



# ICMIEE 2024

8<sup>th</sup> International Conference on Mechanical,  
Industrial and Energy Engineering



2 - 4 January 2025



Khulna, Bangladesh



Organized by:  
**Faculty of Mechanical Engineering**  
Khulna University of Engineering & Technology

**8<sup>th</sup> International Conference on Mechanical, Industrial and Energy  
Engineering (ICMIEE 2024)  
02-04 January, 2025, Khulna, BANGLADESH**

## **Introduction and Objective**

Mechanical and allied engineering have made significant contributions to technological advancement. Rapid development in technology can be achieved through continuous research. The Faculty of Mechanical Engineering of Khulna University of Engineering & Technology (KUET), Bangladesh successfully organized the 8<sup>th</sup> International Conference on Mechanical, Industrial and Energy Engineering (ICMIEE2024), continuing its biennial tradition, on 02–04 January 2025 in Khulna, the industrial city of Bangladesh. The main objective of ICMIEE 2024 was to create an effective platform for researchers and technical experts to share their recent ideas, innovations, and problem-solving techniques in the broad fields of Mechanical and allied Engineering. The conference provided a valuable opportunity for both researchers and industrial communities to meet, discuss, and exchange their research outcomes in the fields of Mechanical, Industrial, Energy, Leather, Textile, Mechatronics, and Chemical Engineering.

## **Scope**

### **Mechanical Engineering**

- Aerodynamics
- CFD
- Composite and Smart Materials
- Energy conversion, Storage & Management
- Thermo-fluid
- Fatigue and Fracture
- Fuels and Combustion
- Maintenance Engineering
- MEMS and Nanotechnology
- Noise and Vibration
- Refrigeration and Air-conditioning
- Tribology

### **Industrial Engineering and Management**

- CAD/CAM/CIM
- Operations and Supply Chain Management
- Optimization and Ergonomics

### **Energy Science and Engineering**

- Building Energy Conservation
- Energy Efficiency Management
- Renewable Energy

### **Mechatronics Engineering**

- Automation and Robotics
- Hydraulic and Pneumatic control

### **Textile Engineering**

- Composite and Functional Textile
- Dyeing, Finishing and Printing
- Sustainable Fashion Design

### **Leather Engineering**

- Leather and Footwear Engineering
- Leather Products

### **Chemical Engineering**

- Advances in Chemical Engineering
- Process safety and control
- Waste-to-Energy

### **Related Engineering**

## **Message from Chairman of Organizing Committee**

On behalf of the Organizing Committee, it is with great honor and privilege that I welcome you to the 8<sup>th</sup> International Conference on Mechanical, Industrial, and Energy Engineering (ICMIEE 2024), hosted by the Faculty of Mechanical Engineering, Khulna University of Engineering & Technology (KUET), from January 2-4, 2025. This conference represents a distinguished platform for advancing research, fostering innovation, and facilitating collaborations among scholars and professionals in the fields of mechanical, industrial, and energy engineering.

The ICMIEE has consistently provided a venue for disseminating cutting-edge research and exploring solutions to contemporary challenges. I am confident that this year's conference will continue that legacy by enabling robust intellectual exchange, presenting innovative methodologies, and inspiring transformative research initiatives.

I would like to acknowledge the collective expertise, dedication, and meticulous efforts of the Organizing Committee and its sub-committees. The academic integrity of this event has been greatly enhanced by the Publication Committee's rigorous review processes, ensuring the inclusion of high-quality research papers. The Program Committee has skillfully curated a diverse and enriching technical program, encompassing keynote speeches, technical sessions, and scholarly discussions.

The seamless execution of this conference has been facilitated by the exceptional contributions of the Website, Registration, Venue, Transportation, and Accommodation Committees, among others. Their logistical precision and attention to detail have created a conducive environment for academic exchange. Furthermore, the Publicity and Media Committee has extended the global visibility of ICMIEE 2024, emphasizing its role as a hub for academic and professional interaction. I would also like to extend my appreciation to SciEn Publishing Group for their partnership in ensuring the timely and professional publication of selected conference papers. This collaboration underscores our shared commitment to advancing research dissemination. Finally, I gratefully acknowledge the contributions of our sponsors and institutional partners, whose support has enabled the realization of this event.

As we gather here to exchange ideas, share groundbreaking research, and build connections, I urge all participants to fully engage in the sessions and discussions. Let us collectively push the boundaries of knowledge and innovation to address the pressing challenges in mechanical, industrial, and energy engineering.

**Prof. Dr. Md. Shahidul Islam**

Chairman, Organizing Committee of ICMIEE 2024  
and

Professor, Department of Mechanical Engineering,  
Khulna University of Engineering & Technology, Khulna 9203, Bangladesh

## Message from Chairman of Technical Committee

It is my great pleasure to welcome all keynote speakers, authors, faculty members, industrial personals, and sponsors to the 8th International Conference on Mechanical, Industrial, and Energy Engineering (ICMIEE 2024), hosted by the Faculty of Mechanical Engineering at Khulna University of Engineering & Technology (KUET) scheduled on January 2–4, 2025. This conference serves as a vital platform to present cutting-edge research and foster collaboration across academia and industry.

I extend my heartfelt gratitude to the technical and organizing committees for their tireless dedication in ensuring the success of this event. The Faculty of Mechanical Engineering, comprising interconnected departments, continues to play a pivotal role in advancing research and innovation that align with the themes of this conference.

I also extend my heartfelt gratitude to the reviewers for their invaluable contributions. Your meticulous evaluation of submissions, insightful feedback, and dedication to upholding high academic standards have been instrumental in ensuring the quality and impact of this conference. Your efforts not only elevate the scholarly value of this event but also inspire authors to refine and upgrade their work. Thank you once again for your time, expertise, and commitment to excellence. Special acknowledgment goes to our esteemed publication partner, SciEn Publishing Group, for their invaluable collaboration in disseminating the conference's research outcomes. I also deeply appreciate the generous support from our sponsors, whose contributions have been instrumental in making this event possible.

The technical sessions, keynote presentations, and publication of selected papers will undoubtedly inspire young researchers and industry professionals, contributing to Bangladesh's progress in the global engineering landscape.

May this conference serve as a significant milestone in advancing research and fostering meaningful collaborations across disciplines.

**Dr. A. N. M. Mizanur Rahman**

Chairman, Technical Committee of ICMIEE 2024

and

Professor, Department of Mechanical Engineering,

Khulna University of Engineering & Technology, Khulna 9203, Bangladesh

## Message from Secretary of Organizing Committee

It is my distinct honor and privilege to extend a warm welcome to all participants of the 8th International Conference on Mechanical, Industrial, and Energy Engineering (ICMIEE 2024), hosted by the Faculty of Mechanical Engineering at Khulna University of Engineering & Technology (KUET) from January 2–4, 2025. This conference is a testament to the hard work, dedication, and collective efforts of a remarkable team.

I would like to express my sincere gratitude to the organizing committee and the many sub-committees who have worked tirelessly to ensure the success of this event. The Publication Committee has played a crucial role in ensuring the dissemination of high-quality research. The Website Committee has been instrumental in creating a seamless digital platform for communication and information sharing. The Registration Committee has efficiently managed participant enrollment, while the Venue Committee has meticulously arranged the physical infrastructure.

The Session Committee has curated an enriching program of technical presentations and keynote speeches, while the Accommodation & Tour Committee has gone above and beyond to provide a comfortable experience for our guests. The Transportation & Reception Committee has ensured smooth logistics, and the Publicity, Media & Press Committee has worked tirelessly to highlight the importance and reach of this conference. Lastly, the Refreshment Committee deserves heartfelt thanks for arranging exceptional hospitality.

Special appreciation goes to our esteemed publication partner, SciEn Publishing Group, for their unwavering support in publishing selected conference papers. I also thank our sponsors for their generous contributions, which have made this event possible.

As we convene to exchange ideas, present groundbreaking research, and foster collaboration, I am confident that this conference will leave a lasting impact on participants and advance the fields of mechanical, industrial, and energy engineering.

Thank you all for your contributions to making ICMIEE 2024 a resounding success.

### **Dr. Mohammad Ilias Inam**

Secretary, Organizing Committee of ICMIEE 2024

and

Professor, Department of Mechanical Engineering,

Khulna University of Engineering & Technology, Khulna 9203, Bangladesh

## **Message from Secretary of Technical Committee**

As a Technical Committee Secretary of the 8th International Conference on Mechanical, Industrial, and Energy Engineering (ICMIEE 2024), it is my distinct pleasure to welcome all participants to this international event organized by the faculty of Mechanical Engineering at Khulna University of Engineering & Technology (KUET). This conference stands as a testament to our shared commitment to advancing knowledge, fostering innovation, and addressing critical challenges in Mechanical and its allied engineering fields.

I am immensely thankful to our distinguished keynote speakers and authors for their valuable insights and groundbreaking contributions. I also wish to recognize the reviewers for their meticulous assessments, ensuring the quality of the technical program. Furthermore, the support of “SciEn Conference Series: Engineering” as our publication partner and our generous sponsors has been pivotal to the success of this event.

KUET has long been a hub of innovation and research excellence, and ICMIEE 2024 continues that proud tradition since its first occurrence in 2010. I am confident that this conference will inspire fruitful discussions, foster new collaborations, and pave the way for innovative solutions to global challenges.

### **Dr. Mohammad Sultan Mahmud**

Secretary, Technical Committee, ICMIEE 2024

and

Professor, Department of Mechanical Engineering,

Khulna University of Engineering & Technology, Khulna 9203, Bangladesh

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# 8<sup>th</sup> International Conference on Mechanical, Industrial and Energy Engineering



Khulna, Bangladesh



02-04 January, 2025



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**Faculty of Mechanical Engineering**

Khulna University of Engineering & Technology (KUET)

## Conference Program

**Date: January 02, 2025**

Time	Program
9:30 AM-10:30 AM	<b>Inaugural Ceremony</b> <b>Venue: KUET Auditorium</b> Zoom Link: <a href="https://bdren.zoom.us/j/95367450162">https://bdren.zoom.us/j/95367450162</a> Meeting ID: 953 6745 0162
	9:30 AM   Arrival of Guests
	9:35 AM   Guests take seats
	9:40 AM   Recitation from the Holy Al-Quran
	9:45 AM   Welcome Speech by <b>Prof. Dr. Md. Shahidul Islam</b> Chair, Organizing Committee
	9:50 AM   Speech by <b>Prof. Dr. A. N. M. Mizanur Rahman</b> Chair, Technical Committee
	9:55 AM   Speech by <b>Prof. Dr. Mohammad Sultan Mahmud</b> Secretary, Technical Committee
	10:00 AM   Speech by Chief Guest <b>Prof. Ahsan Choudhuri, Ph.D.</b> Founder of UTEP-Aerospace Center, University of Texas at El Paso, TX, USA
	10:15 AM   Speech by Chief Patron <b>Prof. Dr. Mohammad Mashud</b> Vice-Chancellor, KUET
	10:30 AM   Vote of Thanks by <b>Prof. Dr. Mohammad Ilias Inam</b> Secretary, Organizing Committee
10:30 AM-11:00 AM	Refreshment and Communication Break
	Keynote Session I Chair: <b>Prof. Dr. Md. Kutub Uddin (ME, KUET)</b> Co-Chair: <b>Dr. Md. Samsul Arefin (LE, KUET)</b> Venue: ME 201 Zoom Link: <a href="https://bdren.zoom.us/j/95367450162">https://bdren.zoom.us/j/95367450162</a> Meeting ID: 953 6745 0162
11:00 AM-11:40 AM	<b>Title: Smart Robotics for Personal Care: Enabling a New Era</b> <b>Prof. Dr. Mohammad Habib Rahman</b> <i>Professor and Chair, Department of Mechanical Engineering</i> <i>University of Wisconsin-Milwaukee, USA</i>
11:40 AM-12:20 PM	<b>Title: Fire Safety of Building Façade</b> <b>Prof. Dr. Khalid Moinuddin</b> <i>Executive Director, Institute for Sustainable Industries and Liveable Cities</i> <i>Victoria University, Melbourne, Australia</i>
12:20 PM - 1:00 PM	<b>Title: Impedance Characteristics of User-Friendly Wearable Rehabilitation Robot's Movement</b> <b>Prof. Dr. Md Mozasser Rahman</b> <i>Visiting Professor</i> <i>Eastern Michigan University, USA</i>
1:00 PM-2:00 PM	Lunch Break



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Parallel Technical Sessions	
2:00 PM-3:30 PM	<b>A1: CFD I</b> Paper ID: 93, 111, 160, 170, 176, 180 Chair: <b>Prof. Dr. Khandkar Aftab Hossain (ME, KUET)</b> Co-Chair: <b>Mr. Rubiat Mustak (ME, KUET)</b> Venue: ME 201
	<b>B1: Composite &amp; Smart Materials I</b> Paper ID: 06, 29, 33, 38, 96, 115, 134, 135 Chair: <b>Prof. Dr. Abdul Hasib (ME, KUET)</b> Co-Chair: <b>Mr. Arup Kumar Debnath (ME, KUET)</b> Venue: ME 308
	<b>C1: Energy Engineering I</b> Paper ID: 60, 63, 74, 88, 90, 91, 172 Chair: <b>Prof. Dr. A.N.M. Mizanur Rahman (ME, KUET)</b> Co-Chair: <b>Dr. Md. Shameem Hossain (ESE, KUET)</b> Venue: ME 310
	<b>D1: Textile &amp; Chemical Engineering I</b> Paper ID: 35, 98, 101, 62, 70, 106, 107, 138 Chair: <b>Prof. Dr. Md. Abdus Shahid (TE, DUET)</b> Co-Chair: <b>Dr. Md. Ismail Hossain (TE, KUET)</b> Venue: ME 401
	<b>E1 : Online I</b> Paper ID: 10, 42, 49, 05, 19, 27, 86, 30 Chair: <b>Prof. Dr. Md. Bodiul Islam (GCE, RUET)</b> Co-Chair: <b>Mr. Fahim Islam Anik (ME, KUET)</b> Venue: ME 207 Zoom Link: <a href="https://bdren.zoom.us/j/95367450162">https://bdren.zoom.us/j/95367450162</a> Meeting ID: 953 6745 0162
3:30 PM -3:45 PM	Tea and Communication Break
3:45 PM -5:15 PM	<b>A2: Energy Engineering II</b> Paper ID: 102, 110, 114, 116, 119, 125, 130 Chair: <b>Prof. Dr. Md. Hasan Ali (ESE, KUET)</b> Co-Chair: <b>Md. Mahmudul Alam (ESE, KUET)</b> Venue: ME 201
	<b>B2: Leather Engineering</b> Paper ID: 04, 82, 121, 127, 183, 184 Chair: <b>Prof. Dr. Md. Abul Hashem (LE, KUET)</b> Co-Chair: <b>Dr. Md. Elias Uddin (LE, KUET)</b> Venue: ME 308
	<b>C2: Thermofluid I</b> Paper ID: 36, 40, 59, 79, 95, 108, 139, 151 Chair: <b>Prof. Dr. Abul Mukid Mohammad Mukaddes (IPE, SUST)</b> Co-Chair: <b>Dr. Md. Mahbubur Rahman (ME, KUET)</b> Venue: ME 310
	<b>D2: CFD II</b> Paper ID: 12, 21, 22, 83, 94, 103, 114, 128 Chair: <b>Prof. Dr. Abdullah Al-Faruk (ME, KUET)</b> Co-Chair: <b>Ms. Oishi Kanta (ME, KUET)</b> Venue: ME 401
	<b>E2 : Online II (Composite &amp; Smart Materials)</b> Paper ID: 15, 61, 109, 142, 147, 149 Chair: <b>Prof. Dr. Md. Sanaul Rabbi (ME, CUET)</b> Co-Chair: <b>Mr. Raju Ahammad (ME, KUET)</b> Venue: ME 207 Zoom Link: <a href="https://bdren.zoom.us/j/95367450162">https://bdren.zoom.us/j/95367450162</a> Meeting ID: 953 6745 0162



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**Date: January 03, 2025**

Time	Program
	Keynote Session II Chair: <b>Prof. Dr. Md Mozasser Rahman</b> ( <i>Eastern Michigan University, USA</i> ) Co-Chair: <b>Dr. Md. Abdulla-Al-Mamun</b> (ILET, DU) Venue: ME 201 Zoom Link: <a href="https://bdren.zoom.us/j/97183697333">https://bdren.zoom.us/j/97183697333</a> Meeting ID: 971 8369 7333
9:00 AM-9:40 AM	<b>Title: Soft actuators and sensors using smart soft materials</b> <b>Prof. Dr. Kazuto Takashima</b> <i>Associate Professor, Department of Biological Functions Engineering            Kyushu Institute of Technology, JAPAN</i>
9:40 AM-10:20 AM	<b>Title: Development of Refrigeration and Air-Conditioning Technologies for Use of Next-Generation Refrigerants in Japan</b> <b>Prof. Dr. Akio Miyara</b> <i>Professor, Department of Mechanical Engineering            Saga University, JAPAN</i>
10:20 AM-11:00 AM	<b>Title: Condensation in High-speed Flow Fields</b> <b>Prof. Dr. Miah Md Ashraful Alam</b> <i>Professor, Department of Mechanical Engineering            Osaka Sangyo University, JAPAN</i>
11:00 AM-11:30 AM	Refreshment and Communication Break
	<b>Parallel Technical Sessions</b>
11:30 AM-12:45 PM	<b>A3: Composite &amp; Smart Materials II</b> Paper ID: 54, 128, 157, 159, 166, 168, 182 Chair: <b>Prof. Dr. Md. Ashraful Islam</b> (ME, KUET) Co-Chair: <b>Dr. Mst. Nazma Sultana</b> (IEM, KUET) Venue: ME 201
	<b>B3: Industrial automation &amp; Robotics I</b> Paper ID: 07, 26, 67, 117, 133, 137, Chair: <b>Prof. Dr. Md. Rafiquzzaman</b> (IEM, KUET) Co-Chair: <b>Dr. Md. Saiful Islam</b> (IEM, KUET) Venue: ME 308
	<b>C3: Thermofluid II</b> Paper ID: 46, 57, 99, 154, 156, 161 Chair: <b>Prof. Dr. Md. Mahbubul Alam</b> (ME, CUET) Co-Chair: <b>Mr. Ridwan Mustofa</b> (IEM, KUET) Venue: ME 310
	<b>E3: Online III (Energy Engineering)</b> Paper ID: 14, 16, 53, 73, 87, 112, 126 Chair: <b>Prof. Dr. Dipayan Mondal</b> (ME, KUET) Co-Chair: <b>Mr. Karib Hassan Khan</b> (ME, KUET) Venue: ME 207 Zoom Link: <a href="https://bdren.zoom.us/j/97183697333">https://bdren.zoom.us/j/97183697333</a> Meeting ID: 971 8369 7333
12:45 PM-2:30 PM	Lunch Break / Prayer Break



# 8<sup>th</sup> International Conference on Mechanical, Industrial and Energy Engineering



Khulna, Bangladesh



02-04 January, 2025



Organized by

**Faculty of Mechanical Engineering**

Khulna University of Engineering & Technology (KUET)

Parallel Technical Sessions	
2:30 PM -3:45 PM	<b>A4: Energy Engineering III</b> Paper ID: 92, 144, 145, 146, 150, 169, 175 Chair: <b>Prof. Dr. Md. Anowar Hossain (ME, DUET)</b> Co-Chair: <b>Mr. Rajan Kumar Raha (LE, KUET)</b> Venue: ME 201
	<b>B4: Industrial Automation &amp; Robotics II</b> Paper ID: 32, 81, 141, 158 167, 181 Chair: <b>Prof. Dr. Md. Helal-An-Nahiyen (ME, KUET)</b> Co-Chair: <b>Mr. Priyo Nath Roy (MTE, KUET)</b> Venue: ME 308
	<b>C4: Related Engineering</b> Paper ID: 23, 50, 77, 120, 143, 174, 185 Chair: <b>Prof. Md. Golam Kader (ME, KUET)</b> Co-Chair: <b>Dr. Asief Javed (MTE, KUET)</b> Venue: ME 310
	<b>E4: Online IV (Composite &amp; Smart Materials)</b> Paper ID: 20, 31, 41, 51, 52, 140 Chair: <b>Prof. Dr. Md. Arifuzzaman (ME, KUET)</b> Co-Chair: <b>Md. Shohanur Rahman (MTE, KUET)</b> Venue: ME 207 Zoom Link: <a href="https://bdren.zoom.us/j/97183697333">https://bdren.zoom.us/j/97183697333</a> Meeting ID: 971 8369 7333
3:45 PM -4:00 PM	Tea and Communication Break
4:00 PM -5:15 PM	<b>A5: Online V</b> Paper ID: 17, 129, 155, 177, 178, 179, 186 Chair: <b>Prof. Dr. Mohammad Abdul Jalil (TE, KUET)</b> Co-Chair: <b>Dr. Md. Shakhawat Hossain (TE, KUET)</b> Venue: ME 201 Zoom Link: <a href="https://bdren.zoom.us/j/97183697333">https://bdren.zoom.us/j/97183697333</a> Meeting ID: 971 8369 7333
	<b>B5: Energy Engineering IV</b> Paper ID: 03, 13, 18, 43, 148, 152, 162, 131 Chair: <b>Prof. Dr. Kazi Mostafijur Rahman (ME, KUET)</b> Co-Chair: <b>Dr. Md. Mahmudul Hassan Mondol (ChE, KUET)</b> Venue: ME 308
	<b>E5: Online VI (CFD)</b> Paper ID: 09, 58, 72, 104, 118, 132, 136, 165 Chair: <b>Prof. Dr. Miah Md Ashraful Alam (Osaka Sangyo University, JAPAN)</b> Co-Chair: <b>Md. Mohiuddin (ME, KUET)</b> Venue: ME 207 Zoom Link: <a href="https://bdren.zoom.us/j/7288269634?omn=94671557677">https://bdren.zoom.us/j/7288269634?omn=94671557677</a>
7:00 PM - 9:00 PM	<b>Dinner &amp; Closing Ceremony</b> <b>Venue: Guest House</b>

**Date: January 04, 2025**

Time	Program
9:30 AM-4:30 PM	Local Tour (On Request)