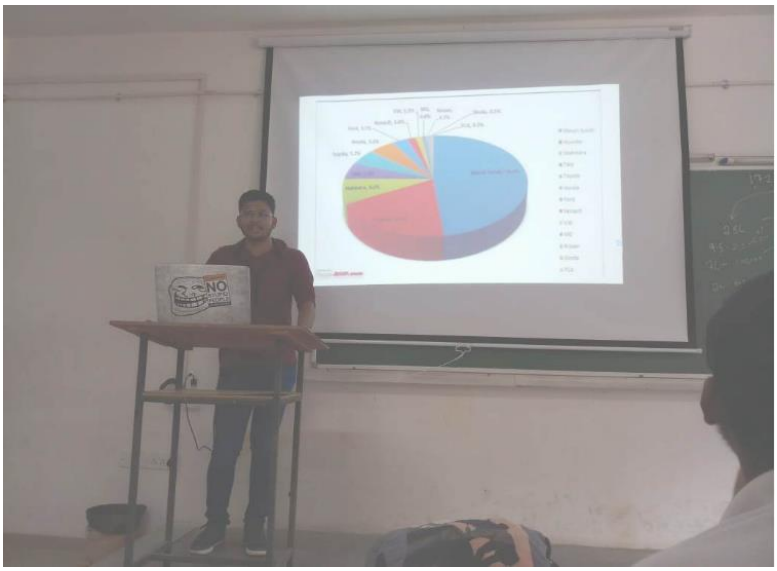
This work discusses the utilization of organically modified montmorillonite (OMMT) Nano clay for the post treatment of the FDM 3D printed Acrylonitrile Butadiene Styrene (ABS) parts via chemical deposition technique. In this work, compatibility of OMMT with ABS was investigated. ABS parts were fabricated by commercial FDM machine and further, nanoparticles were deposited over the printed parts through by acetone bathing.

OMMT in varying amount (two, four, and six wt. %), and immersion time (30, 50, and 70 Sec) were selected as the compatibilizer. The treated parts were evaluated for mechanical and thermal properties. The microstructure of treated parts was observed by optical microscope and analysed by low angle XRD. The specimen treated with 4% Nano clay with 70 sec immersion time showed the better surface smoothness and also increased tensile & flexural strength and elastic & flexural modulus of 38.85 MPa & 48.63 MPa and 2.9 GPa & 1.8 GPa respectively. The parts treated with 6% OMMT Nano clay with 70 sec immersion time showed least (4.48 x 10-5 0C-1) expansion coefficient. It is also observed that, TG value also increases from 101 to 106 ^{0}C with increase of OMMT content from two to 6-wtpercentage. The surface treatment approach showed a competent way to improve the thermal and mechanical properties of FDM parts.

In this work, a feasible method has been tried to treat the surface of the 3D printed parts by coating the Nano clay via acetone bathing technique to modify the mechanical and thermal properties. In this paper, the parameters like Nano clay content, immersion time and heat treatment were also investigated. Based on the observations the following conclusions were made.

8. “DECLINE IN AUTOMOBILE INDUSTRY”

Resource person: ANIRBAN BHATTACHARAJEE
Date: 21-10-2019
Club: SME



Major automobile companies of India today came out with their monthly sales data for July 2019 and the numbers are not at all encouraging. The prominent carmakers like Maruti Suzuki, Hyundai, Mahindra & Mahindra and Honda have all suffered a drop in their sales during the month. The case is similar with companies like TVS and Royal Enfield.

The country's largest carmaker Maruti Suzuki India has been witnessing a decline in sales for the past six months and reported a 33.5 per cent dip in total sales to 1,09,264 units in July 2019. The cumulative sales of Hyundai Motor India fell 3.8 per cent to 57,310 units during the month.

Mahindra & Mahindra has registered a fall of 15 per cent in total monthly sales to 40,142 units in July 2019, while the domestic sales of Honda Cars India have dived 48.67 per cent to 10,250 units in the same month.

TVS Motor Company has reported a sales decline of 13 per cent to 2,79,465 units in July 2019. Royal Enfield sales fell 22 points to 54,185 units during the month.

Overall, economic slowdown coupled with delayed monsoon and higher monsoon deficit in few regions have influenced rural demand.
The automobile industry was reeling under intense pressure during the first quarter of FY20 and this was proven by the data from SIAM (Society of Indian Automobile Manufacturers). While the domestic sales plunged 15.93 per cent to 20,01,096 units in April 2019, there was a drop of 8.62 per cent to 20,86,358 units in May 2019. A decline of 12.34 per cent to 19,97,952 units in domestic sales was witnessed in June 2019.

Domestic automobile industry's sales volume fell 12% in June 2019 on weak consumer sentiments owing to the slowing economy amid delays in the onset of monsoons. With rising inventory levels at dealer level, most original equipment manufacturers continued to take production cut in June 2019 According to a PTI report, ACMA (Automotive Component Manufacturers Association of India) has sought a uniform 18 per cent GST rate across the entire auto and auto component sector for a revival. The auto component industry employs nearly 5 million people and ACMA has said that almost 10 lakh jobs could be on the line if the prolonged slowdown in the automobile industry continues.

4. Tech. talk by Faculty

1. Polyuria coating for self-sealing fuel tank for Armored Fighting Vehicles

-Arun Kumar. T

Date: 20-08-2019

Introduction: The self-sealing fuel tanks (SSFTs) have been into existence from as long as World War II days though they were used only for the aircraft fuel tanks to prevent them from damage when subjected to heavy fire. Those days, multiple layers of rubber were enforced and placed together in order to perform the self-sealing of the fuel tank but by virtue of its weight. Researchers are continuously looking for new materials / composites that offer enhanced protection to the vehicle with less weight.

Objective: The main aim of this research is to examine the suitability of Polyuria (PU) coating on mild steel and aluminum for self-sealing fuel tanks.

2. Filament development and 3D printing

-Balu. P. Patil

Date: 04-09-2019

Introduction Explained basic difference between additive manufacturing and traditional machining process, classification of additive manufacturing processes. Process chain of additive manufacturing explained using flow chart. Working principle of fused deposition modelling process explained mentioning need of setting different process and machine parameters. Mentioned various CAD software used and available file formats to asses' additive manufacturing process.

Further mentioned printing of multiple parts printing options available in FDM slicing software. Importance and need of filament development was highlighted along with STL file manipulation and threats regarding duplication of STL files.

Finally, case study on metal desktop 3D printer is presented mentioning how its weight, time and cost saving capability distinguishes it from parts processed using traditional machining process. A list of applications and areas where 3D printed parts being used was mentioned.

3. Space electric propulsion

-T. S. Sheshadri

The specific impulse of chemical rocket engines is restricted by i) maximum adiabatic flame temperature of given oxidizer-fuel pair, ii) Maximum temperature that is permissible by material considerations for the combustion chamber walls. The highest specific impulse obtained so far is around 500 seconds. This is sufficient for near earth missions but not enough for travel to the outer planets of the solar system

An alternate way of accelerating propellant material is by the direct application of electrostatic and electromagnetic forces directly on the propellant. These engines are referred to as ion and plasma engines respectively. Plasma engines can develop specific impulses of up to 6000-7000 secs depending on propellant used, and ion engines are capable of specific impulses in excess of 10000 secs. This makes the later suitable even for missions outside the solar system. The talk details these two technologies with performance details of international and IISc developed engines. Detailed results of numerical simulation are also presented.

Examples of propellant weight saving by the use of these engines are presented for the cases of : i) North-South Station Keeping of 2 ton class geosynchronous satellite, and ii) for Orbit Transfer Vehicle for moving payloads from low earth orbit to geosynchronous orbit.

5. Phd

Dr. Rajendra Prasad Reddy

Research area: Bio Diesel

University: VTU Belgaum

Abstract:

Microalgae is a third-generation biomass and can be cultivated without affecting the production and prices of food crops. The heterotrophic marine alga Schizochytrium contains high lipid content, which is ideal for producing biofuels. The free fatty acid content of Schizochytrium oil was 0.1%, which is well within the recommended value for one-step alkaline transesterification. The first part of this study was aimed at optimizing the process parameters for the production of biodiesel from Schizochytrium oil through transesterification. The process parameters involved were the volumetric percentage (% v/v) of methanol, weight percentage (% w/v) of catalyst, stirring speed, reaction temperature and reaction time. A conversion efficiency of 99.99% was observed through gas chromatography with mass spectroscopy (GC-MS) analysis for a 30% v/v methanol, 0.4% w/v KOH, 400 rpm stirring speed, 60°C reaction temperature and 90 min reaction time. The proton nuclear magneto resonance (1H NMR) spectra confirmed this result by indicating that the biodiesel derived with these optimum parameters contained only methyl esters of fatty acids and is devoid of mono, di, tri-glycerides and glycerol in the fuel synthesized. The properties of the biodiesel obtained were also found to be well within the recommended limits of biodiesel standards specified by ASTM. The kinematic viscosity was found to be 3.7 mm^2/sec and the flash point was found to be 170°C.
The cloud and pour points were 5°C and 0°C, respectively.
The calorific value was 39.48 MJ/Kg.

The second part of this study was to conduct experiments to analyse the combustion, performance and emission characteristics of a single cylinder CI engine using the optimized biodiesel blends. Tests were carried out using B20, B40, B60 biodiesel blends at an engine speed of 1500 rpm and 16.5:1 compression ratio. Peak in- cylinder pressures of 64 bar and 65 bar were observed for B40 and B60 biodiesel blends at full load, which are 1.42% and 3.01% higher than that of Petro diesel. However, it was 0.95% lower for B20 biodiesel blend when compared to that of petro diesel. The performance parameters calculated were Brake specific fuel consumption, brake specific energy consumption and brake thermal efficiency. The exhaust gas emissions like Carbon monoxide, Carbon dioxide, Oxygen, Nitrogen oxide, and Hydrocarbon were also analysed. The combustion characteristics of biodiesel blends were compared with those of petro diesel. The ignition delay values for B20, B40 and B60 biodiesel blends were reduced by 6.04%, 5.11% and 4.18% respectively when compared to that of petro diesel. The Brake thermal efficiency was reduced by 3-4% for B20, B40 and B60 biodiesel blends when compared to that of petro diesel.

6. Student VTU exam results

SEMESTER	TOTAL APPEARED	FCD	FC	SC	FAIL	PASS	PASS %
4	117	25	24	03	65	52	44
6	106	24	36	11	35	71	70
8	103	81	20	0	02	101	98

Issue: June to November 2019

Editorial Committee

Students:

Akhilesh Ramesh: 1CR16ME012

“Happy people plan actions. They do not plan results.”

-Denis Waitley

Amith Chandra. S: 1CR16ME017

“Patience is not simply the ability to wait, its how we behave while we are waiting.”

Deeptha Sabarish: 1cr17me023

“Happiness can be found in the darkest of places. As long as one remembers to seek out the light. “

-Albus Dumbledore

Manoj Shivakumar, 1cr18me042

“Success is not the key to happiness. Happiness is the key to success. If you love what you are doing, you will be successful.”

-Herman Cain

Faculty:

Dr. Vijayanand Kaup

Dr. Rajendra Prasad Reddy

Professor. Chidhananda. R. S

CMR Institute of Technology

Department of Mechanical Engineering