KUMARAGURU
COLLEGE OF TECHNOLOGY

Department of Mechanical Engineering

Newsletter
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Editors:
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Mr. B. N. Sreeharan

Associate Editors:
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Mr. B. Praveen

DEPARTMENTAL ACTIVITIES

INDUSTRY INSTITUTE INTERACTION

The Entrepreneurship participation and discussions carried out at MSME MEET 2019 at CO-INDIA on 12.102019 by Dr. S. Balasubramanian, ASP/ME and Dr. S. Thirumurugaveerakumar, AP (III)/ME.

Dr. C. Velmurugan, HoD/ME, Dr. S. Balasubramanian, ASP/ME and Mr. M. A. Vinayagamoorthi, AP (II)/ME along with three final year Mech. C students visited M/s. ELGi Equipments, Kinathukadavu, Coimbatore on 21.10.2019 to discuss about the students' projects.

VIVA VOCE CONDUCTED

A Ph. D. Viva Voce was conducted in the department for Mr. S. Ragunath, one of the Research Scholar of Dr. C. Velmurugan, HoD/ME on 17.10.2019.

PROGRAMMES PARTICIPATED

- Dr. P. K. Giridharan, Prof./ME and Mr. V. Manivelmuralidaran, AP (II)/ME participated in a National Conference on "Recent Advances in Welding Processes, Automation, Power sources and Consumables, WAPCON 2019 on 18.10.2019 and 19.10.2019.

ONLINE COURSES COMPLETED

Mr. B. N. Sreeharan, AP (II)/ME completed following modules through Elsevier Researcher Academy

- How to prepare your manuscript
- Guide to reference managers: How to effectively manage your references
- Structuring your article correctly.
- How to write an abstract and improve your article

DEPARTMENTAL ACTIVITIES

GUEST LECTURES DELIVERED

- Mr. S. Kiranlal, AP/ME Garage Incharge delivered a guest lecture on the topic "Introduction to student motorsport" at UKF College of Engineering and Technology during 10.10.2019 to 12.10.2019.

- He also delivered another lecture at FFS India season 3 organized by Fraternity of mechanical and automotive engineers at Kari motor speedway, Coimbatore during 30.09.2019 to 03.10.2019.

- Mr. K. Arumugam, Senior Technical Associate delivered a lecture in the 15th KCM international FIDE rating chess tournament at Sri Krishna Gounder Kalyana Mandabam during 28.09.2019 to 02.10.2019.

EXTERNAL EXAMINERSHIP

Following faculty members had acted as external examiner in conducting various labs at different institutions. Details are as follows.

@ Sri Ramakrishna Engineering College, Coimbatore

- Dr. S. Thirumurugaveerakumar, AP (III)/ME, 16.10.2019
- Dr. S. Balaji, AP/ME, 16.10.2019
- Dr. K. M. Senthilkumar, ASP/ME, 16.10.2019
- Dr. K. K. Arun, AP (III)/ME, 15.10.2019
- Dr. M. Balaji, ASP/ME, 15.10.2019
- Mr. P. D. Devan, AP/ME, 15.10.2019
- Mr. M. Ramesh Kumar, AP/ME, 15.10.2019

@ Sri Krishna College of Engineering and Technology, Coimbatore

- Mr. S. Ramanathan, AP (II)/ME, 11.10.2019

@ KPR Institute of Engineering and Technology, Coimbatore

- Dr. S. Balasubramanian, ASP/ME, 11.10.2019

@ SNS College of Technology, Coimbatore

- Dr. K. K. Arun, AP (III)/ME, 31.10.2019

@ SNS College of Engineering, Coimbatore

- Dr. K. K. Arun, AP (III)/ME, 16.10.2019

@ Hindusthan College of Engineering and Technology, Coimbatore

- Mr. S. Ramanathan, AP (II)/ME, 16.10.2019

@ Government College of Technology, Coimbatore.

- Dr. N. Sangeetha, Sr. ASP/ME, acted as external expect for academic audit of question paper and answer scripts on 03.10.2019.

EVENTS CONDUCTED BY MEA

SOLUTIONATHON

The Department Association of Mechanical Engineering Department had organized an event SOLUTIONATHON – providing solution to the Problems on 15th October on remembrance of Dr.A.P.J.Abdul Kalam.

This Event mainly focused on Brainstorming with their teammates to organize their ideas.

32 Teams with nearly 65 students have participated and nearly 19 problem statements were assessed.

The Department Association is looking forward for the best idealist and solutionist

Team providing the best suitable solution are directly linked to Research Cell of KCT. Where the students are offered with funds to develop their Projects.

Students From 2nd and 3rd Year have Participated in this event

Participants were given with the problem statements and provided 2 weeks to identify a solution for the problem.

Participants were asked to send a PPT of the proposed Solution by November 7th.

Students Achievements - UG

KRAFT FITNESS CHALLENGE

- Mr. Charan V – 18BME184 had participated in Kraft Fitness Challenge conducted on 15th October at Kumaraguru College of Technology and secured 1st Position.

- Mr. Sanjay – 18BME161 has participated in Kraft Fitness Challenge conducted on 15th October at Kumaraguru College of Technology and secured 2nd Position.

AICTE VISHWAKARMA AWARDS:

All India Council for Technical Education (AICTE), Ministry of Human Resource Development, Govt. of India holding a competition "AICTE-Vishwakarma Awards-2019" for the students and institutes of AICTE approved institutions. Its aim is to encourage and motivate young students and institutions to raise their performance in their specific domains leading to significant contribution towards the growth and development of the nation as a whole.

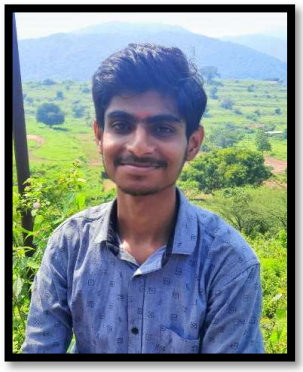
Students from 2nd Year Mechanical Engineering Department have been selected for Regional Level Competition.

- Mr. Praveen B – 18BME092
- Ms. Pavithra R – 18BME106
- Mr. Prasanth M – 18BME100
- Mr. Krishna Prasad L – 18BME105

Dr. S. Balasubramaniam was their Mentor throughout their Progress.

Students Article

DESIGN OPTIMIZATION OF CAD MODEL



PRASANTH - 18BME100
2nd year Mechanical – B

Optimization allows refining the design so that the final model consists of the best possible design without violating a set limit. Moreover to calculate the wave front error of the mirror under a specified loading condition is itself a lengthy process that is first it is required to plot the points on the surface of the mirror and then the displacement of this points under the specified loading condition is to be calculated using the Creo Simulation and then simulated result is taken to other software namely MATLAB where the Zernike polynomials are used to calculate the wave front error of the mirror.

However, Creo automates the process of optimizing the given parameters by using an algorithm and varying the parameters in selected combinations to achieve the goal which are predefined in Creo itself.

In Optimization Design Analysis, user is required to define a goal and a limit for the design. In the example given above the goal is to find the mounting points where the mirror has its minimum wave front error and the design limit is that it should be in between the inner diameter/radius and the outer diameter/radius of the mirror.

There should not be any intervention by the user otherwise it fails. In practice any structural optimization process CAD software, CAE software and analytical software for Math programming.

The optimizer is obtained mainly by manual transferring of data from one software to other serially and iteratively. Due to this atomization the design optimization using CAE result and Math program is possible in same CAD environment for any case study or CAD model.

Here is one such example where the design optimization failed. The calculation of the wave front error was carried out using the 3 Matlab software where it was easy to compute the Zernike terms .

But for the optimization, the entire loop should be fully automated which was not possible if the wave front error was calculated in Matlab as the user has to provide the input. The programming in Math Cad can be replaced with any other analytical code for the purpose of computing optimization function.

Compared to earlier approaches where simulation results are exported to text file or spread sheet in order to make it an input file to analytical softwares like Matlab or MathCad, the integrated approach given in this paper allows seamless flow of data between CAD, CAE and MathCad environment without any user intervention or interaction.

The optimizer of CAD takes control of entire scenario and decides change in parameter values to reach the goal of optimization function computed by MathCad and fed back to CAD optimizer for its comparison with its earlier value. These output values are easily accessible in CAD environment itself in the form of parameters.

LASER CUTTING

PAVITHRA - 18BME106
2nd year Mechanical – B

Laser cutting is a fabrication process which employs a focused, high-powered laser beam to cut material into custom shapes and designs. This process is suitable for a wide range of materials, including metal, plastic, wood, gemstone, glass, and paper, and can produce precise, intricate, and complex parts without the need for custom-designed tooling.

There are several different types of laser cutting available, including fusion cutting, oxidation cutting, and scribing. Each laser cutting process can produce parts with precision, accuracy, and high-quality edge finishes, and with generally less material contamination, physical damage, and waste than with other conventional cutting processes, such as mechanical cutting and waterjet cutting.

However, while laser cutting demonstrates certain advantages over more conventional cutting processes, some manufacturing applications can be problematic, such as cutting reflective material or material requiring secondary machining and finishing work. The requirements and specifications demanded by a particular cutting application—e.g., materials and their properties, energy and power consumption limits, secondary finishing, etc.—help determine the type of cutting process most suitable for use.

While each cutting process has its advantages and disadvantages, this article focuses on laser cutting, outlining the basics of the laser cutting process and the necessary components and mechanics of the laser cutting machine. Additionally, the article explores various laser cutting methods and applications, the benefits and limitations of the process, and comparisons between laser cutting and other types of cutting processes.

Laser cutting is a non-contact, thermal-based fabrication process suitable for metal and non-metal materials. For the laser cutting process to run smoothly and at optimum capacity, several factors should be taken into consideration, such as the laser cutting machine's configuration and settings, the material being cut and its properties, and the type of laser and assist gas employed.

In contrast to mechanical cutting, which utilizes cutting tools and power-driven equipment, and waterjet cutting, which utilizes pressurized water and abrasive material, laser cutting employs a laser cutting machine to produce cuts, engravings, and markings. While laser cutting machines vary from model to model and application to application, the typical setup includes a laser resonator assembly, mirrors, and a laser cutting head which contains a laser focusing lens, a pressurized gas assembly, and a nozzle. The basic laser cutting process includes the following stages:

- beam generation
- beam focusing
- localized heating and melting
- material ejection
- beam movement

Each stage is integral to the laser cutting process and, when properly executed, producing a precise cut.

KUMARAGURU college of technology

COIMBATORE – 641 049

Department of Mechanical Engineering

INSTITUTE VISION:

The vision of the college is to become a technical university of International Standards through continuous improvement.

INSTITUTE MISSION:

Kumaraguru College of Technology (KCT) is committed to providing quality Education and Training in Engineering and Technology to prepare students for life and work equipping them to contribute to the technological, economic and social development of India. The College pursues excellence in providing training to develop a sense of professional responsibility, social and cultural awareness and set students on the path to leadership.

DEPARTMENT VISION:

To emerge as a centre, that imparts quality higher education through the programme in the field of Mechanical Engineering and to meet the changing needs of the society.

DEPARTMENT VISION:

The department involves in sustained curricular and co-curricular activities with competent faculty through teaching and research that generates technically capable Mechanical Engineering professionals to serve the society with delight and gratification.

PROGRAM OUTCOMES (PO's):

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

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8. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

9. **Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long learning:** Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM EDUCATIONAL OUTCOMES (PEO's):

PEO 1 : Graduates will take up career in manufacturing and design related disciplines.

PEO 2 : Graduates will be involved in the execution of Mechanical Engineering projects.

PEO 3 : Graduates will take up educational programme in mastering Mechanical sciences and management studies.

PROGRAM SPECIFIC OUTCOMES (PSO's):

1. Apply the fundamentals of science and mathematics to solve complex problems in the field of design and thermal sciences.

2. Apply the concepts of production planning and industrial engineering techniques in the field of manufacturing engineering.