



The Institution of Engineers Pakistan

KARACHI CENTRE

4th Floor, IEP Building, 177/2 Liaquat Barracks, Shahrah-e-Faisal, Karachi-75530 (Pakistan)

Tele: (92-21) 32780233, 32781492 Fax: (92-21) 32783442

Email: main@jepkarachi.org.pk, info.iepkc@gmail.com Website: www.iepkarachi.org.pk

22nd May, 2023

REPORT

12th INTERNATIONAL MECHANICAL ENGINEERING CONFERENCE (IMEC-2023) WEDNESDAY THE 10TH AND THURSDAY THE 11TH MAY, 2023 AT KARACHI

The Institution of Engineers Pakistan Karachi Centre, NED University of Engineering and Technology, and NED International Alumni Network (NEDIAN) Association jointly organized the 12th International Mechanical Engineering Conference was held on Wednesday the 10th May and Thursday the 11th May, 2023 in collaboration with Federation of Engineering Institutions of South and Central Asia (FEISCA), Federation of Engineering Institutions of Islamic Countries (FEIIC), Mehran University of Engineering & Technology, Jamshoro, Balochistan University of Engineering and Technology, Khuzdar, Balochistan University of Information Technology, Engineering & Management Sciences, Quetta, Dawood University of Engineering and Technology, Hamdard University, DHA SUFFA University-Karachi, Quaid-e-Awam University of Engineering, Sciences and Technology-Nawabshah, Nazeer Hussain University-Karachi, Pakistan Navy Engineering College-NUST, Shaheed Zulfiqar Ali Bhutto Institute of Science & Technology-Karachi, American Society of Heating Refrigerating and Air-conditioning Engineers and Pakistan Society of Plumbing Professionals.

The theme of the conference is **“Role of Mechanical Engineering in Economic Uplift and Sustainability”**.

Inaugural Session

Wednesday the 10th May-2023

Mechanical AV Conference Hall

The Inaugural Session of the Conference started with recitation of the Holy Quran followed by National Anthem.

The Inaugural Session was conducted by Engr. Ifrah Asif, Local Council Member, IEP Karachi Centre and Faculty Member, Department of Mechanical Engineering, NED University of Engineering and Technology, Karachi.

Engr. Asim Murtaza Khan, President, NED International Alumni Network Association, was the Chief Guest at the Inaugural Session

Engr. Farooq Mehboob, President, ASHARE and CEO, Mehboob and Company was the Guest of Honour at the Inaugural Session and he also presented his Key-note address on “Securing Our Future”.

Engr. Prof. Dr. Syed Amir Iqbal, Dean, Department of Mechanical and Manufacturing Engineering, NED University of Engineering and Technology and Co-Convener, 12th International Mechanical Engineering Conference briefed about the Conference.

Engr. Sohail Bashir, Chairman, IEP Karachi Centre presented his address.

Mr. Richard H. Rooley, Presidential Member, ASHRAE presented online his Keynote Address on **“Ethics and Sick Building Syndrome – Is Thermal Comfort the Enemy of Sustainability”**.

Engr. Prof. Dr. Sarosh Hashmat Lodi, Vice-Chancellor, NED University of Engineering and Technology presented his address.

Engr. Asim Murtaza Khan, President, NED International Alumni Network Association, presented his address.

Engr. Sohail Bashir, Chairman, IEP Karachi Centre, and Engr. M. Farooq Arbi, Secretary, IEP Karachi Centre presented the Conference shield to the Chief Guest.

Engr. Ayaz Mirza, Vice-President (Mechanical and Allied), IEP presented the vote of thanks.

The Inaugural Session was attended by a large number of Engineers physically as well as on line through Zoom.

The Inaugural Session came to an end followed by Hi-Tea.

TECHNICAL SESSIONS

THURSDAY THE 11TH MAY-2023

The Conference was spread over six (06) technical sessions at Video Conferencing Hall, Department of Civil Engineering, and at Audio Visual Hall, Department of Mechanical Engineering, NED University of Engineering and Technology. The details are as follows:

TECHNICAL SESSION – 1-A

A/V CONFERENCING, DEPARTMENT OF MECHANICAL ENGINEERING, NEDUET

TOPIC: “ADVANCES IN SUSTAINABLE MECHANICAL ENGINEERING”, “INNOVATIONS IN MECHANICAL DESIGN AND MANUFACTURING”

Chaired by :

Engr. Prof. Dr. Murtaza Mehdi, Professor, Department of Mechanical Engineering, NEDUET

Engr. Dr. Mumtaz Hussain Qureshi, Assistant Professor, Department of Mechanical Engineering, NEDUET

Engr. Ghulam Farooq Maniar, Central Council Member, IEP Karachi Centre

Invited Talk on “Application of Machine Vision Technology for the Betterment of Local Industry presented” by Engr. Azeem Anwar, CEO, SignAxes (Pvt) Limited.

Following papers were presented

1.	Numerical Investigation of a Novel Design of Cross Axis Wind Turbine with Improved Efficiency - Faheem abbas , Usama Ali, Adnan Rasheed, Mumtaz a. Qaisrani, M. Basit Shafiq, Usman Allauddin, Muhammad Umar Farooq, Shajar Abbas, Ali Zulkarnain
2.	Design Optimization and Performance Assessment of a Novel Savonius Wind Turbine - Saqlain Saeed , Saqlain Ali, Khizar Hayat, Muhammad Zahid, Mumtaz A. Qaisrani, M. Basit Shafiq, Muhammad Umer Farooq, Usman Allauddin
3.	Desulfurization Of Diesel Oil for the Upgradation to Euro V Emission Standard - Muhammad Ali , Muzaffar Ali, M Shahrukh Atta, Usama Asghar, Sadeed Ullah Khan Jano, Haris Khan M. Iftikhar ul Hassan

TECHNICAL SESSION- 1B

AUDIO VISUAL HALL, DEPARTMENT OF CIVIL ENGINEERING, NEDUET

TOPIC: “EMERGING AREAS OF MECHANICAL AND AEROSPACE”

“ADDITIVE MANUFACTURING PRSPECTS IN THIRD WORLD COUNTRIES

Chaired by:

Engr. Muhammad Uzair, Associate Professor, Department of Mechanical Engineering, NEDUET

Engr. Dr. Kashid Noor, Assistant Professor, Department of Mechanical Engineering, NEDUET

Engr. M. Aijaz ul Haque, Central Council Member, IEP Karachi Centre

Invited Talk on “Unmanned Aerial Vehicles – R D and Manufacturing Challenges in Pakistan” by Engr. Dr. Bilal Siddiqui, COO, Woot Technology.

Following papers were presented

4.	Performance and Emissions Analysis of a Diesel Engine Fueled by Diesel Mixtures with Manganese Oxide and Carbon Nanotubes Fuel Additives - Muhammad Sarfraz Ali, Sadia Saleem, Rozeena Aslam , Hamza Akhtar, Muhammad Imran, Talha Nadeem Hassan, Abdul Rehman, Muhammad Faheem Nazar, and Anees ur Rehman
5.	Modeling of Surface Roughness and Optimization of Cutting Parameters for Milling Of 42CrMo4 by Coated Carbide Tool Inserts - Hamza Khalid , Mirza Jahanzaib, Muhammad Jawad, Uroosa Malik
6.	Simulation-Based Modal Analysis of Cracked Cantilever Beam - Ahmad Naveed , Muhammad Usman, Muhammad Bu Ali, Muhammad Haseeb, Zain Abbas Tahir, Ali Husnain Ahmad Tabassum, Haseeb Arshad
7.	Design, Fabrication, and Study of Reinforced Arc Weld Joints - Muhammad Saad Suleman , Murtaza Mehdi, Shahzaib Nazim

TECHNICAL SESSION- 2A

A/V CONFERENCING, DEPARTMENT OF MECHANICAL ENGINEERING, NEDUET

TOPIC: "RENEWABLE AND ALTERNATE ENERGIES"

Chaired by :

Dr. Ing. Usman Allauddin, Associate Professor, Department of Mechanical Engineering, NEDUET
Engr. Dr. Syed Ahmed Raza, Assistant Professor, Department of Mechanical Engineering, NEDUET
Engr. Abdul Wahab Tajwani, Local Council Member, IEP Karachi Centre

Invited Talk on "Application of Reverse Engineering and Use of CAD/CAM in Renewable Technology" by Engr. Abdul Raheem, Vice-Chairman (Mechanical & Allied), IEP Karachi Centre and Principal Engineer, Modtech Services Limited.

Following papers were presented

8.	A Novel Study on Performance Evaluation of Single Flow Double Pass Solar Air Heater with Phase Change Materials - Zeeshan Rasool , Muhammad Imran Akram, Rabeet Yousaf, Muhammad Sarfraz Ali, Sadia Saleem
9.	Numerical Investigation of Small-Scale Wind Turbine for Commercial Buildings - Osama Qadeer , M. Usman Khan, M. Basit Shafiq, Usman Allauddin, Mumtaz A. Qaisrani, Liaquat Ali Khan
10.	Effect of Flow Rate on Various Parameters of Archimedes Screw Water Turbine Using Experimental and CFD Analysis - Muhammad Ahsan , Pervaiz Khan

TECHNICAL SESSION- 2B

AUDIO VISUAL HALL, DEPARTMENT OF CIVIL ENGINEERING, NEDUET

TOPIC: "LOCALIZATION, ENTREPRENEURIAL AND COMMERCIALIZATION CASE STUDIES"

Chaired by:

Engr. Dr. Haider Ali, Associate Professor, Department of Mechanical Engineering, NEDUET
Engr. Dr. M. Ehtesham ul Haque, Assistant Professor, Department of Mechanical Engineering, NEDUET
Engr. M. Mustafa Hussain, Local Council Member, IEP Karachi Centre

Invited Talk on "Entrepreneurship" by Engr. Muhammad Abbas Sajid, Chair of Honors and Awards Committee of ASHRAE Region at Large & Secretary General, Pakistan Society of Plumbing Professionals, Karachi.

Following papers were presented

11.	Environmental and Financial Feasibility of a Solar-Powered Air-Conditioning System for a
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	Passenger Train in Pakistan - Haris Riaz, Muhammad Asim Ghaffar, Salman Aziz, Ahmad Bilal
12.	Investigation of Fluid Elastic Instability Effect on Grooved Tube Heat Exchanger Using In-Line Square Arrangement - Hassan Shawar Shah Muzaffar Ali, Muhammad Ammar Akram, Asif Durez, Fawad Yousaf Malik
13.	Comparative Study for Selection of Suppliers Using MCDM Tools - S. Ali Imran Zaidi, Zaheer Ahmed, S. Jawad Hussain Zaidi., S. Adil Abbas Zaidi
14.	Development and Performance Study of Lab Scale Continuously Stirred Tank Reactor for Biogas Production - Asad A. Zaidi, Abdul Hameed Memon, Rahool Rai, Muhammad Uzair

TECHNICAL SESSION- 3A

A/V CONFERENCING, DEPARTMENT OF MECHANICAL ENGINEERING, NEDUET

TOPIC: "MATERIAL SCIENCE AND NANOTECHNOLOGY FROM ECONOMIC PERSPECTIVE"

Chaired by :

Engr. Dr. Muhammad Shakaib, Professor, Department of Mechanical Engineering, NEDUET

Engr. Dr. Muhammad Muzammil, Assistant Professor, Department of Mechanical Engineering, NEDUET

Engr. Dr. Syed Ali Hasnian Naqvi, Local Council Member, IEP Karachi Centre

Invited Talk on "Improving the Boiler Life Through the Application of Thermal Spray Coating" by Engr. Basit Iqbal Khan, Unit Manager Projects, Fauji Fertilizer Power Company Limited

Following papers were presented

15.	Thermal Analysis of Shell and Tube Heat Exchanger and its Optimization Using Different Materials - Usama Asghar, Abdullah Rafique, Muhammad Talha Aziz, Danyal Iqbal, Aymen Nadeem
16.	Stretching Analysis of Copper Thin Film with BS-8599 v7 RTV Substrate Using Computer Simulations - Shahzaib Nazim, Murtuza Mehdi, Saad Suleman
17.	Performance Evaluation of Multi- Nozzle Pesticide Sprayer with Chain & Sprocket Mechanism - Rahool Rai, Asad Ali Zaidi, Kashif Ahmed, Muhammad Uzair, Ali Mustafa Shah
18.	Material Science in Fitness for Service Assessment of Ageing Engineering Component - Engr. Dr. Muhammad Kashif , Assistant Professor, Center for Manufacturing and Materials, Coventry University, UK

TECHNICAL SESSION- 3B

AUDIO VISUAL HALL, DEPARTMENT OF CIVIL ENGINEERING, NEDUET

TOPIC: "RETROFITTING AND MODIFICATION OF MECHANICAL STRUCTURES AND SYSTEMS"

"REVERSE ENGINEERING PRACTICES AND CASE STUDIES"

Chaired by:

Engr. Dr. Muhammad Wasif, Associate Professor, Department of Industrial and Manufacturing Engineering, NEDUET

Engr. Dr. Muhammad Uzair Yousuf, Assistant Professor, Department of Mechanical Engineering, NEDUET

Engr. Ifrah Asif, Local Council Member, IEP Karachi Centre

Invited Talk on "Reverse Engineering Practices and Case Studies by Engr. Majid Hasan, MD at NKR Engineering (pvt) Ltd.

Following papers were presented

19.	Performance And Emission Analysis of a Diesel Engine Using Diesel Mixtures with Biodiesel and Carbon Nanotubes - Muhammad Sarfraz Ali , Sadia Saleem, Rozeena Aslam, Hamza Akhtar, Muhammad Imran, Talha Nadeem Hassan, Abdul Rehman
20.	Optimization And Performance Analysis of Natural Gas-Based Combined Cycle Power Plant Using Post Combustion Process - Abdul Rehman , Abid Hussain, Muhammad Mubashir Iqbal, Haris Khan, Ahmed Usman
21.	Reduction Of Rework Rates in Manufacturing of Domestic Gas Meters Through the Implementation of DMAIC Methodology - Ifrah Asif, Eylia Jaffery , Syed Muhammad Abbas, Muhammad Ali Arshad, Hammad Ahmed Memon, Syed Shabbir Rehman
22.	Design and Development of Compact Equipment for the Grading of Material Composed of Dry Micro Size Particles - Tariq Jamil, Ghufraan Ullah, M. Saad Jamali , M. Ahmed, Sheikh Fahad Ahmed

THE FOLLOWING POSTER PRESENTATION WERE DISPLAYED:

1	Modeling and Simulation of Cockpit Avionics Mounts and its Optimization Using DOE Approach in ANSYS for Air-Crash Worthiness - Muhammad Alqamah , Mubashir Ahmed, Areeb Bin Azhar, Muhammad Shoaib Mushtaq
2	Multi-scale Modeling and Simulation of Sub Micro Channel Flow for the Cooling of Microprocessors Containing Nanoparticle Induced Refrigerants - Muhammad Huzaifa , Ghulam Fareed, Hamiz Salahuddin, Muhammad Hateem Arif
3	Renewable Energy System Designing and Plant Optimization - Abdul Wahab , Noor Ul Huda, Syed Hammad Ali, Muhammad Shafae Qureshi
4	Techno-Economic Analysis of Renewable Energy Sources in comparison with Hydrocarbon Exploration - Monis Anees , Mohammad Huzaifa khan, Muhammad Ayan Ahmed, Syed Muhammad Sameer Raza
5	Static Aeroelastic Analysis of High Aspect Ratio Composite Wing based on Numerical Methods - Sarosh Mahboob , Muhammad Hassan Khan, Syed Hammad Khalid, Muhammad Asim
6	Design of Steel Structure Gantry for filling of Tank Lorry with Allied Pipeline Works Tayyaba Rahim, Muhammad Taha Irfan, Ubaid ur Rehman, Huzaifa Hussain Qureshi
7	Synthesis and Fabrication of Substrate Bonded PVDF Thin Films, - Arisha Zafar , Zahra Ashfaq, Syed Mujtaba Hasan Kazmi, Syed Umair Anwer
8	Design and Development of a Device to Recover Maximum Energy from Flash Steam Currently being vented from Exhaust of Feed Tanks and Condensate Header Exhaust – - Syed Mubashir Ahsan , Lamia Masroor, Muhammad Yasaa Khan, Hamiz Ali Siddiqui
9	Development of photovoltaic (PV) panel cleaning mechanism - Muhammad Suleman Saeed , Muhammad Danish Khan, Abdul Rafay, Haider Khan, Muhammad Ahmad Khan
10	Performance Evaluation of Portable Solar Photovoltaic (PSPV) System - Zeeshan Chaudry , Muhammad Talha Nasir, Taha Ahmed Khan, Muhammad Rafay Khursheed

11	Experimental Investigation of Solar Thermal Desalination Unit - Muhammad Khizar Arif, Owais Uddin, Muhammad Uddin, Shahzaib Sajid
12	Feasibility of using supercritical CO2 cycle for a 660 MW Coal Power Plant - Muhammad Shariq Shamsi, Faizan Zafar Siddiqui, Shahzaib Naseeb, Osama Ahmed
13	The characterization and Mother-Physical property investigations of SiO₂ /R-600 Nano-refrigerants - Muhammad Bilal Jamil, Junaid Ahmed, Osama Abdul Majid, Abdul Wahid
14	Design of a Hybrid Powered (Solar PV and Electric) Shuttle for reducing Carbon Footprint - Muhammad Daniyal Khan, Asim Ramzan, Faraz Amir, Irfan Samad
15	Utilization of Sawdust Ash (Carpentry Waste) as supplements of cements in concrete and study its Mechanical Properties. - Muhammad Ashar, Abdul Arham Khan, Muhammad Usman, Muhammad Ubair Hussain
16	Design A Conventional HVAC System For A Shopping Mall In Comparison With Green Building Design. - Muhammad Umar, Saqib Shah Afridi, Hammad Hussain, Hamza Iftiqar
17	Prospects of Photovoltaic (PV) Application in Unregulated Building Rooftops in Karachi, Pakistan - Muhammad Ibtisam Nasih, Abdul Rafay, Aun Abbas Majoka, Syed Ali Turab
18	Performance enhancement of Solar Thermal System integrated with PCM - Ali Jahangir, Muhammad Talha, Qazi Muhammad Fayyaz, Syed Abdullah
19	Prospects of Photovoltaic (PV) Application in Unregulated Building Rooftops in Karachi, Pakistan Muhammad Ibtisam Nasih, Abdul Rafay, Aun Abbas Majoka, Syed Ali Turab
20	Implementation of Lean Six Sigma Manufacturing tools on shocks and struts plant - Syed Yashal Ahmed, Nasr Haider Qari, Muhammad Hassan Nafees, Syed Muhammad Huzaifa
21	Design and Fabrication of Emergency braking system in Four-Wheeler - Hamza Ejaz, Ahmed Abdullah, Nouman Mustafa,

The Technical Sessions were attended by large number of Engineers, Professional and Students and was very much appreciated.

CLOSING SESSION

The Closing session started with recitation of Holy Quran at 3:30 pm and was conducted by Engr. Bushra Fatima, Faculty Member, Department of Mechanical Engineering, NEDUET

Engr. Farhat Adil, President, The Institution of Engineers Pakistan was the Chief Guest and Engr. Muhammad Abbas Sajid, Chair of Honors and Awards Committee of ASHRAE Region at Large, Secretary General, Pakistan Society of Plumbing Professionals, and General Secretary NED International Alumni Network Association was Guest of Honour at the Closing Session.

The Conference highlights was presented by Engr. Prof. Dr. Mubashir Ali Siddiqui, Chairman, Department of Mechanical Engineering, NED University of Engineering and Technology and Co-Convener, 12th IMEC 2023.

A keynote presentation was presented in the Closing session of 12th IMech-2023 by Engr. Zia Ahmed Abbasi, Head Inspection at National Refinery Limited on “**Cnergyico Refinery - Story of Success.**”

Engr. Farhat Adil, President, IEP, Chief Guest of the Closing Session presented his address on the occasion and appreciated the efforts made for this conference by the All members of Organizing Committee, particularly, Engr. Sohail Bashir, Chairman, IEP Karachi Centre, Engr. M. Farooq Arbi, Secretary, IEP Karachi Centre for their entire efforts.

Engr. Prof. Dr. Sarosh Hashmat Lodi, Vice-Chancellor, NED University of Engineering and Technology, also spoke on the occasion and appreciated the efforts made for this conference.

The Conference recommendations were presented by Engr. Dr. Tariq Jamil, Assistant Professor, Department of Mechanical Engineering, NEDUET, and Secretary, 12th IMEC-2023

“Chairman’s Gold Medal for the Best Paper”

Selection Committee comprising of session chairs decided the best paper of the Conference, the Selection Committee decided the best paper award will be awarded to the presenter.

The best paper award was given to **Engr. Shahzaib Nazim** on presenting his paper on **“STRETCHING ANALYSIS OF COPPER THIN FILM WITH BS-8599 V7 RTV SUBSTRATE USING COMPUTER SIMULATIONS”**.

IEP Award for Best Poster presentation by M. Huzaifa, Ghulam Fareed, Hamiz Salahuddin, M Hateem Arif for the best poster presentation entitled **“Multi-scale Modeling and Simulation of Sub Micro Channel Flow for the Cooling of Microprocessors Containing Nanoparticle Induced Refrigerants”** in the conference.

Engr. Sohail Bashir, Chairman, IEP Karachi Centre delivered his address and appreciated the efforts of Engr. Prof. Dr. Muhammad Tufail, Pro Vice-Chancellor, NED University of Engineering and Technology and Convener 12th IMEC-2023, Engr. Prof. Dr. Mubashir Ali Siddiqui, Chairman, Department of Mechanical Engineering, NED University of Engineering and Technology and Co-Convener, 12th IMEC 2022, and Engr. Dr. Muhammad Uzair, Assistant Professor, Department of Mechanical Engineering, NED University of Engineering and Technology and Secretary, 12th IMEC 2023, Engr. Dr. Tariq Jameel, Assistant Professor, Department of Mechanical Engineering, NED University of Engineering and Technology and Secretary, 12th IMEC 2023 for making the arrangements of 12th IMEC 2023, a success.

The Closing Session was attended by a large number of Engineers Professional and Students, Physically as well as online through Zoom.

An E-souvenir was published on the occasion consisting of abstracts of technical papers and messages received from the following dignitaries.

- Honourable Mohammad Baligh-Ur-Rehman, Governor of Punjab
- Honourable Haji Ghulam Ali, Governoer of KPK
- Engr. Syed Murad Ali Shah, Chief Minister Sindh,
- Engr. Prof. Dr. Sarosh Hashmat Lodi, Vice-Chancellor, NEDUET
- Engr. Farhat Adil, President, IEP
- Engr. Sohail Bashir, Chairman, IEP Karachi Centre
- Engr. Asim Murtaza Khan, President, NED International Alumni Network (NEDIAN) Association
- Engr. Amir Zamir Ahmed Khan, Secretary General, IEP
- Engr. Prof. Dr. Muhammad Tufail, Pro Vice-Chancellor, NED University of Engineering and Technology, Karachi and Convener, 12th IMEC 2023
- Engr. Ayaz Mirza, Vice-President,(Mechanical), IEP
- Engr. Prof. Dr. Syed Amir Iqbal, Dean Faculty of Mechanical and Manufacturing, NED University of Engineering and Technology
- Engr. Prof. Dr. Mubashir Ali Siddiqui, Co-Convener, 12th IMEC-2023
- Engr. M. Farooq Arbi, Secretary, IEP Karachi Centre
- Engr. Abdul Raheem, Vice-Chairman (Mechanical), IEP Karachi Centre

- Engr. Muhammad Abbas Sajid, General Secretary, Pakistan Society of Plumbing Professionals and Secretary General, NED International Alumni Network (NEDIAN) Association
- Engr. Dr. Tariq Jamil, Secretary, 12th IMEC-2023

The Conference was highly appreciated by the Chief Guests/Session Chairs/Delegates and participants.

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ENGR. M. FAROOQ ARBI, FIE, PE
Secretary, IEP Karachi Centre
