MECHANICAL ENGINEERING
Newsletter

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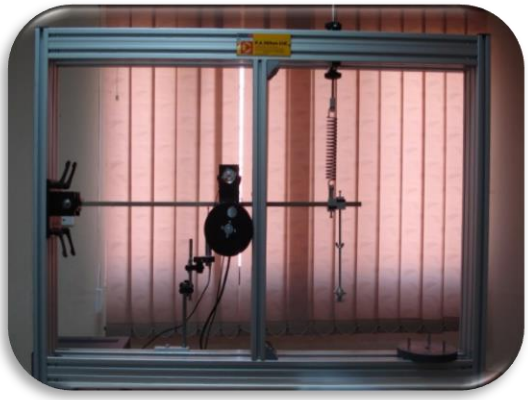

Chairman's Message

It is a matter of great pleasure that the Department of Mechanical Engineering is bringing out e-newsletter to provide an insight into the activities at the Department. The newsletter will serve as platform to showcase the accomplishments of the Department to the fellows, colleagues and professional engineers. This would also serve as a vehicle of communication for faculty, students and those with a shared interest outside the campus. It is hoped that this newsletter will encourage and keep them well informed and will also help them interact and build relationships which will ultimately result in improvements.

I especially congratulate the editors of this volume who had been endeavoring very hard to bring about this e-newsletter despite of their academic and research activities.

Prof. Dr. Hassan Ali Khan Durrani
Chairman
Department of Mechanical Engineering

Departmental Logo Competition

An official logo of the Department is to be designed. Please send your logos to editor's email address (jawaid.daudpoto@faculty.muet.edu.pk). The winner will be announced in following issue of the newsletter.

Dr. Abdul Razaque Sahito has also proposed a logo which is shown here for comments.

Laboratory Developments

Emphasis is being paid to provide better experimental facilities to taught and research students. Following Laboratories have been developed and strengthened to achieve this:

- Mechatronics Laboratory
- Aerodynamics Laboratory
- Automobile Laboratory
- Thermodynamics Laboratory
- Refrigeration & Air Conditioning
- Mechanical Vibration Laboratory
- Energy Technology Laboratory
- Material Testing Laboratory
- Heat and Mass Transfer Laboratory
- Fluid Mechanics Laboratory
- Engineering Mechanics Laboratory
- Mechanics of Machines Laboratory
- Engineering Graphics Laboratory

Mechatronics laboratory Equipment

Aerodynamics laboratory

Drawing Hall

Engineering Mechanics laboratory

Heat & Mass Transfer laboratory

CNC Shop

Machine Shop

Mechanical Engineering Workshop

Mechanical Engineering Workshop is a place where students acquire knowledge on the operation of various Processes involved in manufacturing and production.
The Workshop Practice course makes students competent in handling practical work in engineering environment.

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Mechanical Engineering Workshop consist of following shops: (Workshop)

- Machine Shop
- CNC shop
- Forging shop
- Fitting shop
- Woodwork shop
- Foundry shop
- Welding shop

Dr. Engr. Abdul Razaque Sahito completes his Ph.D.

Dr. Engr. Abdul Razaque Sahito has recently completed his Ph.D. in Environmental Engineering from Mehran University of Engineering & Technology Jamshoro. His Ph.D. topic was "Optimization of Anaerobic Co-Digestion Process of Crop Residues & Buffalo Dung for Maximum Methane Production". In Ph.D. research work, Dr. Sahito utilizes the wasted crop residues including sugarcane trash, banana plant waste, rice straw, canola straw and cotton stalks along with the buffalo dung to produce renewable methane by anaerobic co-digestion process. He has also optimized the crop residue to buffalo dung ratio, the most suitable alkaline chemical doze and most suitable crop residue particle size that gives maximum methane generation. The optimization of all the three parameters was done as anaerobic batch reactors by using Automatic Methane Potential Test Setup as shown in Fig. 1.

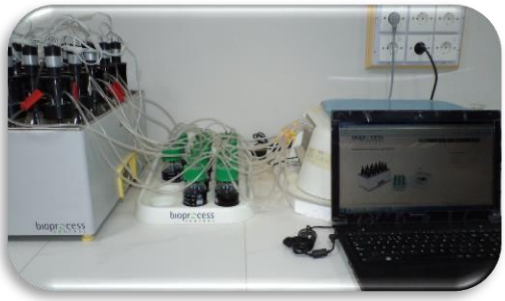

Fig. 1: Automatic Methane Potential Test Setup (AMPTS)

The optimization also includes the most suitable organic loading rate (OLR) and the hydraulic retention time (HRT) for the Continuously Stirred Tank Reactor (CSTR). The optimization of the OLR and HRT was carried out by using the specially designed and fabricated CSTR assembly as shown in Fig. 2. The optimized parameters were also simulated by using the mathematical models.

Fig. 2: The developed CSTR assembly for anaerobic co-digestion process optimization

This unique instrument is a reliable, inexpensive, easy to construct, easy to use, and corrosion resistant that does not need maintenance, can measure a wide range of gas flow at varying pressure and temperature and adequately accurate to measure the volume of methane generated from the laboratory scale anaerobic reactors.

Dr. Sahito has also designed a Semi-automatic Methane Potential Test Setup as shown in Fig.3.

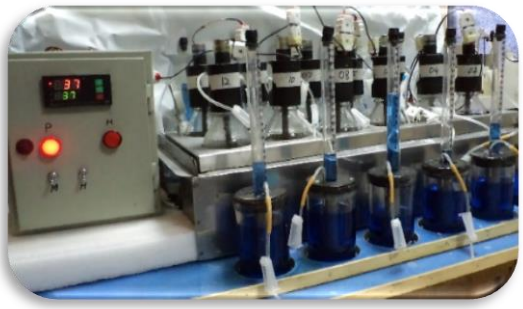

Fig. 3 Semi-automatic Methane Potential Test Setup

Juniors Project (Suspension Cable Transport Bridge) (Mr. Aakash Deep)

As the start of new semester system at the University causes the increment in the class and group activities. This enables the teachers to assign the mini projects to the group of students for enhancement of their practical capabilities. In order to analyze the force components and other equilibrium condition or structures to the different loadings without considering the internal defects on the system. "Engineering Mechanics is the backbone of not only the Mechanical but Whole Engineering. In that case, solving the problems not fulfills the demand but experimental practice also needed. So, the students of the engineering should be given not only the theoretical tasks but the practical ones also like making the different models and its analysis which gives the students, the application view of the particular subject in particular field which is basic meaning of Engineering i.e. to apply." says Mr. Zain-ul-abdin.

Various projects were submitted by different groups of the students explaining the various structures and supports and their equilibrium analysis. But in the project some condition were given to student that also increases the challenges for the students. For instance, the project budget should not exceed the limit of 1400 Rs so the students should find the cheaper sources or find some old repairable thing for their model and project should be self-made and a small report that contains all information and analysis of the project.

Among of all projects, one of the best was of Suspension Cables Transport Bridge Model (SCTBM) that was made by group of 7 students, Mr. Aakash Deep as lead.

The project core objective was to analyze and explain the force at each suspension cable by various loading at the track suspended by them. In the project, Entire group worked together at core derivation of equations, reading management i.e. span, cable lengths, angles along with all other dimension of the project, project design, loading variation and at the end we had worked at assembly of project and created model that fulfilled all condition given by Mr. Zain-ul-abdin.

In the Analysis, the team SCTBM analyzed the majorly the variation of resultant forces on the individual cables by varying the weight on the deck. Besides this, they also extracted and analyzed other factors that can change the resultant force such as span, geometry and symmetry of the cables etc.

The group comprises of following students: Mr. Aakash, Mr. Ikram, Mr. Uzair, Mr. Rafeeque, Mr. Jameel.

Besides this, other projects were made with great efforts that include:

1. Analysis of Forces at Inclined Plane.
2. Moveable Inclined Plane with Pulley.
3. Forces Analysis at the Load Carrying Point.
4. Moment and Force Analysis.
5. Concept Model of Position Vectors.
6. Concept Model of Reaction Moments.

Unmanned Aerial Vehicle

(Mr. Rizwan and Mr. Abdul Wahab)

Unmanned Aerial Vehicles (UAVs) have been used for the first time to detect Naxal hideouts in dense forests and hilly terrains and monitor the movement of ultras to help ground forces carry out precision attacks. While the early operational experiences with UAVs show great promise, their full range of capabilities is largely unknown. However, it is clear that these technologies will enable military forces to use aerospace power more efficiently, which means at lower cost and with less risk to the humans who pilot aircraft.

"An unmanned aerial vehicle is .a powered, aerial vehicle that does not carry a human operator, uses aerodynamic forces to provide vehicle lift, can fly autonomously or be piloted remotely, can be expendable or recoverable, and can carry a lethal or non-lethal payload"

In order to explore the UAV industry conventionally, American Institute of Aeronautics and Astronautics (AIAA) through the Applied Aerodynamics, Aircraft Design, Design Engineering and Flight Test Technical Committees and the AIAA Foundation invites all university students to participate in the Student Design/Build/Fly Remote – Controlled Aircraft competition. The contest will provide a real-world aircraft design experience for engineering students by giving them the opportunity to validate their analytic studies. Replicate to this international event AIAA, its GIKI chapter got pride to hold the event named Design, Build and Fly Competition (DBFC) by past 9 years exploring world of UAV in Pakistan. of technology developed by the teams from prior.

The impacts of such competitions in Pakistan's universities leads the manufacturing of UAVs locally even by undergraduate engineering students. In such regards students of Mechanical Department of Mehran University of Engineering and Technology took part in the event DBFC last year for the first time.

Receiving award for first position in National Flying Competition (NFC) at PAF Kiet.

A team named MUET MECHLINES design, builds and fabricates a UAV under the supervision of Dr. Zeeshan Ali and participated in DBFC – 8 at GIKI and in National Flying Competition (NFC) at PAF Kiet. Team won first position in NFC. This was the turning point in the development of UAVs in MUET.

MUET MECHLINES have designed a UAV using the Pro Engineer software. Preliminary design phase of UAV focused on fully developing and refining the details of the design chosen, the critical aerodynamic design details were determined to be wing area, aspect ratio, airfoil and power requirements at takeoff and cruise. These parameters were optimized using commercial software tools such as JAVAFOIL. Finally, stability, control, and propulsion system analysis over the entire velocity range of the aircraft was conducted to further refine the design. In second phase, the designed airplane is assembled using the appropriate techniques.

The designed electric powered UAV is capable of safe flight in the air and has been tested on various occasions. MUET MECHLINES designed UAV can serve several different purposes such as regulating the traffic, survey land and provide transport of small cargo in hostile situations. This particular UAV can also be used for military purposes, with its primary task being intelligence-gathering investigation.

Project Exhibition

The Department of Mechanical Engineering organized the Project Exhibition for Final year students. The event was all about providing the students a platform to showcase their Final Year Projects.

Faculty members, current students and h**o**norable VC along with registrar visited the exhibition and acknowledged the hard work put in by the students.

Project Exhibition at PEC Job fair

Awards Presenting to VC

Team representing MUET lead by Dr. Zeeshan and Dr. Tanweer Phulpoto from Mechanical Department went for project exhibition which was organized by Pakistan Engineering Council (PEC). Mehran University secured four Awards for the projects displayed at Expo Centre Karachi held in November this year.

LabVIEW Academy

LabVIEW Academy has been established by National Instruments, USA. in the Mechatronics Laboratory of the Department

The Academy will help students gain status of Certified LabView Associate Developers (CLAD). The certification will increase their employability.

HEC Best Research Paper Award

Dr. Khanji Harijan, Department of Mechanical Engineering, Mehran University Jamshoro (MUET) receives BEST RESEARCH PAPER AWARD.