

"If Pakistan is to take its proper place among the progressive nations of the world, it will have to take up a good deal of leeway in the realm of scientific and technical education which is so necessary for the proper development of the country and the utilization of its resources. The establishment of institution like the Institute of Engineers will greatly stimulate technical research and help in disseminating available information. The Institute of Engineers will not only benefit the engineers themselves by improving their technical knowledge but also bring lasting benefits to public services which they are called upon to perform. I wish the Institute every success"

QUAID-E-AZAM'S message to the first inaugural meeting of the Institute of Engineers Pakistan on 20th June 1948.





Governor of Punjab

The Institution of Engineers Pakistan, Karachi Centre and NED University of Engineering & Technology are jointly organizing the 8th International Mechanical Engineering Conference (IMEC-2018) scheduled to be held on Friday 26th & Saturday 27th January, 2018 at Karachi in collaboration with Federation of Engineering Institutions of Islamic Countries (FEIIC), Federation of Engineering Institutions of South & Central Asia (FEISCA), Balochistan University of Information Technology, Engineering & Management Sciences (BUITEMS), Pakistan Navy Engineering College-NUST, Dawood University of Engineering & Technology (DUET), and DHA Suffa University.

Emerging technologies include a variety of technologies such as educational technology, information technology, nanotechnology, biotechnology, cognitive science, psych technology, robotics, and artificial intelligence resultant to technical convergence of different systems towards similar goals. Converging these distinct technologies into uniform systems by sharing resources and actions, create new efficiencies. However, the opinion on the degree of the impact, status and economic viability of several emerging technologies varies.

I am confident that the 8th International Mechanical Engineering Conference will have a far reaching impact on the ongoing research and development in the fields of various emerging technologies and their industrial application besides it will provide an opportunity to the participant to share their experience for mutual benefit.

I wish The Institution of Engineers Pakistan and NED University of Engineering & Technology a great success.

Malik Muhammad Rafique Rajwana Governor Punjab





It is a matter of great pleasure to learn that the Institution of Engineers Pakistan, Karachi Centre and NED University of Engineering & Technology are jointly organizing the 8thInternational Mechanical Engineering Conference (IMEC-2018) scheduled to be held on 26th & 27th January, 2018 at Karachi in collaboration with Federation of Engineering Institutions of Islamic Countries (FEIIC), Federation of Engineering Institutions of South & Central Asia (FEISCA), Balochistan University of Information Technology, Engineering & Management Sciences (BUITEMS), Pakistan Navy Engineering College-NUST, Dawood University of Engineering & Technology (DUET), and DHA Suffa University.

The IMEC-2018 will be attracting engineers of world repute from within the country and abroad as well. It is observed that the emerging technologies are knowledge driven means; perceived as capable of changing the status quo. Although, such technologies are generally new yet developed on the basis of older technologies. These technologies are still controversial and relatively undeveloped in potential, when it comes to application of pre-implantation genetic diagnosis and gene therapy respectively. However, it is a fact that the emerging technologies are characterized by radical novelty, relatively fast growth, coherence, prominent impact, and uncertainty and ambiguity. With such realities in the backdrop, the IMEC-2018 is expected to offer ample opportunities to the distinguished delegates to deliberate upon issues of their studies and exchange knowledge and experiences.

I wish the Institution of Engineers Pakistan and NED University of Engineering & Technology all the success for the conduct of 8th International Mechanical Engineering Conference.

Iqbal Zafar Jhagra Governor of Khyber Pakhtunkhwa





Chief Minister Punjab

I am pleased to know that the Institution of Engineers Pakistan (IEP) and NED University of Engineering & Technology are jointly organizing the 8th International Mechanical Engineering Congress (IMEC-2018) in collaboration with Federation of Engineering Institutions of Islamic Countries (FEIIC), Federation of Engineering Institutions of South & Central Asia (FEISCA) and last but not the least DHA Suffa University.

In my opinion, the theme of this year's conference i.e. "Emerging Technologies & Industrial Applications" is of paramount importance beeping in view the ongoing technological advancements in the world. There is no doubt that rapid technological advances are having a major impact on our professional and personal life as they are changing the nature of work — not just in terms of the jobs that we do, but also the way we do them and who we work with.

Creativity and innovation of engineering professionals is central to building up a resilient community. They are, therefore, required to come up with new ideas and smart solutions. Transforming the businesses in line with new technologies helps to expand the business foot print, introduce innovation and boost the output through innovation.

Having a more efficient IT infrastructure equipped with new technologies allows public administrations to get quality work done and improve service delivery. While the government is playing its due role for improvement in governance through IT based initiatives, it is equally important that engineers develop a fundamental understanding of their professional responsibilities. They are architect and builder of the nation in terms of infrastiucturg development, innovation and entrepreneurship.

I am confident that this Conference will be of great benefit to the engineers and will prove to be a milestone in the history of IEP and NED. Moreover, the moot will also enhance 'the kriowledge of participants in raising the efficiency and increasing the productivity of the engineering sector. I wish the organizers of this Conference all the success in their endeavours.

Muhammad Shehbaz Sharif Chief Minister Punjab Government of Punjab





Chief Minister Sindh

It gives me immense pleasure to congratulate the Institution of Engineers Pakistan (IEP) and NED University of Engineering & Technology for jointly organizing the 8th International Mechanical Engineering Conference (IMEC-2018) in collaboration with Federation of Engineering Institutions of Islamic Countries (FEIIC), Federation of Engineering Institutions of South & Central Asia (FEISCA), DHA Suffa University, Dawood University of Engineering Technology, Balochistan University of Information Technology, Engineering & Management Sciences, Pakistan Navy Engineering College - NUST.

This Conference Theme "Emerging Technologies & Industrial Applications" provides a unique platform to eminent Professionals, Scientists, Researchers, Academicians, and Entrepreneurs across the globe to participate and share their research advancements and new technologies.

I sincerely hope that the two days of deliberation, discussion, interaction and proactive exchange of ideas will prove to be fruitful and contribute immensely to our mutual growth. I also congratulate the conference organizers for attracting a wide range of papers from experts in their fields.

The technical talks and papers which will be presented by eminent scientists, researchers, faculty members and industry personnel hopefully will ignite new ideas, inspire young graduates to focus on research and development, it will also pave way to work closely with industries for solutions in the relevant technical areas.

I hope that this conference would certainly induce innovative ideas among the participants paving way for new avenues of research in multiple disciplines of engineering field.

I wish all the success to the Institution of Engineers Pakistan, Karachi Centre and NED University of Engineering & Technology.

Pakistan Zindabad

Engr. Syed Murad Ali Shah Chief Minister Sindh





Federal Minister for Education and Professional Training

It is a matter of great pleasure to learn that the 8th International Mechanical Engineering Conference is being jointly organized by the Institution of Engineers Pakistan, Karachi Cente and NED University of Engineering & Technology scheduled to be held on Friday 26th & Saturday 27th Janury, 2018 at Karachi in collaboration with many other well reputed institutes / organizations including Federation of Engineering Institutions of Islamic Countires (FEIIC), Federation of Engineering Institutions of South & Central Asia (FEISCA), Balochistan University of Information Technology, Engineering & Management Sciences (BUITEMS), Pakistan Navy Engineering College-NUST, Dawood University of Engineering & Technology (DUET), and DHA Suffa University.

It is a matter of great pride that this institution came into existence in 1948 with the blessings of the Father of the Nation, Quaid-e-Azam Mohammad Ali Jinnah. I hope that this institution will leave no stone unturned to deliver up to the expectations of while reposing confidence in the institution, the Father of the Nationa, Quaid-e-Azam Mohammad Ali Jinnah when he said that the establishment of the institution of Engineering Pakistan, will greatly stimulate technical research and help in disseminating available information.

Today the world is witnessing 4th industrial revolution through use of technology and collaboration. It is imperatives that our institutes build the capacity of our engineers in such a manner that they not only learn new technologies and skills but also apply them while working in teams i.e. collaboratively. Educational technology, information technology, nanotechnology, biotechnology, cognitive science, psych technology, robotics, and artificial intelligence are all developing at a very fast pace and we must be on top of the new developments.

I wish the institution of Engineers Pakistan and NED University of Engineering & Technology, Karachi and all collaborating institutes a real success in noble endeavors

> **Engr. Muhammad Baligh ur Rehman** Federal Minister for Education and Professional Training Government of Pakistan





President Federation of Engineering Institutions of Islamic Countries (FEIIC)

It is a great pleasure to share with you that the Institution of Engineers Pakistan (IEP), Karachi Centre and NED University of Engineering & Technology are organizing the 8th International Mechanical Engineering Conference (IMEC-2018) in Collaboration with Federation of Engineering Institutions of Islamic Countries (FEIIC).

The Federation of Engineering Institutions of Islamic Countries (FEIIC) is an international nonprofit professional organization, established in 1989, with the aim of fostering cooperation in engineering education, research and professional practice in the Islamic Countries. It comprises of 22 member countries and a number of corporate and institutional members from amongst academic and research institutions, consultants, contractors and national organizations.

FEIIC, in cooperation with its members, has organized many scientific and research conferences, seminars, and workshops in its member countries on various aspects of engineering and related issues, such as engineering education, accreditation of engineering qualifications, and affordable housing etc. and, we are committed to share and exchange the experiences. expertise of the member countries with each other in addressing the crucial challenges in engineering and technological fields and in adopting the emerging trends and new concepts in engineering education, research and development and their implementation.

This 8th International Mechanical Engineering Conference is one of such efforts by the Institution of Engineers Pakistan, an active member of FEIIC, which we hope will bring the researchers and practicing engineers together on a shared platform to share and exchange their expertise and experiences.

Finally, I would like to congratulate and commend the partners and Organizing Committee of the Conference for all their efforts and wish all the participants a very successful and enriching experience at the Conference.

Dr. Jamil Jarallah Al-Bagawi President, FEIIC



President The Federation of Engineering Institutions of South & Central Asia (FEISCA)

It is with pleasure that I send this message on the occasion of the 8th International Mechanical Engineering Conference (IMEC-2018) on Emerging Technologies and Industrial Applications.

Engineers play a critical role in the development of a country as all developed and developing countries have to rely on engineers to remain on the cutting edge of economic growth and compete at the global level.

Papers presented being of good level in international authorship and topics range, the Conference will be a forum that will enrich the regions knowledge and expertise potentials and be a platform for sharing innovations and advances in Mechanical Engineering and related disciplines among countries in the region.

The Federation of Engineering Institutions of South & Central Asia (FEISCA) as a collaborating partner to the event looks forward to the improved professional collaboration that would result among engineering.

The FEISCA hopes that the confluence of technology and expertise would ultimately flow to the engineering community at large contributing to the sustainable socio-economic development in the region. Also I hope that this Conference shall bring together researchers and practicing engineers in the important area of Mechanical Engineering from Pakistan and other countries in an effort to share their knowledge and experience for the good of the profession.

While congratulating the IEP-Karachi Centre and NEDUET-Karachi for successfully organizing the IMEC - 2018, I also convey my well wishes to the fellow collaborating partners to the event; Federation of Engineering Institutions of Islamic Countries (FEIIC), Federation of Engineering Institutions of South & Central Asia (FEISCA), Balochistan University of Information Technology Engineering & Management Sciences (BUITEMS), Pakistan Navy Engineering College (PNEC-NUST), DHA SUFFA University, Dawood University of Engineering & Technology.

I wish all the participants a very successful and enriching experience at the Conference.

Eng. Jayavilal Meegoda President – FEISCA Immediate Past President - IESL





Chairman Pakistan Engineering Council

I am delighted to felicitate the management, members of the Institution of Engineers Pakistan, Karachi Centre and NED University of Engineering &Technology. Who are jointly organizing the 8thInternational Mechanical Engineering Conference (IMEC-2018) on "Emerging Technologies & Industrial Applications. Which is going to be held on Friday 26th& Saturday 27th January, 2018 at Karachi. It is in collaboration with Federation of Engineering Institutions of Islamic Countries (FEIIC), Federation of Engineering Institutions of South & Central Asia (FEISCA), Balochistan University of Information Technology, Engineering & Management Sciences (BUITEMS), Pakistan Navy Engineering College NUST, Dawood University of Engineering & Technology (DUET) and Suffa University, DHA.

The internationalization of new ventures from emerging technologies such as Nanotechnology, Power plant Performance, Renewable Energy & Green Buildings, Energy Conversion, Robots, Smart Grids, Artificial Intelligence and much more to develop economies remains an unfilled gap at the intersection of the literature between international entrepreneurship and strategy inemerging economies.

It is the era of a knowledge economy and no nation can make progress without promoting education, the universities are responsible for imparting education, creating knowledge and integrating it into society. The faculty to pay special attention to the training of students, to develop a peaceful society.

Keeping in view the fast global technological advancements, we are committed to provide qualityengineering and technical education. The establishment of Pakistan Engineering Council, the Institution of Engineers Pakistan, NED University of Engineering and Technology and otheraccredited Engineering Universities in Pakistan will prove to be a blessing for the people ingeneral and the aspirant engineering and technology candidates in particular. To provide them an opportunity to seek education in their chosen fields to serve their homeland, society and the nation as a whole.

I wish the Institution of Engineers Pakistan, NED University of Engineering & Technology, Karachi and all collaborating Institutes a real success in noble endeavors.

Engr. Jawed Salim Qureshi Chairman Pakistan Engineering Council





President The Institution of Engineers, Pakistan

It is a matter of great pleasure that the Institution of Engineers Pakistan Karachi Center and NED university of Engineering & Technology are jointly organizing the 8th International Mechanical Engineering Conference from 26th to 27th January 2018 in collaboration with Federation of Engineering Institutions of Islamic Countries (FEIIC), Federation of Engineering Institutions of South & Central Asia (FEISCA), Dawood University of Engineering & Technology, Karachi, Balochistan Universityof Information Technology Engineering & Management Sciences (BUITEMS), Quetta, Navy Engineering College – NUST, Karachi and DHA Suffa University Karachi.

It is also a matter of great satisfaction that renowned experts from within the country and from abroad shall be presenting their valuable papers during the 8th International Engineering Conference in the light of its theme "EMERGING TECHNOLOGIES AND INDUSTRIAL APPLICATIONS". This event will provide the opportunity to young Engineers to benefit from the knowledge of experienced Engineers in their relevant fields.

The Institution of Engineers Pakistan Karachi Center is working hard for dissemination of knowledge by holding the National, International Engineering Conferences, Technical Seminars, Workshops and lectures for the benefit of Engineering profession and development of the Country.

The Chairman, Vice Chairmen, Secretary and Local Council Members of Karachi Centre deserve appreciation for organizing the Engineering Conferences and Technical lecturers on various Engineering topics for the benefit of engineering community.

I pray for the success of 8th International Mechanical Engineering Conference.

Engr. Dr. Izhar Ul Haq President, The Institution of Engineers, Pakistan





Chairman The Institution of Engineers Pakistan Karachi Centre

Once again you will witness the outcome of a continuously growing successful collaboration with NED University of Engineering and Technology, in the form of 8th International Mechancial Engineering Conference IMEC-2018. The Conference this time is scheduled two (02) month earlier then the previous Conference which speaks volumes of the joint collaborative and sincere efforts of IEP and NED University. The dedicated efforts of all the teams involved is commendable in upholding the pledge that we have made to establish credibility of these conferences among the stake-holders and reaching out with extra vigour and handwork to utilize the platform for disseminating the related knowledge to the professionals.

The thoughtful theme of the Conference "Emerging Technologies and Industrial Applications" clearly indicates the desire of creating link between academia, industry and the enduser. As usual other collaborative institutions, Federation of Engineering Institutions of Islamic Countries (FEIIC), Federation of Engineering Institutions of South and Central Asia (FEISCA), Balochistan University of Information Technology, Engineering & Management Sciences (BUITEMS), Quetta, Pakistan Navy Engineering College-NUST, DHA Suffa University, Karachi and Dawood University of Engineering & Technology, Karachi happily joined hands which reflects their faithin these events and the promise which these conferences shows.

Indeed all these efforts are pre-conference efforts which are the back bone of such events, however, the success lies in the effective organization on the day and participation of related persons inclusive of keynote speakers, authors and the participants. The evidence setforth in the last conference leaves no doubt that the Conference would meet the desired objectives as well as its intended purpose, which infact is the main and purpose of holding such distinguished Conferences.

Our sincere gratitude to all the authors, referees and keynote speakers for their overwhelming participation. Congratulations to the authors who succeeded in getting their papers selected inspite of a very strong blind peer review. I personally would thank Engr. Prof. Dr. Sarosh Hashmat Lodi, Vice-Chancellor, NED University, Engr. Dr. Muhammad Tufail, Pro-Vice-Chancellor, NED University, Engr. Prof. Dr. Nasiruddin Shaikh, Secretary IMEC-2018 and the team members from NED University. Thanks are also due to Engr. Sohail Bashir, Chief Organizer, IMEC-2018, Engr. Ayaz Mirza, Secretary, IEP, Karachi Centre and their team inclusive of all staff of IEP, Karachi Centre

I hope you will enjoy the proceedings and wish a very successful Conference.

Engr. Prof. Dr. S. F. A. Rafeeqi, FIE(Pak) Chairman The Institution of Engineers Pakistan Karachi Centre





Secretary General The Institution of Engineers, Pakistan

It gives me immense pleasure to know that IEP Karachi Center and NED University are organizing 8th International Mechanical Engineering Conference from 26th to 27th January 2018 in collaboration with Federation of Engineering Institutions of Islamic Countries (FEIIC), Federation of Engineering Institutions of South & Central Asia (FEISCA), Dawood University of Engineering & Technology, Karachi, Balochistan University of Information Technology, Engineering & Management Sciences (BUITEMS), Quetta, Navy Engineering College – NUST, Karachi and DHA Suffa University Karachi.

The theme of the conference **"EMERGING TECHNOLOGIES AND INDUSTRIALAPPLICATIONS"** is very important and is need of the day. The topics selected for presentation in the conference are quite relevant to the theme of the conference.

The Institution of Engineers, Pakistan has always played a commendable role in promoting Engineering Science and Technology in Pakistan particularly through its Karachi Local Centre. I hope that the organizers of the 8th International Mechanical Engineering Conference will formulate useful recommendations for further promoting scientific and technological education and research work in the country so that we may get the respectable status in the developed community of the nations. I am also certain that the deliberations of the conference will help in providing useful guidelines to our policy makers.

I wish success for the 8th International Mechanical Engineering Conference and also extend heartiest congratulations to the organizers of the conference.

Engr. Mian Sultan Mahmood Secretary General The Institution of Engineers, Pakistan





Vice-Chancellor NEDUET

NED University being the oldest engineering institution of the Country has always imparted quality education to the students. It has also focused on getting its faculty involved in active research; the outcome of such research are published by the University faculty on regular basis mostly in ISI indexed impact factor journals. Simultaneously, the faculty is also being encouraged participating in international conferences. The recently published QS ranking for Asian Institutions where NED University has been declared among top 2.5% institutions of Asia is clearly an indication of the status of this institution in Asia.

The University has itself been organizing international conferences under its various faculties which are very well participated. This 8th International Mechanical Engineering Conference which is being organized jointly by NED University and IEP is the result of continuous and strong collaboration between the two institutions. Institution of Engineers Pakistan has always remained at forefront for arranging such academic oriented activities which need to be appreciated. NED University has also extended full support to IEP in its endeavors. This very conference is the evidence of such collaboration.

The theme of the conference being "Emerging Technologies and Industrial Applications" focuses on new innovations and recent developments in mechanical engineering and allied disciplines. The call for paper for the conference was very well received and a large number of papers received by the organizing committee. It is hoped that the participants will have the opportunity to get familiarized with new knowledge and technology which have been developed in recent past. They will certainly be able to have an interaction with the learned speakers who will be presenting their research work.

I hope that the participants coming from abroad and from other cities of the Country will have a comfortable stay. I would also like to congratulate the Organizing Committee of the conference for putting their untiring efforts for making this conference a success.

Dr. Sarosh H. Lodi Vice Chancellor, NED University of Engineering and Technology, Karachi





Vice-Chancellor DHA Suffa University, Karachi

On behalf of DHA Suffa University and the conference organizing committee, I would like to greet all the delegates and attendees at the 8th International Mechanical Engineering Conference (IMEC-18).

The evolving geo-economic strategies of the Asian countries demand a shift in planning, action and quick response of our academia and industries. This is possible only if an active, efficient and performing link between all the stakeholders exists. Technical conferences are one of the best ways to build and strengthen such linkages. The IMEC-18 encompasses the recent research and developments taking place broadly in the area of Mechanical Engineering and the technologies emerging as a result.

I believe that this platform will gather and allow national and international scientists, engineers, researchers and industry professionals to interact with each other, sharing experiences and ideas about current and future strategies.

I also hope that these interactions will go a long way in helping build new relations, foster academic and research collaborations and also allow all the stakeholders to align themselves with each other's goals for the sustainable development of academic, industrial and R&D sectors of Pakistan.

I wish you all a pleasant time here and hope that your active participation and deep involvement in the event will allow you to make the most of your time in Karachi.

Rear Adm (R) Engr. Prof. Dr. Sarfraz Hussain TI(M), SI(M) Vice Chancellor DHA Suffa University



Commandant Pakistan Navy Engineering College, Karachi

It is a matter of immense pleasure and great satisfaction that Pakistan Navy Engineering College (PNEC), a constituent college of National University of Sciences and Technology (NUST) in collaboration with IEP Karachi, NED University and other leading institutions is jointly organizing 8th International Mechanical Engineering Conference. This event will provide an opportunity to a large number of eminent Engineers, Scientists, Educationists, Technologists, Researchers and students of various Engineering universities from within Pakistan and abroad to focus in meeting challenges of today's era, particularly in the paradigm of emerging technologies and industrial applications.

The emerging technologies in today's era includes nanotechnology, renewable energy / green building, power plant automation, artificial intelligence / robotics, additive manufacturing and process optimization. PNEC is particularly involved in the field of renewable energy with particular focus on solar based technologies to meet the future energy needs. Presently, the work on solar desalination plant is in advanced stages.

I am pleased to acknowledge that IEP, being the chief organizer, is providing a very effective platform for researchers to present their research outcomes, which will surely educate and enhance the knowledge of conference participants. I sincerely hope that IMEC-2018 will bring along the relevant research community and gel them well to share their valuable experiences and domain expertise even after the event.

I would like to extend my felicitations to the organizing committee especially IEP, NED, participants of conference and other leading institutions for their worthy contribution in making IMEC -2018 a complete success.

Imran Ahmed SI(M) Rear Admiral Commandant PNEC-NUST





Vice Chancellor Balochistan University of IT, Engineering and Management Sciences (BUITEMS)

It is my pleasure to be part of the 8th International Mechanical Engineering Conference (IMEC-2018). The conference series has successfully contributed in fostering a dialogue among the academic community, industry and the government on emerging issues in mechanical engineering over the past few years. In today's era of inter-disciplinary scientific research, the discipline of Mechanical engineering remains a corner stone in developing modern-day technological solutions. Researchers in Mechanical engineering strive to provide solutions to problems. The IMEC-2018 is being organized to address progress in this important arena of engineering.

The **IMEC-2018** will be an excellent opportunity for academics, researchers and policy makers from Pakistan and abroad to participate and share their ideas related to national and global problems in Mechanical Engineering. I sincerely appreciate the efforts of the entire organizing team in making this conference possible. I acknowledge the efforts of the Institution of Engineers Pakistan (IEP), NED University of Engineering & Technology Karachi, Pakistan, Pakistan Navy Engineering College (PNEC-NUST), Dawood University of Engineering and Technology, DHA-Suffa University, Federation of Engineering Institutions of South and Central Asia and the Balochistan University of IT, Engineering and Management Sciences (BUITEMS) Quetta in jointly making this conference a success.

On behalf of BUITEMS, I would like to extend my warm wishes to all the delegates and participants.

With best wishes,

Engr. Ahmed Farooq Bazai (S.I) Vice Chancellor Balochistan University of IT, Engineering and Management Sciences (BUITEMS)





Vice Chancellor Dawood University of Engineering & Technology Karachi.

It is with immense pleasure and satisfaction to acknowledge that the Institution of Engineers Pakistan Karachi Centre and NED University of Engineering & Technology in collaboration with other reputed Institutions fo higher learning in Pakistan including Dawood University of Engineering & Technology (DUET) are organizing 8th International Mechanical Engineering Conference (IMEC-2018) on 26th & 27th January, 2018

I must congratulate the organizer for selecting a very pertinent theme for conference on "Emerging Technologies and Industrial Applications."

It is acknowledged world over that the socio-economic development of many nations depend upon its sound scientific and technological base. The aim of this conference is to expand research and innovation and various challenges and solutions in the subject theme of the conference.

This conference is envisaged to be a gathering of relevant stake holders from various section across the country to exchange ideas and disseminating pertinent knowledge to build capacity for socioeconomic development.

Organizing such a huge event is not possible without the enthusiasm commitment and sincerity of the organizers. I appreciate their untiring efforts and congratulate them !

I sincerely believe that, this conference will facilitate the establishment of a forum for the exchange of research ideas.

I wish the conference a grand success.

Dr. Faizullah Abbasi Vice Chancellor Dawood University of Engineering & Technology Karachi.





Pro-Vice-Chancellor NEDUET & Convener IMEC-2018

NED University of Engineering & Technology and Institution of Engineers, Pakistan (IEP) Karachi Centre are organizing 8th International Mechanical Engineering Conference which is continuation of the collaborative efforts between the two institutions since last many years. IEP has always remained active for such academic initiatives and NED University has also been continuously extending its support to IEP for its endeavours which are mainly towards promotion of knowledge and research.

This International Conference with the theme of "Emerging Technologies and Industrial Applications" will certainly result in sharing research outcomes pertaining to new trends in Mechanical Engineering Disciplines. All engineering disciplines are getting bridged together and the innovations are based upon multi-disciplined approach, therefore, this conference will hopefully cover all peripheral areas of engineering as well. As there was very warm response from the authors while receiving the papers, it is hoped that new and innovative idea will be presented which will help exploring further avenues of development in this area.

I would like to extend my sincere gratitudes to all reviewers for reviewing the papers submitted to them. I would also like to thank and congratulate every individual member of the organizing committee for their efforts.

I hope that all the participants will get fully benefited by the papers which will be presented in the two days conference.

Prof. Dr. M. Tufail Pro Vice Chancellor and Dean (Mechanical & Manufacturing Engineering) NED University & Convener IMEC-2018



Chief Organizer, 8th IMEC-2018 Member Executive Committee of The Asian Civil Engineering Coordinating Council, Federation of Engineering Institutions of Islamic Countries & Federation of Engineering Institutions of South & Central Asia



The 8th International Mechanical Engineering Congress (IMEC-2018) is being organized jointly by the Institution of Engineers Pakistan, Karachi Centre and NED University of Engineering and Technology, Karachi, in collaboration with Federation of Engineering Institutions of Islamic Countries (FEIIC), Federation of Engineering Institutions of South & Central Asia (FEISCA), Balochistan University of Information Technology, Engineering & Management Sciences (BUITEMS), Pakistan Navy Engineering College-NUST, Dawood University of Engineering & Technology (DUET), and DHA Suffa University. The organization of IMEC-2018 involves a great deal of foresight, planning and pains taking efforts by all the participating stake holders. We are lucky enough to have a dedicated team of Management and Organizers to organize such a mega event. I feel proud to acknowledge the enthusiasm and contribution of all comrades on this IMEC-2018. I would like to place on record my profound regards to the Faculty Members of the Mechanical Engineering Department - NEDUET particularly Engr. Prof. Dr. S.F.A. Rafeeqi, Chairman, IEP Karachi Centre, Engr. Prof. Dr. Muhammad Tufail, Pro Vice-Chancellor -NEDUET & Convener of IMEC-2018, Engr. Prof. Dr. Mubashir A. Siddiqui, Chairman, Department of Mechanical Engineering, NEDUET & Co-Convener of IMEC-2018, Engr. Prof. Dr. Nauman Qureshi, Chairman, Department of Mechanical Engineering, DHA Suffa University and Engr. Ayaz Mirza, Secretary, IEP Karachi Centre.

As Chief Organizer of IMEC-2018, it is indeed a proud privilege for me to pen a few words on this occasion. The Institution of Engineers Pakistan (IEP), the prime national institution of engineers of Pakistan having representation in World Federation of Engineering Organization (WEFO), Federation of Engineering Institutions of South & Central Asia(FEISCA), Federation of Engineering Institutions of Islamic Countries (FEIIC), Commonwealth Engineers Council (CEC) and bilateral agreements with other 39 International organizations has always endeavored to disseminate the ever expanding knowledge in the various field of engineering to its members through arranging Seminars, Symposiums, Conferences, Workshops, Lectures, etc.

Today, we are proud to welcome all the distinguished guests, learned speakers and delegates from all over Pakistan and abroad, in this IMEC-2018. I, take this opportunity to specially thank our distinguished guest speakers who have spared their valuable time and traveled a long distance to participate in this International Conference.

I am confident that the delegates attending this Conference will be benefited by the presentation to be made by the experts from all over Pakistan and abroad, and will be able to improve their knowledge in the relevant fields of Mechanical & Allied Engineering disciplines.

My sincere gratitude are to Engr. Prof. Dr. Sarosh Hashmat Lodi, Vice-Chancellor, NEDUET, Engr. Dr. Izharul Haq, President - IEP, Engr. Mian Sultan Mahmood, Secretary General – IEP & Engr. Syed Jamshed Ali Rizvi, Past President - IEP for extending their help in organizing this IMEC-2018. I take this opportunity to pay my special thanks to Engr. Jilani Yousuf, Vice-Chairman (Mechanical), IEP, Karachi Centre, Engr. Asim Murataz Khan, Engr. Ghulam Farooq Maniar, Engr. Abdul Rahim, Engr. M. Taufeeq Bilwani, Engr. Meraj Ahmed Khwaja, members of IEP Central & Local Council, Karachi Centre, Engr. Ramish, Engr. Shehroz Tahir Khan, Engr. Ameenuddin faculty members of NEDUET, & DSU, Mr. Sikander Mannan, Mr. Sharif Khan Qadri, Mr. Saif-Ud-din and all other staff members of IEP Karachi Centre, for extending their full support for organizing IMEC-2018

Engr. Sohail Bashir, FIE (Pak) Chief Organizer, 8th IMEC-2018



Secretary The Institution of Engineers Pakistan Karachi Centre



The challenges and opportunities that surround educational field and practice are experienced everywhere in the world. To face these challenges, it is necessary for an individual to know the context, within which his society currently operates, the impact and process of technology in which his activities are based. International Conferences always play an inevitable role in simulating discussions through paper presentation that make us competitive enough to contribute in the field of advanced technologies. In this context, the Institution of Engineers Pakistan, Karachi Centre and NED University of Engineering and Technology, Karachi joined hands to organize its 8th International Mechanical Engineering Conference on "Emerging Technologies & Industrial Applications". in collaboration with Federation of Engineering Institutions of Islamic Countries (FEIIC), Federation of Engineering & Management Sciences (BUITEMS), Pakistan Navy Engineering College-NUST, Dawood University of Engineering & Technology (DUET), and DHA SUFFA University.

This conference is a forum for the academic as well as industrial community to address the opportunities & challenges and to discuss the scope for future research. The conference will bring together academicians, research scholars, engineers and scientists to exchange and share their expertise.

The conference will provide an opportunity for the presentation of new advances in theoretical and experimental research in the fields of Mechanical Engineering. Professional practice and broader impacts of the Mechanical Engineering profession will be discussed through a series of Research Papers and Expert Talks.

As Secretary, IEP Karachi Centre, I am confident the delegates, participants and corporate members attending the Conference, will be benefited by the presentations to be made by the experts from all over Pakistan and abroad, the participants will be able to improve their skills in their fields. It is hoped the participants attending this Conference will be able to apply their improved knowledge for better productivity in their practical life.

Best Paper award will be given in the closing session of the Conference, the Conference proceedings will be provided in CD-ROM.

I believe this Conference will provide us the benchmark for continued improvement in overall development of the Institution of Engineers Pakistan and NED University of Engineering and Technology. I appreciate the efforts of the Organizing Committee, Engr. Sohail Bashir, Vice Chairman (Civil), IEP Karachi Centre and Chief Organizer, of IMEC-2018. Engr. Prof. Dr. S.F.A. Rafeeqi, Chairman, IEP Karachi Centre, Engr. Sarosh Hashmat Lodi, Vice-Chancellor, NEDUET, Prof. Dr. M.Tufail, Pro-Vice-Chancellor, NEDUET & Convener, IMEC-2018, Engr. Prof. Dr. Mubashir Ali Siddiqui, Chairman, Mechanical Engineering Department, NEDUET, and Co-Convener, IMEC-2018, Engr. Prof. Dr. Nasiruddin Shaikh, Secretary, IMEC-2018, Engr. Jilani Yousuf, Vice-Chairman (Mechanical), IEP Karachi Centre, Central and Local Council Members, Mechanical Division, IEP Karachi Centre particularly Engr. Asim Murtaza Khan, Engr. Ghulam Farooq Maniar, Engr. Abdul Rahim, who have done an excellent job in compiling the 8th International Mechanical Engineering Conference activities and disseminate them through this Conference.

It is appreciable that The Institution of Engineers Pakistan, Karachi Centre and NED University of Engineering and Technology is enriched with dynamic, dedicated, highly competent and qualified faculty members. I extend my best wishes to all the members of organizing committee and my office staff to achieve a grand success in IMEC-2018.

Engr. Ayaz Mirza, FIE (Pak) Secretary The Institution of Engineers Pakistan Karachi Centre





Co-Convener IMEC-2018

It is a matter of pride for being Co-Convener of 8th International Mechanical Engineering Conference, which is being jointly organized by NED University of Engineering & Technology and The Institution of Engineers Pakistan (IEP) Karachi on 26th and 27th January 2018, in collaboration with Federation of Engineering Institutions of Islamic Countries (FEIIC), Federation of Engineering Institutions of South & Central Asia (FEISCA) and Higher Education Commission, Pakistan.

The theme of the conference "Emerging Technologies and Industrial Applications "is the need of the day. The industrial and academic sectors must work in collaboration with each other for development of the Country. Emerging technologies, that our researchers have been working upon, must be introduced to industrialists and applied efficiently. Few of emerging technologies include nanomaterials, smart cars, batteries, virtual reality, AI and others, that have immense effect on our lives. Improved materials, systems, and methods are being developed using such and other techniques across the globe by research community. The Conference will certainly provide a platform to present and discuss emerging technologies and their applications in the field of Mechanical Engineering.

I had noticed a considerable participation of students - our future architects - in the last conferences and hope to see the same this year as well. Lastly, I would like to thank IEP and NED committee members, volunteers, and authors for their valuable contribution towards the Event.

I pray for the success of the Conference.

Prof. Dr. Mubashir Ali Siddiqui Chairman, Mechanical Engineering Department NED University of Engineering & Technology & Co-Convener 8th IMEC-2018





Secretary IMEC-2018

Academia and industries are back bone of recent developments in any of the Engineering discipline. Advancements in product / process / quality is based on the researchers in Engineering Institutes and/or in Research and Development cells of innovative engineering industries.

Conferences provide a platform to share recent developments among the people of common interest. NED University and Institute of Engineers Pakistan have developed a culture of conferences and every year hosting conferences on innovative themes in various engineering disciplines so in mechanical engineering.

I want to congratulate IEP officials and NED University, organizing Eighth International Mechanical Engineering Conference 2018 on Emerging Technologies and Industrial Applications. Being the Secretary I oblige the efforts of the organizing committee, member of the reviewer committee, volunteers and all my colleagues who worked hard arranging this conference and ensuring a wide participation from all across Pakistan and from overseas.

> **Engr. Prof. Dr. Nasir Uddin Shaikh** Secretary, IMEC -2018 NED University of Engineering & Technology, Karachi

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Day 1-Friday, January 26, 2018 Inaugural Session

04:25 pm Registration 04:30 pm **Asr Prayer** 04:40 pm **Recitation from the Holy Quran** 04:45 pm **National Anthem** 04: 50 pm **Conference Briefing by Engr. Sohail Bashir** Vice-Chairman, IEP, Karachi Centre & Chief Organizer, 8th IMEC-2018 04:55 pm Address by Engr. Prof. Dr. Muhammad Tufail Pro-Vice-Chancellor, NEDUET & Convener IMEC-2018 05:00 pm Welcome Address by Engr. Prof. Dr. S.F.A. Rafeeqi, FIE(Pak) Chairman, IEP Karachi Centre 05:05 pm **Key Note Address** 05:40 pm Address by Dr. Sarosh Hashmat Lodi Vice-Chancellor, NEDUET 05:45 pm Address by Guest of Honor 05:50 pm **Address by Chief Guest** 05:55 pm **Presentation of Conference Memento** 06:00 pm Vote of thanks by Engr. Ayaz Mirza, FIE(Pak), Secretary, IEP Karachi Centre 06:10 pm **Conference Photo with Chief Guest Maghrib** Prayer 06:15 pm 06:30 pm **Dastan Goi (Storytelling)** 07:35 pm Isha Prayer 07:50 pm **Conference Dinner**

DASTANGOI by M. Fawad Khan

Dastangoi is the art of oral storytelling. The term itself is made up of two words Dastan (meaning epic) and Goi (meaning to tell). Dastangoi was very popular in India and lots of dastans were told by storytellers but the one that received the most fame was Dastan-e-Amir Hamza. It was published in the late 19th century by Naval Kishore Press in 46 volumes of around a thousand pages each. Of these 46 volumes 9 are of Tilism-e-Hoshruba which some people mistakenly assume to be a separate Dastan when it is actually only one part of Dastan-e-Amir Hamza. The idea of Daastaangoi is to revive this tradition in Pakistan, following somewhat in the footsteps of Delhi's famous Daastaango of his time, Mir Baqir Ali. The Daastaango in this program are mainly inspired by what Danish Hussain and Mahmood Faarooqui do and partly from what they have learnt from their teacher legendary Zia Mohyeddin at NAPA.

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Day 2 - Saturday, January 27, 2018 TECHNICAL SESSIONS

09:30 am - 11:00 am	Technical Session - 1 at Convention Center		Technical Session - 5 at Engr. Asfia Aleem Hall
09:30 am - 11:00 am	Technical Session - 2 at Dr. S.A.Hasan Hall		Technical Session - 6 at 4th Floor Council Hall
11:00 am - 11:20 am	Tea Break	12:50-pm - 02.00 pm 02:00 pm - 03:30 pm	Zohar Prayer/Lunch Technical Session - 7
11:20 am - 12:50 pm	Technical Session - 3 at Convention Center Technical Session - 4		at Convention Center Technical Session - 8 at Dr. S.A.Hasan Hall

Technical Session-9 at Engr. Asfia Aleem Hall

CLOSING SESSION on Saturday 27th January, 2018

at Dr.S.A. Hasan Hall

03:40 pm 03:50 pm 03:55 pm	Guest to be seated Recitation from the Holy Quran Conference Highlights Engr. Prof. Dr. Nasir Uddin Shaikh Secretary IMEC-2018	04:20 pm	Conference Recommendation by Engr. Prof. Dr. Mubashir Ali Siddiqui Chairman, Department of Mechanical Engineering, NEDUET & Co-Convener 8 th -IMEC-2018
04:00 pm	Address by Engr. Prof. Dr. S.F.A. Rafeeqi, FIE (Pak) Chairman, IEP Karachi Centre	04:30 pm 04:40 pm	Presentation of Conference Mementos Concluding Remarks by Engr. Ayaz Mirza Secretary, IEP, Karachi Centre
04:05 pm	Address by Engr. Prof. Dr. Muzaffar Mahmood Dean Academics, PAF-KIET & Vice-President, (Mechanical & Allied), IEP	04:45 pm	Vote of Thanks by Engr. Jilani Yousuf Vice-Chairman (Mechanical) IEP, Karachi Centre
04:10 pm	Address by Guest of Honor	04:50 pm	Asr Prayer
04:15 pm	Address by Chief Guest	05:00 pm	Refreshments

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Session 1:

Design and Optimization (2nd day 09:30-11:00)

Session Chair:

Engr. Dr. Muhammad Nauman Qureshi HOD, Mechanical Engineering Department DHA SUFFA University

Engr. Neelofar Hameed Khan Director, SCAD & Corporate Secretary, State Bank of Pakistan & Central Council Member, IEP

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"Prediction of Remaining Life of Damaged Engineering Components Using Failure Assessment Diagram and Non-Destructive Testing" -Engr.M. K. Khan, Faculty of Engineering and Computing, Coventry University, Coventry, UK Engr.. M. A. Abro, Department of Mechanical Engineering, Mehran University, Khairpur, Pakistan

"A Review of Recent Advancements in Cooling Technologies for Axial Turbine Blades" -Engr. Shahzeb Irfan, Engr. Ali Sarosh, CAE, National University of Sciences Technology, Pakistan

"Optimization of Bi-Morph Piezoelectric Bender for Harvesting Vibration Energy" -Engr. Shahzeb Irfan, Engr. Nadeem S. Khan, Aerospace Engineering Department, College of Aeronautical Engineering, NUST, Risalpur, Pakistan

"Survey on Design of Fuselage Structure for Fighter Aircraft" -Engr. Syed Muhammad Shaheer, Engr.Faisal Siddiqui, Engr. Amjad Aziz, National University of Sciences and Technology, CAE, Risalpur, Pakistan

Session 2 (Parallel to 1):	Aerodynamics $(2^{nd} day, 9:30-11:00)$
Session Chair:	Egnr. Dr. Anjum Khalid Department of Mechanical Engineering NED University of Engineering and Technol
	Engr. Dr. Usman Alauddin Department of Mechanical Engineering NED University of Engineering and Technol
	Engr. Meraj Ahmed Khwaja Member Local Council JEP Karachi Centre

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"Passive Control of Base Drag Using Stream Wise Tabs"

-Engr. Shehryar Kharal, Engr. Hassan Raza, Engr. Qasim Zaheer, Department of Aerospace Engineering, College of Aeronautical Engineering, National University of Science and Technology, Islamabad, Pakistan

"Recent Advances in Control of Rotating Stall in Axial Flow Compressor" -Engr. Inam ur Rehman, Dr. Ali Sarosh, CAE, National University of Sciences & Tech., Pakistan

"Conceptual Design of Aerial Target Vehicle" Engr. **Talha Basit Engr. Aun Haider Dr. Irtiza Ali Shah** Department of Aerospace Engineering, College of Aeronautical Engineering, NUST, Pakistan

"Analysis of Oscillatory Oblique Stagnation-Point Flow Towards a Plane Wall" -Engr. Inam ur Rehman, Engr. Syed Irtiza Ali Shah, CAE, National University of Sciences & Technology, Pakistan

Session 3:

Innovative Materials (2nd day, 11:30-01:00)

Session Chair:

Engr. Dr. Khuram Kamal Department of Mechanical Engineering National University of Science and Technology

Engr. Ayaz Mirza

Secretary, The Institution of Engineers Pakistan, Karachi Centre

Engr. Ghulam Farooq Maniar

General Manager (Projects), Pakistan Petroleum Limited & Local Council Member, IEP, Karachi Centre

"Enhancement of Tensile Strength of Ductile Iron with Austempering Heat Treatment" -Dr. M. Ashraf Sheikh, The University of Lahore & Institution of Engineers Pakistan

"A Review of Recent Advances in the Adhesively Bonded, Riveted and Hybrid Joints" -Engr. Engr. Inam ur Rehman, Engr. Dr. Shakeel Sadar, College of Aeronautical Engineering, National University of Sciences and Technology, Pakistan

"Parametric Analysis of an L-Shaped Aluminum Profile Extrusion Process" Engr. Talha Basit, Dr. Nadeem Shafi Khan, Engr. Abdul Waheed, Engr. Asad Ullah Butt, Engr. Waleed Fayaz, Engr. Shehryar Kharal, National University of Sciences & Technology Islamabad, Pakistan

"Inverse Die Prediction Based Upon Extrudate Swell; A Case Study of Spider Web Manager Extrusion Process"

-Engr. Mohsin Ali, Dr. Nadeem Shafi Khan, Engr. Riaz Ahmed, Engr. Danial Mehmood, -Engr. Odeida Joma AlzghoulNational University of Sciences & Technology, Islamabad, Pakistan

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Session 4 (Parallel to 3):	Dynamics and Control (2 nd day, 11:30-01:00)
Session Chair:	Engr. Dr. Muhammad Usama Siddiqui Department of Mechanical Engineering DHA SUFFA University
	Engr. Dr. Syed Ali Hasnain Naqvi Member, Central Council, IEP
	Engr. Jilani Yousuf SEM, National Refinery Limited & Vice- Chairman, (Mech), IEP, Karachi Centre
"Analysis of Four Degrees o -Engr. Muhammad Hasnain Engr. Asad Ali, National Un	of Freedom Half Car Suspension System" Quraishi, Engr. Nadeem Shafi Khan,Engr. Syed Muhammad Shaheer iversity of Sciences & Technology, Islamabad, Pakistan
"Analysis of Dynamic Aero -Engr. Muhammad Jamil, C	elastic Effects with Estimation of Flutter Speeds" AE, National University of Sciences & Technology, Pakistan
"Fault Tolerant Control of an -Engr.Mahmood ul Hassan, Engr.Abdul Qadir Channa Engineering & Technology,	n Active Suspension System for Road Vehicles" , Engr. Imtiaz Hussain Kalwar, Engr. M. Zaigham Abbas Shah, Engr , Department of Mechatronics Engineering, Mehran University of Jamshoro, Sindh, Pakistan
"Effect of Directional Stiffr -Engr. Musawar Hussain, C	ness on Control Reversal Speed" CAE, National University of Sciences & Technology, Pakistan
Session 5 (Parallel to 3):	Computational Fluid Dynamics (2 nd day, 11:30-01:00)
Session Chair:	Engr. Dr. Tahir Abdul Hussain Ratlamwala Department of Mechanical Engineering National University of Science and Technology
	Engr. Dr. Johar Khurshid Farooqi Professor & Dean, Faculty of EAS & EMS DHA Suffa University
"CFD and Numerical Analy Configurations" -Engr. Muhammad Haris Sl Department, CAE, Nationa	ysis of Diverter Less Supersonic Inlet with S-Duct for Different hafique, Dr. Messam Abbas Naqvi, Dr. Shuaib Salamat Aerospace l University of Science and Technology, Islamabad, Pakistan

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"CFD Analysis of Effect of Wavy Tube Parameters on Heat Transfer and Pressure Drop of Flowing Fluid"

-Engr. Muhammad Sameer, Engr. Syed Murtuza Mehdi ,Department of Mechanical Engineering, NED University of Engineering & Technology, Karachi, Pakistan

"Computational Fluid Dynamics Analysis for Ventilation and Air-Conditioning of an Office Room"

-Engr. M. Mahrukh, NED University of Engineering & Technology, Karachi, Pakistan -Engr. B. Ashraf , Engr.. U. Allauddin, Engr. U. Saleem , University of the German Federal Armed Force, Bundeswehr University Munich, Neubiberg, Germany

"NO_x Formation Quantification inside a Combustion Chamber Using Computational Fluid Dynamics (CFD)"

-Engr.M. Ahmed Department of Automotive and Marine Engineering, NED University of Engineering and Technology, Karachi, Pakistan Engr.M. Shakaib, Engr. M. A. Siddiqui, Department of Mechanical Engineering, NED University of Engineering and Technology, Karachi, Pakistan Engr. I. Ahmed King Abdulaziz University, Jeddah, Saudi Arabia

Session 6 (Parallel to 3):	Lean Manufacturing and System Optimization (2 nd day, 11:30-01:00)
Session Chair:	Engr. Dr. Sved Amir Jahal

Metallurgical Engineering Department NED University of Engineering and Technology

Engr. Dr. Zahoor ul Hussain Awan Department of Chemical Engineering NED University of Engineering and Technology

"Modeling Flight Control System for An Aircraft that Uses Inclined Ruddervator and Flaperons"

-Engr. Mubashir Aftab Nawaz Dr. Messam Abbas Naqvi, National University of Science and Technology, Islamabad

"Application of Queuing Theory in Improving Healthcare Performance of OPD of ABC Hospital of Sindh Pakistan"

-Engr. Sarmad Ali Khashheli, Engr. Muhammad Ahmed Kalwar, Engr. Faiza Bhutto, Department of Industrial Engineering and Management, Mehran University of Engineering and Technology, Jamshoro, Sindh, Pakistan

"Comfortable Waiting Time of Patients at the OPD with Varying Demographics" -Engr. Muhammad Ahmed Kalwar, Egnr. Anwaruddin Tanwari, Dr. Muhammad Saad Memon, Engr. Sarmad Ali Khaskheli, Engr. Ali Arsalan Siddiqui. Department of Industrial Engineering and Management, Mehran University of Engineering and Technology Jamshoro, Sindh, Pakistan

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"Factors Influencing Job Satisfaction of Faculty Members in Public Sectors Engineering Universities of Sindh Province"

-Engr. Ameer Ali Shahani, Engr., Mukhtiar Ali Korai, Department of Industrial Engineering and Management, Mehran University of Engineering and Technology, Jamshoro, Sindh, Pakistan.

Session 7:	Modelling and Simulation (2 nd day, 01:45-03:15)
Session Chair:	Engr. Dr. Muhammad Hayat Jokhio Chairman, Department of Material & Metallurgy Engineering Dawood University of Engineering & Technology Karachi
	Engr. M. Taufiq Bilwani Director, Gatron Industries Limited & Member Local Council, IEP, Karachi Centre
	Engr. Abdul Rahim Principal Engineer, Modtech Service Pvt Ltd & Member Local Council, IEP, Karachi Centre
"An Algorithm to A - Engr. Muhammad	Analyze Artificial Viscosity in Shock Capturing through CD Nozzle" I Yaser Javed

"Development of An Algorithm to Solve Steady Supersonic Inviscid Flow Over a 2-D Double Wedge"

-Engr. Musawar Hussain, CAE, National University of Sciences & Technology, Pakistan

"Finite Element Study of Micro Rough Topologies for Stretchable Thin Films'

-Engr. Murtuza Mehdi, Engr. Dr. Maaz Akhtar, Engr. Sufiyan Ahmad Department of Mechanical Engineering, NED University of Engineering & Technology, Karachi, Pakistan, Engr. Muhammad Adeel' Department of Engineering, SUPARCO, Karachi, Pakistan , Engr. Nauman Malik Muhammad Faculty of Integrated Technologies, Universiti Brunei, Darussalam, Bandar Seri, Brunei

<u>Session 8 (Parallel to 7):</u>	<u>Thermal and Mechanical Systems</u> (2 nd day, 01:45-03:15)
Session Chair:	Engr. Asim Murtaza Khan Former Managing Director, PPL & Member Central Council, IEP
	Prof. DrIng. Syed Mushahid Hussain Hashmi Chairman, Department of Marine & Automobile Engineering NED University of Engineering and Technology

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"Experimental investigation of no-frost refrigerator with nano-lubricants" -Muhammad E. Haque, Rosli Abu Bakar and M Shakaib, Faculty of Mechanical Engineering University of Malaysia Pahang, Pekan, Malaysia NED University of Engineering and Technology, Karachi, Pakistan

"Technical and Environmental Analysis of SHP in RET Screen: A Case Study of Power Production at Machai/Mardan" -Engr. Anjum Khalid, Engr. Nageen Jalal, NED University of Engineering & Technology, Karachi, Pakistan

"Energy Potential from Municipal Solid Wastes in Urban Pakistan"

-Engr. Abdullah Riaz, Engr. M Mobin Siddiqui, Engr. Syed Muhammad Hamza, Engr. Syed Irtiza Ali, Department of Engineering Sciences, Pakistan Navy Engineering College (PNEC), National University of Science & Technology, Karachi, Sindh, Pakistan

"Torque Estimation Analysis for Piezoelectric Savonius Wind Mill for Wind Energy Harvesting" -Engr. Nadeem Shafi Khan, Engr. Fahad Shahbaz, National University of Sciences and Technology, NUST, Pakistan

Session 9	Parallel to 7):	

 $\frac{\text{System Design}}{(2^{nd} \text{day}, 01:45-03:15)}$

Session Chair:

Engr. Dr. Maaz Akhtar Mechanical Engineering Department NED University of Engineering and Technology

Engr. Dr. Muhammad Shakaib Co-Chairman, Mechanical Engineering Department NED University of Engineering and Technology

Engr. Zaheer Ahmed Ather

Member, Central Council, IEP

"SMAActuated Index Finger Exoskeleton"

-Engr. Nirma Sheikh, Engr. Jawaid Daudpoto, Engr. Bhawani S Chowdhry, Institute of Information and Communication Technologies, Mehran University of Engineering and Technology, Jamshoro, Pakistan

"Analysis of Forced Vibrations of Flap Wise Bending of Rotating Tapered Rayleigh Cantilever Beams"

-Engr. Inam ur Rehman, Dr. Nadeem Shafi Khan, CAE, National University of Sciences & Technology, Pakistan

"Bird Hit Impact Analysis of Aircraft Nose Radome" -Engr.Inam ur Rehman, Dr. Nadeem Shafi Khan, CAE, National University of Sciences & Technology, Pakistan

IMEC-2018

Session Name **DESIGN & OPTIMIZATION**

PREDICTION OF REMAINING LIFE OF DAMAGED ENGINEERING COMPONENTS USING FAILURE ASSESSMENT DIAGRAM AND NON-DESTRUCTIVE TESTING

M. K. Khan1, 2, M. A. Abro3*

1Faculty of Engineering and Computing, Coventry University, Coventry, UK 2MatStress Engineering, Karachi, Pakistan 3Department of Mechanical Engineering, Mehran University, Khairpur, Pakistan *Corresponding author. Tel.: +92300-2187266; fax: +9221-34509308 E-mail address: kashoo@enegineer.com (M.K. Khan)

The ambient sources of energy are being explored vigorously all around the world in order to replace the fossil fuels to fight the climate change. These ambient sources include solar energy, wind energy, ocean wave energy and etc. To take full advantage of these resources, different methods are being used in the world. One of these methods is to harvest the energy produced by the wind induced vibrations in structures. To achieve this goal, a special class of materials called piezoelectric materials are being used. These materials are used in different configurations for energy harvesting.

Aerospace industry has given special attention to this resource of energy because of presence of continuous aeroelastic vibrations which are experienced by the wings. The configuration which has been investigated in this paper is a an aluminum cantilevered beam which has a bi-morph piezoelectric material polyvinylidene fluoride (PVDF) on upper surface of it. Optimization of the piezoelectric layer has been done with output voltage as the objective function and number of piezoelectric patches as the design variable.

Effect of decreasing the length of each electrode patch and increasing the number of these on obtained electric potential has been studied. Initially whole length was encompassed by one patch and then number of patches were increased with decrease in length for each path and obtained voltages were compared.

The proposed methodology will serve as a benchmark method which can be used for the analysis of real world problems.

Keywords: Bi-morph, Piezoelectric, Optimization, Output Voltage.

IMEC-2018

Session Name **DESIGN & OPTIMIZATION**

A REVIEW OF RECENT ADVANCEMENTS IN COOLING TECHNOLOGIES FOR AXIAL TURBINE BLADES

ShahzebIrfana *, Ali Sarosha

Aerospace Engineering Department, College of Aeronautical Engineering, National University of Sciences and Technology, Risalpur, Pakistan

With the advent of modern gas turbine engines, power output can be increased considerably but this results in higher turbine inlet temperatures and thus higher thermal loads for turbine blades. These extraordinary thermal loads put a constraint on the performance of gas turbine engines. To avoid these thermal loads, cooling of turbine blades has been a constant area of research since long. This paper reviews recent research trends in the field of external and internal cooling techniques which include .lm, impingement, pin-.n, rib-roughened, vortex and combination of these techniques. An alternate cooling technique has emerged lately which intends to replace air with steam as a coolant. This technique has also been reviewed and shown that if optimally used, it can be a better coolant than air. Cooling effectiveness of any technique does not just depend on the heat transfer but also on the associated aerodynamic losses, therefore, to achieve maximum cooling both parameters has to be optimized. The reviewed researches in this paper contain both experimental and computational techniques of studying cooling effectiveness of different techniques by considering both parameters simultaneously.

Keywords: Turbine blade, Internal cooling, External cooling, Cooling effectiveness, Nusselt number, Heat transfer, Blow ratio, Composite cooling, Steam cooling.

IMEC-2018

Session Name **DESIGN & OPTIMIZATION**

OPTIMIZATION OF BI-MORPH PIEZOELECTRIC BENDER FOR HARVESTING VIBRATION ENERGY

ShahzebIrfana *, Nadeem S. Khan1a

Aerospace Engineering Department, College of Aeronautical Engineering, NUST, Risalpur, Pakistan

The ambient sources of energy are being explored vigorously all around the world in order to replace the fossil fuels to fight the climate change. These ambient sources include solar energy, wind energy, ocean wave energy and etc. To take full advantage of these resources, different methods are being used in the world. One of these methods is to harvest the energy produced by the wind induced vibrations in structures. To achieve this goal, a special class of materials called piezoelectric materials are being used. These materials are used in different configurations for energy harvesting. Aerospace industry has given special attention to this resource of energy because of presence of continuous aeroelastic vibrations which are experienced by the wings. The configuration which has been investigated in this paper is a an aluminum cantilevered beam which has a bi-morph piezoelectric material polyvinylidene fluoride (PVDF) on upper surface of it. Optimization of the piezoelectric layer has been done with output voltage as the objective function and number of piezoelectric patches as the design variable. Effect of decreasing the length of each electrode patch and increasing the number of these on obtained electric potential has been studied. Initially whole length was encompassed by one patch and then number of patches were increased with decrease in length for each path and obtained voltages were compared. The proposed methodology will serve as a benchmark method which can be used for the analysis of real world problems.

Keywords: Bi-morph, Piezoelectric, Optimization, Output Voltage.

ABSTRACTS

IMEC-2018

Session Name **DESIGN & OPTIMIZATION**

SURVEY ON DESIGN OF FUSELAGE STRUCTURE FOR FIGHTER AIRCRAFT

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The paper written below provides a detailed discussion on the history, evolution, and changes in aerodynamics designs, structure and technological aspects of fighter aircrafts. Design of an aircraft is a extensive and iterative process that requires major technical and technological knowledge. Three stages of aircraft include the conceptual, preliminary and detailed design. From the emergence of fighter jet concept to present world, there are numerous revolutions in combat aircrafts through which the world today has entered in fifth generation of aircrafts. The mission requirements, engineering attributes, knowledge and expertise required for designing a fifth-generation aircraft has been discussed in this piece of work with special reference to the already existing Fighter Aircrafts like f-22 Raptor and F-35. Aerospace and avionics related, both studies over the history are taken into account. Different procedures and options for inculcating advance engineering attributes like stealth, thrust vectoring, maneuverability, super-cruising etc. in the design of Fighter Aircraft are studied to achieve the goal of a successful design of fuselage structure for FIGHTER AIRCRAFT.

The design of a next generation fuselage is itself a challenge to the structural engineers. The design has to be a balance between strength and weight. One has to make an optimization between these two important aspects of the fuselage structure since fuselage is the most important component of an aircraft. The fuselage carries most of the weight of the aircraft. The presence of high structural loads requires the fuselage to be as strong as possible. However, the design for higher strength increases the weight of the fuselage. The structural members of the aircraft such as the fuselage are designed to carry a load or resist stress. Fuselage carries the pilot, controls, engine and other equipment.

The larger the fuselage more is the drag so the aim is to design a small fuselage with smaller drag. Since fuselage is the main component of aircraft therefore its design become a crucial factor for designing an aircraft.

Keywords: Aerodynamics, Fuselage, Aerospace, Avionics, Conceptual design, Stealth, Drag, Thrust vectoring, Structural member, Maneuverability, Design, Super-cruising.

ABSTRACTS

IMEC-2018

Session Name **AERODYNAMICS**

PASSIVE CONTROL OF BASE DRAG USING STREAM WISE TABS

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Research on different methods for the reduction of base drag, have been reviewed in this survey paper. Survey begins with a brief introduction of origin of base drag. More recent studies, specially from the last decade are the primary focus of review. Both experimental and numerical work from various authors have been evaluated. Also, the recent work done for reduction of base drag using active and passive methods have been discussed. Further passive control of base drag using stream wise tabs and its applications have been discussed. At the end the advantages of this technique have been discussed.

Keywords:Aircraft base, Angled tabs, Axisymmetric model, Ventilated cavity, laminar flow control, three-dimensional boundary layers, transition, discrete roughness;

IMEC-2018

Session Name **AERODYNAMICS**

RECENT ADVANCES IN CONTROL OF ROTATING STALL IN AXIAL FLOW COMPRESSOR

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Rotating stall has remained a major concern in axial flow compressors. This instability can lead to catastrophic mechanical failures across compressor. Considerable amount of research has been performed in this area. In the current review paper, recent advances regarding explaining rotating stall phenomenon and control of rotating stall has been studied. Focus of the review has been kept on the research paper of last 10 years (2007-2017). Multiple factors like true understanding of rotating stall phenomenon, spike initiation, rotating and aerodynamics instabilities have been separately discussed. Factor like blade passage flow structures, tip clearance effect on rotating stall, Stabilization of flow have been deliberated upon. Different categories of numerical simulations performed have been compiled together. In the end, multiple factors related to timely prediction of stall inception and effective measures to suppress rotating stall have been discussed. The prime objective of the research paper is to suggest measures to improve overall efficiency of the compressor. This can be performed by performed by effective control of rotating stall and by increasing flow stability.

Keywords: Recent advances, Rotating stall, Spike initiated, Control, Axial flow compressors

IMEC-2018

Session Name **AERODYNAMICS**

CONCEPTUAL DESIGN OF AERIAL TARGET VEHICLE

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Designing an engineering product is a non-unique iterative process, the aim of which is to attain best results even with tradeoffs. Even if it's a totally new item or for a development of an existing one the first step involves the correct interpretation of the requirements. Decision making is involved a lot in this synthetic process of engineering design. Once the first concept has been clearly understood and derived it is then analyzed with respect to requirements. Synthesis/analysis/decision-making sequence starts to refine the concept to get a solution meeting the required bare minimum standards. An "acceptably good" result is reached only after continual refinement of assumptions even if optimum solution has been derived by a particular set of assumptions. The rate at with which the iterations converge depends a lot on the complexity of the design and partly on the skill of the design team in using the available aids. If the project is a complex one for sufficient experience the time needed to build up is extended.

IMEC-2018

Session Name **AERODYNAMICS**

ANALYSIS OF OSCILLATORY OBLIQUE STAGNATION-POINT FLOW TOWARDS A PLANE WALL

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Two dimensional stagnation point flow has been investigated towards a plane wall using a proposed algorithm. Earlier this problem was studied as a generalized steady oblique flow. In this work, the problem has been formulated as an orthogonal, irrotational stagnation point flow away from a body with a time-periodic strength, a simple shear flow of constant vorticity and a time-periodic uniform stream. The uniform stream has been considered with constant vorticity. With the help of Navier-Stokes equations, exact solution has been calculated for which stream function is dependent on coordinates parallel to the wall. The relationship came out to be linear. The problem formulation reduces to a coupled pair of partial differential equations in time and one spatial variable. The first equation describes the oscillatory orthogonal stagnation-point flow. The second equation, which couples to the first, describes the oblique component of the flow. A description of the flow velocity field, the instantaneous streamlines, and the particle paths is sought through numerical solutions of the governing equations and via asymptotic analysis. An algorithm has been written to analyze the multidimensional effects of such flow. With the help of this algorithm, analysis of the any oscillatory oblique stagnation flow could be done.

Keywords: Stagnation point flow, Plane Wall, Algorithm, Oblique flow, Oscillatory flow

IMEC-2018

Session Name INNOVATIVE MATERIALS

ENHANCEMENT OF TENSILE STRENGTH OF DUCTILE IRON WITH AUSTEMPERING HEAT TREATMENT

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Austempered Ductile Iron (ADI) is a relatively new material introduced in the engineering industry. This product offers the design engineers the best combination of low cost, good toughness and wear resistance. This engineering material is replacing steel because of comparable properties of steel. It can be used for automobile, agriculture, railroad and in other industries. Iron can be melted in any furnace and it can be converted to ADI with a little effort. In the present research ductile iron was made by sandwich method using local facilities and materials available in local market. To enhance the tensile strength of ductile iron the tensile samples were machined from Y-block castings. The samples were austenitized at 900 0C for one hour and austempered at two temperatures 270 0C and 370 0C. It was found that the tensile strength increased at both temperatures. The maximum tensile strength was achieved at temperature 270 0C. The tensile strength was almost doubled for the same material after the heat treatment.

KEY WORDS: Engineering material, Austempered, Austenetized, Tensile Strength

IMEC-2018

Session Name **INNOVATIVE MATERIALS**

A REVIEW OF RECENT ADVANCES IN THE ADHESIVELY BONDED, RIVETED AND HYBRID JOINTS

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In any structural design, joining technique plays an important role. Adhesively bonded joints have multiple benefits over the mechanically fastened joints. These advantages include high strength to weight ratio, low stress concentration, large bond area for load transfer, smooth external surfaces at the joint, less sensitivity to cyclic loading, electrical and thermal insulation, time / cost saving, corrosion and fatigue resistance and crack retardation. However, adhesively bonded joints have few disadvantages as well, some of them are; disassembly is impossible without component damage, they can be severely weakened by environmental effects, they require surface preparation, joint integrity is difficult to confirm by inspection. Due to the aforementioned disadvantages, ensuring bond quality is a challenge. A relatively new approach is to use adhesively bonded riveted joints also sometimes referred to as hybrid joints. Addition of rivets to adhesive bonded joints provides structural integrity even after adhesive failure. Adhesively bonded riveted joints therefore integrate the advantages of both adhesive and riveted joints and at the same time, if properly designed, can reduce the individual disadvantages of adhesive or riveted joints. Combination of fasteners and adhesive are utilized in the hybrid joints. In the current review paper, recent advances in the adhesives joints, riveted joints and hybrid joints have been consolidated together.

Keywords: Adhesively bonded joints, riveted joints, hybrid joints, static strength, fatigue strength

ABSTRACTS

IMEC-2018

Session Name INNOVATIVE MATERIALS

PARAMETRIC ANALYSIS OF AN L-SHAPED ALUMINIUM PROFILE EXTRUSION PROCESS

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Experimental results, which indicate a significant influence of the die shape on the shape of extrudate during nonisothermal/isothermal extrusion processes, are presented. The process was numerically analyzed using finite element simulations on ANSYS POLYFLOW, taking into account the die shape with varying input parameters were carried out.

The results are discussed with regard to the material flow and different boundary conditions. The results gained from the research undertaken prove that the shape of die is major contributor towards defining the output flow parameters, such as velocity, shape of the extrudate etc.

IMEC-2018

Session Name INNOVATIVE MATERIALS

INVERSE DIE PREDICTION BASED UPON EXTRUDATE SWELL; A CASE STUDY OF SPIDER WEB MANAGER EXTRUSION PROCESS

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Poly flow extrusion is the most extensively used method for designing sheets, pipes, cables, films and multiple shapes. The final shape of die can be predicted for the desired shape of extrudate using ANSYS®. 3D Poly flow extrusion of a spider web structure under isothermal conditions is being carried out for which an effective die design is to be predicted.

Swelling of the extrudate is taken in to account and an optimum die shape is being predicted with help of Inverse Prediction Management in ANSYS®. By simulating the flow of extrudate inside and at the exit of the die where the region is considered as free flow region, temperature, pressure, velocity and shear stress profiles have been developed and analyzed.

ABSTRACTS

IMEC-2018

Session Name **DYNAMICS & CONTROL**

ANALYSIS OF FOUR DEGREES OF FREEDOM HALFCAR SUSPENSION SYSTEM

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In automobile dynamics, when an automobile is disturbed by various forcing functions, it reacts to these disturbances, accordingly. Automobiles consist of number of masses, springs and dampers which react to these disturbances because of inertia, stiffness and damping, espectively. The disturbances can be of harmonic, increasing or decreasing with time or constant in nature. In real life, such forces can be seen in the form of bumps (may be single or repeated), speed breakers (in the form of rectangular pulse load or unit step load), uneven road surfaces (may be termed as ramp loading) and sharp edged roads (may be considered as impulse). The response of the automobile is desired in such a manner that the passengers must be in comfortable zone. In simplified case, a half car suspension system having four degrees of freedom with rigid chassis was analyzed for different forcing conditions. Using Newton''s Second Law of Motion, the equations of motion for all four degrees of freedom were derived. These equations were converted into matrix form which were later on solved with the help of computer software application for different forcing conditions. The results were plotted with the help of computer software application for general values of the parameters used in the equation. The plots showed the response of the system to different forcing conditions. The plots were analyzed and the conclusion was made, accordingly.

Key words: Automobile dynamics, forcing functions, springs, dampers, stiffness, damping, half car suspension system, Newton's Second Law of Motion.

IMEC-2018

Session Name **DYNAMICS & CONTROL**

ANALYSIS OF DYNAMIC AEROELASTIC EFFECTS WITH ESTIMATION OF FLUTTER SPEEDS

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Aeroelastic effects are always been a challenging area for researchers and aircraft designers. In this same regard, flutter is a dynamic aeroelastic instability which is caused by the fluid-structure interaction characterized by dangerous structural oscillations and may lead to complete structural failure. In the current research, dynamic aeroelastic analysis has been carried out for a F-16 wing model to present a better understanding of the phenomenon. The modelling, problem formulation and subsequent analysis is carried out in Femap with NX Nastran. Nastran was specifically chosen for the analysis as it is a reliable and accurate FEM solver endorsed by major regulatory authorities. The mathematical model for k method was developed for flutter analysis and applied through computer aided codes. The structural and aerodynamic models were developed in Femap which were connected by the mathematical function called Splines. The command Sol 145 was called for the flutter solution sequence and results were analyzed. V-g and V-f curves were plotted in MS Excel to ascertain the critical flutter speeds. Similar analysis was also carried out for modified wing models and a comparison is made with the base model. The analysis proves that the various structural parameters such as mass, material and model dimensions have a significant effect in defining the stability boundary near flutter. Moreover, it is also shown that aerodynamic effects also play a substantial part in determining the dynamic stabilities of an aircraft. The analysis carried out in the current study will assist researchers to evaluate other aircraft's wing models with improved accuracies on the same underlying principles.

Keywords:

Aeroelastic effects; Fluid-strucutre interaction; Flutter; K method; Femap; Nastran; V-g curve; V-f curve.

ABSTRACTS

IMEC-2018

Session Name **DESIGN & OPTIMIZATION**

FAULT TOLERANT CONTROL OF AN ACTIVE SUSPENSION SYSTEM FOR ROAD VEHICLES

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In this paper a model based approach is used in fault tolerant control (FTC) system to detect, identify and isolate the fault occur in an active suspension system of road vehicles, Quarter car active suspension system is considered in this research work.

Previously many research has been done on actuator faults, in this research our work focuses on the sensor fault occur in active suspension system.

Key words: Quarter Car, Fault tolerant control system, Active suspension, FDI, FTC.

IMEC-2018

Session Name **DESIGN & OPTIMIZATION**

EFFECT OF DIRECTIONAL STIFFNESS ON CONTROL REVERSAL SPEED

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Aeroelastic tailoring is basically the use of directional stiffness to achieve desirable changes in our aerodynamic parameters. In this research paper, the aileron reversal speed of a fighter aircraft has been evaluated by modelling and subsequent analysis of the wing in FEMAP. The static aeroelastic analysis has been carried out at Mach 0.0 and sea level conditions and aileron deflection of 1 degree. The model was simulated at different dynamic pressures one by one and the speed of aileron control reversal was evaluated by examining the stability derivatives in the result file of FEMAP. The material properties of the wing were now changed and laminate element with 2D orthotropic material was used and wing central region was now given this composite property. The whole process of finding the aileron control reversal speed was again carried out and the results were compared with the previous case. An increase in the reversal speed was observed. This comparison would allow us to better comprehend the use and significance of directional stiffness in influencing our aerodynamic parameters of an aircraft. In the end recommendations for future work are also presented.

Keywords: Directional stiffness, aeroelastic tailoring, static aeroelastic, control reversal, aelrion effectiveness, FEMAP, laminate, orthotropic material.

IMEC-2018

Session Name COMPUTATIONAL FLUID DYNAMICS

CFD AND NUMERICAL ANALYSIS OF DIVERTER LESS SUPERSONIC INLET WITH S-DUCT FOR DIFFERENT CONFIGURATIONS

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A detailed study on Diverter Less Supersonic Inlet, which are also called shock control bumps, have been reviewed in this survey paper. This paper begins with a brief introduction of origin of DSI concept. This paper also includes a detailed study on how the performance parameters (pressure recoveries, frictional losses, shock structures and flow streamlines) change with different s-duct configurations. Both experimental and numerical work from various authors have been evaluated. Also, the recent advancement of DSI and how they are successfully replacing the conventional air inlets have been discussed. Various optimization techniques can be used to increase the pressure recoveries and decrease the frictional losses which largely governs the aerodynamic efficiency of the aircraft

Keywords: Diverter Less Supersonic Inlet (shock control bumps), passive bump, passive suction, total pressure recovery, boundary layer interaction, single serpentine duct, dual serpentine duct, twodimensional bump, three-dimensional bump, aerodynamic design optimization

IMEC-2018

Session Name COMPUTATIONAL FLUID DYNAMICS

CFD ANALYSIS OF EFFECT OF WAVY TUBE PARAMETERS ON HEAT TRANSFER AND PRESSURE DROP OF FLOWING FLUID

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Co-relations of Nusselt number and Pressure drop for circular tubes have been widely developed, but less analysis has been done for tubes with wavy surfaces. This paper uses CFD tools for the analysis of heat transfer and pressure drop in wavy tubes, which can be utilized as a heating element for fluids. The effect of Reynolds number ($50 \le \text{Re} \le 35000$) and wave amplitude ($1\text{mm} \le \text{A} \le 3\text{mm}$) on heat transfer and pressure drop has been studied numerically. Based on the results, important controlling parameters have been identified and it is concluded that heat transfer to and pressure drop of the fluid flowing in wavy tube is affected by Reynolds number and wave amplitude.

Keywords: Wavy tubes, Nusselt number, Pressure drop, Heat transfer, Flow separation

IMEC-2018

Session Name COMPUTATIONAL FLUID DYNAMICS

COMPUTATIONAL FLUID DYNAMICS ANALYSIS FOR VENTILATION AND AIR-CONDITIONING OF AN OFFICE ROOM

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The aim of this study is to analyze the performance of Ventilation and Air conditioning (VAC) of an office room using computational fluid dynamics (CFD) simulations. The optimized location of the air handling unit (AHU) is designed for the proper cold air distribution in an office room. The scope of this study is to increase the efficiency of the VAC system of the commercial room using CFD simulations. The optimization of the whole design is performed by increasing the efficiency of supply and return system, and by reducing the system losses. By running CFD simulations, several positions of the AHU are modeled to minimize the high-temperature zones in the room. Thus, by optimizing the cool air flow in a room, the energy is properly conserved, decrement in the temperature saturation zones are observed, and better comfort is achieved. Also, the proper air distribution reduced the running cost of VAC systems.

IMEC-2018

Session Name COMPUTATIONAL FLUID DYNAMICS

NO_x FORMATION QUANTIFICATION INSIDE A COMBUSTION CHAMBER USING COMPUTATIONAL FLUIDDYNAMICS (CFD)

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This paper is a part of an extensive research to optimize a combustion system of an internal combustion (IC) engine to reduce engine emission by novel techniques. This paper describes a numerical study to calculate in-cylinder NOx formation using commercially available simulation software and compared it with experimentally measured NOx value of a commercial direct injection diesel engine. Investigation was focused in analyzing the generation and evolution of NOx during the combustion. In this paper, the focus is to simulate in-cylinder NOx formation and quantify it. As validation is an important aspect of a numerical analysis, pre-published work is used to compare the present numerical result with published experimental result.

 IMEC-2018
 Session Name LEAN MANUFACTURING & SYSTEM OPTIMIZATION

MODELING FLIGHT CONTROL SYSTEM FOR AN AIRCRAFT THAT USES INCLINED RUDDERVATOR AND FLAPERONS

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In the era of technology and development where the world has been converted into a Global Village, and every product from every corner of the world is available and is accessible to a customer within no time. The world has moved from random to systematic approach with the passage of time in all aspects of life. So is the case with the field of Aerospace, with the passage of time mankind has introduced many design techniques and methodologies. These techniques have improved the standards of product development by learning from the already available data and flight experiences. It has become mandatory for any successful design technique to have a thorough study of the previous endeavors taken on the relevant subjects by authentic researchers all around the globe There are advanced design tools followed for a complete and comprehensive product development that fulfills the voice of the customer and ultimately ensures the profitability for the producer and the user. In this work, popular design techniques and methodologies that have been developed in the recent history have been studied briefly, analyzed and compared. This paper presents a review of a design method known for flight controls using Matlab Simulink user interface, it has become one of the most widely cited methods in aerospace Design, analysis and development. Literature review of the recent developments in Flight controls is presented along with correlation with parallel design method

IMEC-2018 Session Name LEAN MANUFACTURING & SYSTEM OPTIMIZATION

APPLICATION OF QUEUING THEORY IN IMPROVING HEALTHCARE PERFORMANCE OF OPD OF ABC HOSPITAL OF SINDH, PAKISTAN

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Long waiting lines are the common occurrence at the health care centers. Patients wait at the public healthcare before they get served. The delay is the main issue which is mainly caused due to improper handling of queuing system .In order to simplify the issue of long waiting lines, this study was conducted by using multi server queuing model with the objective of suggesting the optimum number of servers in the queuing system at ABC public sector hospital to improve service by reducing queue. The most congested OPD i.e., Medical OPD was selected for the data collection for a week: data collection variables were arrival rate and service rate of patients along with number of doctors or servers. Arrival and service distribution were checked by the input analyzer of Rockwell Arena Software. The data was put into the TORA optimization software for the computation of solution. After the analysis, it was concluded that one receptionist and one doctor in the OPD should be increased.

Keywords. queue, waiting cost, serving cost, servers.

IMEC-2018 Session Name LEAN MANUFACTURING & SYSTEM OPTIMIZATION

COMFORTABLE WAITING TIME OF PATIENTS AT THE OPD WITH VARYING DEMOGRAPHICS

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Waiting time is one of the most important feature of healthcare delivery. Therefore, it is required for an organization to be aware of its customers in terms of the comfortable waiting time that they can wait comfortably in the system. This study investigated the facts regarding the comfortable waiting times of the patients coming in the OPD. 200 questionnaire responses were collected from the patients: Three alternate hypothesis were developed in order to reveal the comfortable waiting times of patients having demographic characteristics i.e., gender, age groups, visiting experience of the OPD. The data was analyzed in the Statistical Package of Social Sciences (SPSS) version 22. Firstly, skewness and kurtosis of the data was computed, and the values did not come in normal range; due to non-normal data, the hypothesis couldn't be tested by using T-test; Therefore, one hypothesis was tested by Mann Whitney U test and rest of two hypothesis were tested by applying Kruskal Wallice test. Results indicated that the comfortable waiting time of the patients across both genders i.e., male and female was same: whereas, it was not same across the different age groups: furthermore, patients having different OPD visiting experience (1st, 2nd, 3rd) had the same comfortable waiting time.

Keywords: Queue, OPD, satisfaction, waiting time

IMEC-2018

Session Name LEAN MANUFACTURING & SYSTEM OPTIMIZATION

FACTORS INFLUENCING JOB SATISFACTION OF FACULTY MEMBERS IN PUBLIC SECTORS ENGINEERING UNIVERSITIES OF SINDH PROVINCE

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The study of job satisfaction of faculty members in Public Sector Engineering Universities of Sindh Province, used the 5-point likert scale to assesses the satisfaction extent of job of teaching staff on a basis of six factors such as Compensation, Research and Technology, Management Style, Recognition, Working environment, In-Service teaching training. The consequences showed largely that the faculty members of the universities have a moderate level of job satisfaction. Moreover, Gender, Age group, marital status, Education level, Total years of teaching experience, Present job title, Universities, Job responsibilities shows noteworthy influence on the respondents' level of job satisfaction. This study will help the management to rectify the areas of dissatisfaction and improves the satisfaction level of teaching staff in Public Sector Engineering Universities of Sindh-Pakistan.

Keywords:Job satisfaction, Faculty members, Education, Public sector Engineering Universities, Empirical Data Analysis.

IMEC-2018

Session Name **MODELLING & SIMULATION**

AN ALGORITHM TO ANALYZE ARTIFICIAL VISCOSITY IN SHOCK CAPTURING THROUGH CD NOZZLE

A nozzle is a device used to regulate the direction or characteristic of flow. Pressure energy is converted to kinetic energy as the fluid flows through the nozzle. The main usage of nozzle is to accelerate the flow to produce thrust for driving steam or gas turbines, jet engines and rocket motors. Nozzle has many industrial applications including jet engines, geo-environmental setups, turbo machinery, refrigeration, wind tunnels, thermal ejectors, separation systems etc. The present work studies the effects of artificial viscosity on flow parameters for shock capturing in a quasi-one-dimensional calorically perfect gas flow. A computer algorithm has been developed for numerical scheme by using specific form of artificial viscosity. Three flow parameters namely pressure, Mach number and mass flow rate were selected to demonstrate the effect of artificial viscosity. The objective of study was to compare these three flow parameters for accuracy and stability with and without the use of artificial viscosity. Developed computer algorithm has the flexibility for using different nozzle equations for geometry with different pressure ratio values. Moreover, initial conditions and grid points can also be varied for different set of conditions. Algorithm is designed to indicate negative primitive variable value and diverged solution during the process of iteration, if occurs. In case the solution converges before the defined number of time steps, algorithm is designed to terminate iterations and generate solution. The computational time for a converged solution through subject algorithm, starting from the assumed initial conditions, comes out to be 45 ms. The numerical model was validated through comparison between numerical and analytical results. Percentage differences between the two solutions have also been calculated and presented. A good agreement is observed between the numerical and analytical results.

Keywords: Quasi one-dimensional flow; Artificial Viscosity; MacCormack method.

IMEC-2018

Session Name **MODELLING & SIMULATION**

DEVELOPMENT OF AN ALGORITHM TO SOLVE STEADY SUPERSONIC INVISCID FLOW OVER A 2-D DOUBLE WEDGE

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The flow over a wedge has always been of great interest to aerospace industry as many portions of an aircraft essentially can be seen as wedges. In this research, the supersonic steady flow over a 2-D wedge has been studied and analyzed. An inviscid perfect gas is considered. An algorithm has been developed to solve this flow, utilizing the Naiver Stokes equations and shock expansion theory. This code also makes use of the oblique shock relation and the Prandtl-Meyer relations. This algorithm helps us in evaluating the aerodynamic coefficients like Coefficient of lift and drag and pressure and this algorithm also provides us with graphs of static pressure, temperature and Mach number distribution all along the airfoil chord length. CFD solution of the problem has also been carried out. Shock capturing approach has been used in this numerical solution. Sufficient number of grid points have been utilized with the boundary. The governing differential equations have been non-dimensionalized. The results obtained from the CFD solution have been compared with the analytical solution obtained from the algorithm and are found to be in accordance to each other. Proposed algorithm will enable us to solve a wide range of practical flow problems including flow over nose cones and shock cones. The flow parameters can also be varied to see the change in various properties and their interaction with aerodynamic body. The algorithm can be used as a handy and fast tool for the evaluation of aerodynamic parameters for a range of input conditions and different thickness to chord ratio. Whereas the CFD solution can be used to evaluate the same parameters but only at one thickness to chord ratio this giving our algorithm a distinct advantage.

Keywords:Navier stokes, Prandtl-meyer, inviscid, wedge, steady flow, supersonic flow.

ABSTRACTS

IMEC-2018

Session Name **MODELLING & SIMULATION**

FINITE ELEMENT STUDY OF MICRO ROUGH TOPOLOGIES FOR STRETCHABLE THIN FILMS

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Stretchable micro-electro-mechanical systems (MEMS) are getting popular in the modern day world. The present paper studies the effect of two different micro roughness topologies on the tensile stress and interfacial shear stress of a stretchable thin film/substrate laminate which can form an intrinsic part of a MEMS device.

Mesh independent results indicate that roughness feature built in to the substrate performs better when compared to the same feature patterned on top of the substrate.

Keywords: Roughness feature, MEMS, Stretchable, Thin film, Substrate, Mechanical performance, Numerical

IMEC-2018

Session Name THERMAL & MECHANICAL SYSTEMS

EXPERIMENTAL INVESTIGATION OF NO-FROST REFRIGERATOR WITH NANO-LUBRICANTS

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Abstract— In this work the reliability and Performance of a domestic refrigerator was investigated by adding Al2O3 and SiO2 nanoparticles to the lubricant oil of the compressor. The refrigerator performance was investigated for energy consumption, freeze capacity and pressure drop caused by Nanoparticles suspended in Polyol-ester (POE) oil. The results indicated that the energy consumption and freeze capacity of refrigerator improved with the addition of nanoparticles. There were no significant pressure drops caused by the nanoparticles. In all cases nanoparticles enhanced the lubricity of the POE oil which resulted in better performance of compressor. Energy savings of 27.97% and 14.69% were achieved, when 0.1% Al2O3 and SiO2 were suspended into the compressor lubricant oil. An enhancement in the freezing capacity of the refrigerator has been observed without any significant

IMEC-2018

Session Name THERMAL & MECHANICAL SYSTEMS

TECHNICAL AND ENVIRONMENTAL ANALYSIS OF SHP IN RET SCREEN: A CASE STUDY OF POWER PRODUCTION AT MACHAI/MARDAN

Anjum Khalid and Nageen Jalal

The RET Screen International Clean Energy Project Analysis Software is the leading tool specifically aimed at facilitating pre-feasibility and feasibility analysis of clean energy technologies.

RET Screen International addresses a number of renewable energy electricity generating technologies. The four most widely applied technologies are Wind energy, photovoltaic, small hydro, and biomass combustion power technologies. Generation from Small Hydropower plant at Mardan/Machai using hydrology data of upstream location was possible through RET Screen Energy Model.

The energy available from a hydro turbine is proportional to the quantity of water passing through the turbine per unit of time (i.e. the flow), and the vertical difference between the turbine and the surface of the water at the water inlet (i.e. the head).

IMEC-2018

Session Name THERMAL & MECHANICAL SYSTEMS

ENERGY POTENTIAL FROM MUNICIPAL SOLID WASTES IN URBAN PAKISTAN

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Solid waste management needs a re-evaluation in developing countries like Pakistan, that currently employs land filling as primary option. With time and increasing population, space for landfills will decrease and the cost of land filling will increase.

While this waste will keep on accumulating, it will produce pollution. Locating and preparation of a sanitary landfill involves the acquisition of large areas as well as day to day operation in order to minimize potential negative environmental effects. Also, In the field of sustainable energy, energy production from MSW (municipal solid waste) is the most rational idea for large cities, as waste is an undesirable output that adds to land and air pollution The current study evaluates the potential that this waste provides for power generation by the process of incineration.

The amount of daily MSW produced in just Karachi has reached 12,000 tons per day. A simple evaluation gives estimated average calorific value to range around 3000 Kcal/kg. This presents a total of 150624 GJ energy potential daily that in terms of continuous power is 1743 MW. However, the energy potential from an incineration plant operating based on 8000 ton of daily waste with an average calorific value of 3000kcal/kg is assessed to be at 121.9 MW at 25% plant efficiency.

ABSTRACTS

IMEC-2018

Session Name THERMAL & MECHANICAL SYSTEMS

TORQUE ESTIMATION ANALYSIS FOR PIEZOELECTRIC SAVONIUS WIND MILL FOR WIND ENERGY HARVESTING

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Recently, the trend in the use of piezoelectric materials for wind energy harvesting is highly encouraging. The notion of piezoelectric wind mill is not very old and still, a lot needs to be done in this regard. On top of this, the use of VAWT (Vertical Axis Wind Turbine) for this purpose, is yet to be fully explored. In this study, torque generated by various wind velocities encountered by a Piezoelectric Savonius Wind mill is first calculated analytically from the available simple analytical formulations and then, Computational Fluid Dynamics (CFD) has been used to evaluate it through the simulation.

The purpose is to evaluate the difference in performance contribution for a two blade and a three blade wind mill. The results show the superiority of the three blade design over the two blade design. Further exploration also denied the assumption that increasing the number of blades will further ameliorate the operational performance of the wind mill.

The calculation of the voltages and currents generated and the effect of tuning the natural frequency of the system with the mostly prevalent wind velocity in the region of the deployment of the wind mill will be investigated in the later phase of the project.

IMEC-2018

Session Name SYSTEM DESIGN

SMA ACTUATED INDEX FINGER EXOSKELETON

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Now a days it become difficult to take physical medicine and manual therapy for injured and impaired part of hand. To resolve the outcomes of such type issues Robotic finger exoskeleton is one of the strategy to fulfill the desire of participating in cutting edge research. Therefore in order to regain the dexterity of the patient's finger one of the orthotic device has designed. A CAD model of each phalanx has designed using SolidWorks. A portable finger exoskeleton is proposed in this paper by using 0.15mm (diameter) Flexinol actuator along with the length of 440mm and then a hardware prototype has been developed and reported in this paper.

Keywords-Index finger rehabilitation, Orthotic finger exoskeleton, SMA actuator

IMEC-2018

Session Name SYSTEM DESIGN

ANALYSIS OF FORCED VIBRATIONS OF FLAP WISE BENDING OF ROTATING TAPERED RAYLEIGH CANTILEVER BEAMS

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Analysis of forced vibration of rotating tapered Rayleigh cantilever beams has been performed. Earlier research in this area was performed by keeping it a case of free vibrations. Dimensionless natural frequencies were calculated in that research and effect of taper ratio, slenderness ratio and angular velocity variation was studied. In this research, same values of taper ratio, slenderness ratio and angular velocity were utilized.

Effect of these parameters has been studied under application of different forcing functions. Multiple combinations of these parameters were formulated to study the forced response. Each combination was separately analyzed under application of blast, ramp and pulse forcing functions. A MATLAB program has been written to evaluate the beam response under different forcing functions.

IMEC-2018

Session Name SYSTEM DESIGN

BIRD HIT IMPACT ANALYSIS OF AIRCRAFT NOSE RADOME

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Bird hit impact analysis has been performed on an air liner nose radome. Nose radome comprises of four layers of glass fibre. Relevant data has been taken from aircraft technical manuals. Concept of practical repair strategy like sanding ply has also been taken care off. Analysis has been performed using LS-Dyna. Requisite parameters selected for impact analysis are displacement, stress and shear strains. Failure criterion has been based on values of von-mises stress.

Calculated results have been compared with the experimental data available in the earlier research. Based on this comparison, correlation has been established between this research and earlier research.



List of Papers Presented in 7th International Mechanical Engineering Conference held on 24th & 25th March, 2017 at IEP, Karachi Centre

Key Note Presentation on "Renewable Energy" -Prof. Dr. Muhammad Asif, Glasgow Caledonian University, UK.

"Presentation on Renewable energy potential in Sindh a remedy to Pakistan Energy " -Engr. Mehfooz A. Qazi Director Alternative Energy Board, Sindh.

Presentation on "Geo-Thermal Power Plant Prospects in Pakistan"-Ms. Susan Petty, President and Chief Technology Officer, AltaRock Energy Inc, Seattle, USA, via Skype

"Design and Optimization of 6 Hour Endurance Unmanned Aerial Vehicle for DHA City Project" -Engr Bilal. A. Siddiqui, DHA SUFFA University, Karachi

"Implementing Lean Manufacturing at a Fast-Moving Consumer Goods Industry" -Engr.Zunair Zafar, NED University of Engineering & Technology, Karachi

"Design of a Quadrotor UAV for Different Industrial Applications" -Engr. Ramish, K-Electric Limited

"Tensile Strength Analysis of Basalt-Carbon/Epoxy Laminated Hybrid Composite"
-Engr. Muhammad Najam Malghani, Balochistan University of Information Technology, Engineering & Management Sciences (BUITEMS)

"Finite Element Modeling of Multi-Walled Carbon Nanotube Reinforced Polymer Composites" -Engr.Bushra Fatima, Middle East Technical University, Turkey

"Numerical Investigation of the Effect of Various Propellant Gases on the Performance of Micro Electric Thruster" -Engr. Muzammil Ejaz, NED University of Engineering & Technology, Karachi

"A Numerical Study of Effervescent Atomiser Internal and External Flow" -Dr. M. Mahrukh, University of Surrey, Guildford UK

"Modeling, Simulation and Optimization of Automobile Powertrain" -Engr. Yasir Hasnain, NED University of Engineering & Technology, Karachi

"Analysis of Syngas Composition in Wood Gasification Using Downdraft Gasifier" -Egnr.Ahsan Alam, K-Electric, Limited

"Pyrolysis Heating Performance of Oil Palm Shell Waste Biomass With Carbon Surfaces At 2.54 Ghz Microwave Frequency" -Engr. Faisal Mushtaq, Balochistan University of Information Technology, Engineering & Management Sciences (BUITEMS)



"Comparison of Biomass Gasification by Modelling and Simulation in Gibbs Free Energy Reactor and Entrained Flow Downdraft Gasifier Using Aspen Plus"

-Engr. S. H. Ansari, University of South Africa

"Statistical Analysis of Empirical Sky Models for Energy Policy Making of Karachi" -Engr.Uzair Yousuf, NED University of Engineering & Technology, Karachi

"Development of a CFD Model for Airflow and Temperature Pattern Inside a Domestic Refrigerator" -Engr.M Ehtesham-ul-Haque, Universiti Malaysia Pahang, Malaysia

"Energy and Exergy Analysis of a Steam Power plant" -Engr.Ahsan Alam, K-Electric Limited

"Productivity and Sustainability Enhancement by Improving Lighting System Design at a Textile Industry" -Dr. Fahad, NED University of Engineering & Technology, Karachi

"Computer Aided Modeling and Simulation of Pneumatic U.A.V. Catapult Mechanism" -Engr.Bilal A. Siddiqui, DHA Suffa University, Karachi

"Model Analysis for Classification of Healthy and Degraded Electric Utility Poles" -Engr. M. Atayyab Shahid, Pakistan Navy Engineering College, PNEC, NUST

"A System Level Modeling of a Small Scale Organic Rankine Cycle Driven by Parabolic Trough Collectors" -Engr. Syed Zaid Hasany, Turkey

"Impact of Solar Radiation on Building Envelope Using Energy plus Software"Engr. Ateeque Ahmed, NED University of Engineering & Technology, Karachi

"A Comparison between Empirical and EPF Method for Wind Data Analysis" -Engr. Aftab Ahmed, Institute of Business Administration, Sukur)

"Modeling of Unsteady Velocity and Temperature Profiles in Membrane Distillation Process Using CFD" -Dr. Muhammad Shakaib NED University of Engineering & Technology, Karachi

"Water Treatment System by Ozonation Based on Corona Discharge Method Using Renewable Energy (PV Panels)"

-Engr. Sikandar Tahir, Pak Suzuki Limited

"Municipal Wastewater Treatment by Phytoremediation with Chlorella Vulgaris: Effects of pH Regulation" -Egnr.Abeera Malik, Balochistan University of Information Technology, Engineering & Management Sciences (BUITEMS)

"Achieving Lean Manufacturing by Changing Design of the Product" -Engr. Mufazzal





List of Papers Presented in 6th International Mechanical Engineering Conference held on 15th & 16th July, 2016 at IEP Karachi Cetnre

- 1. MOVING TOWARDS SUSTAINABLE ENERGY AND GREEN MATERIAL -Prof. Dr. Wan Mohd Norsani B. Wan Nik, Deputy Dean, (Academics and Student) Universiti Malaysia Terengganu
- 3. A SCHEME PROPOSED FOR SOLAR DESALINATION SYSTEM FOR RURAL AREAS -Muhammad Waseem, Mechanical Engineering Department, NED University of Engineering & Technology, Karachi, Pakistan
- 4. NEED OF ENERGY CONVERSION MEASURES IN SAUDI ARABIA AND METHODOLOGY FOR CERTIFICATION OF ENERGY PERSONNEL -Abdullah Alshehri¹, Ahmad Hussain Faculty of Engineering, King Abdulaziz University, Rabigh, Kingdom of Saudi Arabia, Department of Mechanical Engineering, NED University of Engineering & Technology,
- 5. CFD ANALYSIS OF PERFORMANCE OF CIRCULAR PIPE FLAT PLATE SOLAR COLLECTOR

-T. Manzoor^{*} A. Akbar, Z. Hassan, H. Javed, A. Ali, and M. Amjad, Mechanical Engineering Department, COMSATS Institute of Information Technology, Sahiwal, Pakistan

- 6. DESIGN AND EVALUATION OF LAYOUT FOR AN ENERGY EFFICENT FACILITY -Syed Asad Ali Naqvi^{1,*}, Muhammad Fahad, Muhammad Atir, Muhammad Zubair, Muhammad Musharaf Shehzad Industrial & Manufacturing Department, NED University of Engineering & Technology, Karachi, Pakistan, Associate Professor, Industrial & Manufacturing Department, NED University of Engineering & Technology, Karachi, Pakistan
- 7. ASSESSMENT AND COMPARISON OF SUSTAINABILITY OF HOUSEHOLD PRODUCTS MANUFACTURED IN PAKISTAN USING LCA -Muhammad Fahad, Syed Tahir Bukhari, Jorrit Leijting Industrial and Manufacturing Engineering Department, NED University of Engineering & Technology, Karachi, Pakistanm Deputy Manager, Dawlance Pvt. Ltd., Karachi, Pakistan Sustainability Consultant, Leijting Advies, NMCX Centrum voor Duurzaamheid | Centre for Sustainability, Amsterdam, Netherlands
- 8. PREDICTION OF RESIDUAL STRESSES FOR ULTRASONIC IMPACT TREATMENT OF ENGINEERING ALLOYS

-H. Rehman, M. K. Khan MatStress Engineering, Karachi, Pakistan



9. GREEN ADDITIVE MANUFACTURING

-Shaheryar A. Khan, Muhammad Fahad and Maqsood Ahmed Khan, Mechanical Engineering Department, DHA Suffa University, Karachi, Pakistan Industrial and Manufacturing Engineering Department, NED University of Engineering & Technology, Karachi, Pakistan

10. FABRICATION OF DYE SENSITIZED SOLAR CELLS USING DYE N719 AND COMPARING EFFICIENCY UNDER SUN, INDOOR AND MOON LIGHT

-Muhammad Ayaz^{*} Jafar Khan Kasi, Ajab Khan Kasi, Samiullah and Mustafa Ali Department of Physics, University of Balochistan, Quetta, Pakistan, Department of Chemistry, University of Balochistan, Quetta, Pakistan, Department of Biotechnology, Balochistan University of Information Technology, Engineering and Management Sciences, Quetta.

11. DESIGN AND THERMAL ANALYSIS OF PARABOLIC TROUGH SOLAR THERMAL POWER PLANT

-Muhammad Usama Bin Aijaz, Syed Ahsan Adeeb, Ghazanfar Rasool and Asad A. Zaidi, Mechanical Engineering Department, PN Engineering College, National University of Sciences & Technology, Karachi, Pakistan, Department of Engineering Sciences, PN Engineering College, National University of Sciences & Technology, Karachi, Pakistan

12. EFFECTS OF EFFICIENT APPLIANCES IN REDUCTION OF ELECTRICITY CONSUMPTION IN PAKISTAN

-Azhar Abbas Khan¹, Tanzeel-ur-Rashid¹*, Najamulhassan Shah², Muhammad Afzal Khan, Muhammad Irfan, Tahir Mehmood, Department of Energy Engineering, University of Engineering & Technology Taxila, Department of Mechanical Engineering, University of Engineering & Technology Taxila

13. EFFECT OF STEAM TEMPERATURE ON STEAM POWER PLANT EFFICIENCY AND POWER OUTPUT

Ahsan Alam, Mubashir Ali Siddiqui, Syed Abdullah Faiz, Syed Fakhir Hasani Bin-Qasim Power Station – 1, K-Electric Ltd., Karachi, Pakistan, Mechanical Engineering Department, NED University of Engg & Tech., Karachi, Pakistan Gul Ahmed Energy Ltd, Karachi, Pakistan Associate Professor, Mechanical Department, Al-Imam Mohammad Ibn Saud University, Riyadh, Saudi Arabia

14. STRUCTURAL INTEGRITY OF ENERGY DEVICES THROUGH REPLICA BASED MICROSCOPY AND FINITE ELEMENT ANALYSIS

-S. Behram, M. K. Khan, Department of Metallurgy and Materials Engineering, DUET, Karachi, Pakistan. MatStress Engineering, Karachi, Pakistan.

15. ASSESSMENT AND COMPARISON FRAMEWORK: DEVELOPMENT AND IMPLEMENTATION

-Muhammad Midhat Ali, Muhammad Fahad, Sheheryar Mohsin Qureshi, Chang Wook Kang Young's (Private) Limited, Department of Industrial and Manufacturing Engineering, NED University of Engineering and Technology, Karachi, Pakistan.

Department of Industrial and management Engineering, Hanyang University, republic of Korea

16. INRUSH CURRENT MINIMIZATION FOR THE SINGLE PHASE TRANSFORMER -Umair Ahmed, Mukhtiar Ahmed Mahar, Pervez Hameed Shaikh, Adil Ahmed Department of Electrical Engineering, Mehran University of Engineering & Technology, Jamshoro, Pakistan



17. ONSET OF WHISTLING IN CORRUGATED PIPE SYSTEMS: EXPERIMENT AND LINEAR MODEL

-Faran Razi and S. A. Wahab, Engineering Sciences Department, Pakistan Navy Engineering College, National University of Science and Technology, Karachi, Pakistan, Engineering Sciences Department, Pakistan Navy Engineering College, National University of Science and Technology, Karachi, Pakistan

18. PLATE : A COMPUTATIONAL AND EXPERIMENTAL STUDY

-Sohaib Z Khan, Muhammad A Khan, Muhammad Tariq, Department of Engineering Sciences, PNEC, National University of Sciences and Technology, Karachi, Pakistan

19. ACOUSTIC EMISSION FOR EVALUATING POINT CONTACT WEAR UNDER DRY AND LUBRICATED CONDITIONS

M. A. Khan, Kanza Basit, S. Z. Khan, Engineering Sciences Department, National University of Sciences and Technology (NUST), Karachi, Pakistan

K. A. Khan, Khalifa University of Science, Technology and Research Abu Dhabi, United Arab Emirates

20. DESIGNING AND EXPERIMENTAL ANALYSIS OF DEPRESSURIZATION MECHANISM OF LAUNCH VEHICLE FAIRING

-Hammad Misbah Uddin, M. Ahmad Binyamin, M. Omair, Shafiq R. Qureshi Abdul Majid, Tanveer Iqbal and Sidra Zahid

- 21. COMPARATIVE ANALYSIS ON THERMAL CONDUCTIVITIES OF AQUEOUS AND HYDROCARBON NANO-FLUIDS USING MOLECULAR DYNAMICS SIMULATIONS -Dr.Adil Loya and Muhammad Bilal Khan Mechanical Engineering Department, COMSATS Institute of Information Technology, Sahiwal
- 22. MS-EXCEL BASED CALCULATOR FOR DYE SENSITIZED SOLAR CELL PARAMETERS

Muhammad Junaid Qamar, Muhammad Nadeem, Muhammad Ayaz, Junaid Babar, Abdul Basit, and Atiq Ahmed, Department of Computer Science and IT, University of Balochistan, Quetta, Pakistan, Department of Physics, University of Balochistan, Quetta, Pakistan

- 23. EFFECTS OF MAGNETIC FIELD ON ACCELERATED PLATE IN MAXWELL FLUID -Kashif Ali Abro, Mukarrum Hussain, Mirza Mahmood Baig Department of Mathematics, NED University of Engineering Technology, Karachi, Pakistan Institute of Space Technology, Karachi, Pakistan
- 24. RESISTANCE CALCULATION AND LATERAL HULL SPACING OPTIMIZATION FOR ADVANCE SERIES 60 CATAMARAN HULLFORM USING CFD TECHNIQUES -Salma Sherbaz, Adnan Maqsood and Jawad Khan, Research Center for Modeling and Simulation

(RCMS), National University of Sciences and Technology (NUST), Islamabad, Pakistan, Pakistan Navy Dockyard, West Wharf Road, Karachi, Pakistan

