Preface

Research Association of Masters of Engineering is committed to providing a peer reviewed platform to outstanding researchers to exhibit their findings for the furtherance of technology to provide a research forum. We are devoted to continual innovation to better support the wishes of our communities, making sure the integrity of the research we publish, and championing the importance of open research.

ICRAMEN 2021 was a two days event that aimed to showcase state-of-the-art methodologies and technologies in Mechanical Engineering and Nanomaterials. It focused on new ideas and paves the way to disseminate the latest innovations and practices. It facilitates opportunities to network, collaborate, and exchange ideas with renowned leaders, scientists, and researchers in Mechanical Engineering and Nanomaterials. It acts as a crucial platform for industry and academia to foster innovative ideas, theories, frameworks, and applications. ICRAMEN 2021 was encouraged recent and futuristic advancements, challenges, and new strategies in the frontiers of Mechanical Engineering and Nanomaterials.

Dr. C. C. Handa, Professor and Head, Department of Mechanical Engineering, KDK College of Engineering, Nagpur, Maharashtra, India was the Chief Guest of the conference and delivered an inaugural address. Dr. S. A. Khan, Professor, Department of Mechanical Engineering, International Islamic University Malaysia, Kuala Lumpur, Malaysia was the Guest of Honor and Keynote Speaker of the conference and delivered a keynote address on “Recent Advances in Aerospace Engineering”. Several students/research scholar and academicians have presented their research work at ICRAMEN 2021 in the areas of design engineering, thermal engineering and fluid science, material science and nanomaterials, production and industrial engineering. We believe that the knowledge exchanged at ICRAMEN 2021 immensely helps to the researchers working on relevant fields and contributes to the growth of science and technology.

As the coronavirus (COVID-19) spreads worldwide, taking into account the various circumstances of the participants, ICRAMEN was adopted all available social media methods, such as online presentation besides the regular presentation styles (oral & poster). The online presentation session was arranged via ZOOM platform. All authors were participated via in-person presentation at the time of their session on the online platform. Our sincere thanks to the keynote speakers, reviewers, technical and advisory committee members, organizing committee, and all authors for their contribution and making ICRAMEN 2021 a grand success.

Dr. Manoj A. Kumbhalkar
Conference Chair, ICRAMEN 2021
President,
Research Association of Masters of Engineering, India
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Nikhil Jumade, CFD Engineer, Fiat Automobiles, Pune, India

Vednath Kalbande, Assistant Professor, G. H. Raisoni College of Engineering, Nagpur, India
ICRAMEN aims to bring together leading academic scientists, researchers, and research scholars to exchange and share their experiences and research results in the field of Mechanical Engineering and Nanomaterial.

Major Themes
1. Design Engineering
2. Thermal Engineering
3. Production and Industrial Engineering
4. Material Science and Nanomaterials

Topics including but not limited to the following:
- Mathematical formulation and modelling
- Computer aided modelling
- Experimental analysis
- Finite element analysis
- Applied Mechanics
- Automotive Engineering
- Computer aided manufacturing
- Composite and Smart Materials
- Thermal Engineering
- Heat and Mass Transfer
- Industrial and Systems Engineering
- Machinery and Machine Design
- Manufacturing and Production Processes
- Material Science and Processing
- Composite Materials
- Production Technology
- Robotic Automation and Control
- Solid Mechanics
- System Dynamics and Simulation
- Mechanical Power Engineering
- Computational Fluid Dynamics
- Fluid Mechanics and Machinery
- Additive Manufacturing
- Supply Chain Management
- Functionally Graded Materials
- Mechanics of Biological Materials
- Nanomaterials and Alloys
- Nano and Microscale Engineering
- Nanocomposites
- Smart Materials
- Shape Memory Alloys
## LIST OF ACCEPTED PAPERS

### Track 1 - Design Engineering

| Paper Id  | Author(s)                                           | Article title                                                                 |
|-----------|-----------------------------------------------------|-------------------------------------------------------------------------------|
| paper_35  | Neetirajsing Chhasatia, Jitendra Chaudhari and Amit Patel | Ridge Gap Waveguide based band pass filter for Ku-band Application            |
| paper_36  | Shrutika Dahake, Nilesh Awate and Rupeesh Shelke    | Design And Analysis of Release Mechanism Using Shape Memory Alloy for Spacecraft |
| paper_37  | Deepesh Makhiya, Sanjay Jain, Madhusudan Achari and Kunal Ghosh | Aerodynamic analysis of aircraft model using indigenously developed wind tunnel facility |
| paper_38  | Dhairya Raval, Sanjay Jain, Madhusudan Achari and Kunal Ghosh | Design and analysis of smoke flow visualization apparatus for wind tunnel     |
| paper_40  | Saurabh Kumar                                       | Free vibration analysis on axially graded beam resting on variable Pasternak foundation |
| paper_44  | Nitin Sawarkar, K S Zakiuddin, Roshan Umate, Rajkumar Chagde | Application of Jaw Type Flexible Clutches In Human Powered Machines: A Literature Review |
| paper_46  | Surojit Biswas and Priyankar Datta                  | Finite Element Model for Free Vibration Analyses of FG-CNT Reinforced Composite Beams using Refined Shear Deformation Theories |
| paper_51  | Devismita Sanjay, Neeraj Kumar and Souptick Chanda  | Stress-strain distribution in intact L4-L5 vertebrae under the influence of physiological movements: A finite element (FE) investigation |
| paper_54  | Prakash Kumar Sen and Mahesh Bhiwapurkar            | Numerical Simulation and Parametric Analysis of Fatigue Crack in UIC60 Rail Thermite Welded Joint |

### Track 2 - Material Science and Nanomaterials

| Paper Id  | Author(s)                                           | Article title                                                                 |
|-----------|-----------------------------------------------------|-------------------------------------------------------------------------------|
| paper_12  | Satadru Kashyap and Debanil Das                    | Study of effects of weathering on natural fiber composites                     |
| paper_28  | Abhishek Singh and S.C Jayswal                     | Mechanical characterization of TiO2 nanoparticles based on glass fiber reinforced polymer composite |
| paper_30  | Sk Faruque Ahmed, Mohibul Khan andNilohit Mukherjee | Enhancing electrical properties of carbon nanotubes thin films by silicon incorporation |
| paper_33  | Mukesh Thakur and Rohan Senanayake                 | Experimental Analysis using an Innovative Catalytic Converter coated with Nano-particles for Pollution Control from Automobiles |
| paper_39  | Mohd. Anas and Anurag Sharma                       | 2-Dimensional inline system for peppermint oil extraction                     |
| paper_45  | Sourab Shinde, Taukir Momin, Vispi Karkaria and Parshuram Karandikar | Investigation of substitute jar materials for Laboratory grade ball milling machine to process electrode materials for energy storage devices |
| paper_47  | Ujjwal Ks and Dr. Sharath Chandra N                 | A review of wear resistance materials used in power-screw mechanism for aerospace applications |
| Paper Id | Author(s) | Article title |
|----------|-----------|---------------|
| paper_48 | Siva Chakra Avinash Bikkina | Analysis of Electromagnetic Reflection Loss for Mesh Structure with Al6061 MMC for Aerospace Applications |
| paper_52 | Srinu Budumuru | Electromagnetic shielding effectiveness for Al6061 metal matrix composite based mesh wire reinforced with Flyash for oblique incidence of EM wave |
| paper_53 | Sumit Kumar, Praveen Kumar and Rudra Pratap | Reliability Failure in Microelectronic Interconnects by Electric Current Induced Chemical Reaction |

### Track 3 - Thermal Engineering and Fluid Science

| Paper Id | Author(s) | Article title |
|----------|-----------|---------------|
| paper_18 | Shyamal Chakrabarty, Uday Wankhede and Rupesh Shelke | Impact of Non-convective Zone and Lower Convective Zone Thickness on the Performance Characteristics of Salinity Gradient Solar Pond |
| paper_24 | N. Golden Stepha and D. Kavin Jacob | Analysis on physical properties of micropolar nano fluid past a continuously moving permeable plate |
| paper_27 | Ujwal Sontakke and Santosh Jaju | Green Hydrogen Economy and Opportunities for India |
| paper_31 | Ritwik Bhattacharya and Pranab Samanta | Simulation-based Study of Graphene-water Nanofluid flow through Microchannel Heatsink |
| paper_50 | Sunil Gupta, Bb Arora and Akhilesh Arora | Economics-Based Payback and Life Cycle Cost Savings Assessment of Inverter Type Air Conditioners |

### Track 4 - Production and Industrial Engineering

| Paper Id | Author(s) | Article title |
|----------|-----------|---------------|
| paper_4  | Umesh Kumar Vates, Nand Jee Kanu, Eva Gupta, Gyanendra Kumar Singh, Naveen Anand Daniel and Bhupendra Prakash Sharma | Optimisation Of FDM 3d Printing Process Parameters on ABS Based Bone Hammer Using RSM Technique |
| paper_16 | Vijay Kalbande, Chandrashas Handsa, Radheshyam Gajghat and Shitalkumar Rawandale | Development of Online Platform for Checking Placement Capability of Engineering Students |
| paper_23 | Vijay Kalbande, Dr Nitin Manadavgade, Radheshyam Gajghat and Shitalkumar Rawandale | New Approach to Identify Industry Institute Skill Gap of Engineering Students |
| paper_25 | Avez Shaikh, Ajinkya Shinde, Satish Chinchanikar, Guruprasad Zagade and Sonia Purdeshi | Comparative assessment of hard turning under dry and minimum quantity lubrication |
| paper_34 | Rohit Sharma and Ubaid Ahmad Khan | Applying analytical hierarchy process for addressing the agile manufacturing drivers |
| paper_49 | Tanmay Pati, Shruti Kabra and Utkarsh Chadha | Statistical Quality Study of the Parts Produced in an Automobile Industry: A Daimler India Case Study |
Message of Chief Guest

It gives me great pleasure to extend my greetings and warmest wishes to the Research Association of Masters of Engineering for organizing an International Conference on Recent Advances in Mechanical Engineering and Nanomaterials (ICRAMEN 2021) during October 16-17, 2021.

Advances in Mechanical Engineering and nanomaterials are the main area covered by the conference. The growth and transformations of colloidal nanocrystals are a major issue for the creation of functional nanomaterials. In practical terms, knowledge of how to selectively synthesis the required sizes and forms of nanocrystal that would benefit various applications. Interdisciplinary character of research enthuses the current activity in the field of nanomaterials. People from varied backgrounds combine hands to succeed in establishing a simple way of synthesizing and applying heterogeneous nanomaterials.

Despite extensive efforts and evidence that the tuning of various nanomaterials to specific applications may be extremely advantageous, many basic features of complex nanomaterial systems are still poorly understood and empiricism is still widespread.

I am quite sure that this conference will ignite the creative ideas and exchange of knowledge to fill up the gaps in ongoing research on multifunctional nanomaterials.

I once again commend the core organizing team and wish the conference a resounding success.

Dr. C. C. Handa
Message of Guest of Honor

I feel truly delighted to learn that the Research Association of Masters of Engineering e-platform for the scientific community to share their ideas and research by organizing an International Conference on Recent Advances in Mechanical Engineering and Nanomaterials (ICRAMEN 2021) during October 16-17, 2021.

Its subject is fascinating since it focuses on the latest developments in mechanical and nanomaterial engineering. Through the range of discoveries and technologies produced using nanomaterials, we see a silent revolution. Now, nanomaterials and products, including paints, filters, insulation, and lubricant additives, are utilized in several manufacturing processes and medical treatments. There can be no exaggeration that multidisciplinary research now constitutes the foundation of any country's economic success and that humankind directly benefits. The finest examples of multidisciplinary research are nanotechnology and nanoscience.

It is also vital to grasp the underlying fundamental concepts of science, apart from developing applicable technology. ICRAMEN 2021, therefore, takes on particular relevance. I think the attendees will profit immensely.

My congratulations to the organizing team, and I extend my best wishes for its successful completion.

Dr. S. A. Khan
Dr. M. A. Kumbhalkar  
President,  
Research Association of Masters of Engineering

Message of Conference Chair

I am very happy to share that Research Association of Masters of Engineering is organising an International Conference on Recent Advances in Mechanical Engineering and Nanomaterials (ICRAMEN 2021) during October 16-17, 2021.

The fast advancements in technology make the promotion of technical competence in the workforce highly essential nowadays. One of the main problems for scientists is the implementation of their highly specialized research in many domains of human knowledge and interdisciplinary study. This problem must be seen as an opportunity for human resources development in a variety of areas. The other significant problem is to discover how these material advancements may be utilized to better the everyday job and the common person's surroundings. In these recent years there has been a lot of focus to promoting cross-disciplinary research with specific issues in nanoscience and nanotechnology.

I'm confident there will be many intellectually engaging contacts and the presentation of constructive ideas which would benefit a broad spectrum of participants in the conference on current achievements in mechanical engineering and nanomaterials.

I congratulate the team of RAME and extend my best wishes for its success.

Dr. Manoj A. Kumbhalkar
Message of Convener

I am pleased to know that the Research Association of Masters of Engineering is organizing an International Conference on Recent Advances in Mechanical Engineering and Nanomaterials (ICRAMEN 2021) during October 16-17, 2021.

The present requirement of our society is to develop the abilities to address different challenges of individuals with a scientific temperament. Research in nanotechnology covers several fields, which get different information from multidisciplinary sources. Nano research is getting more and more inclusive. I’m delighted that the invited speakers for the event are well-known speakers from around the world.

I am convinced that at this magnificent conference on knowledge the mainstay of nanoscience and nanotechnology will put together the insight and wisdom appropriate to human growth.

I congratulate the Research Association of Masters of Engineering for organizing such event and convey my best wishes for all success.

Dr. R. H. Gajghat
Message of Convener

It gives me immense pleasure to know that Research Association of Masters of Engineering is organising an **International Conference on Recent Advances in Mechanical Engineering and Nanomaterials (ICRAMEN 2021)** during October 16-17, 2021.

The subject of the conference is intriguing since it includes a wide variety of mechanical and nanomaterial characteristics. The emergence of huge potential uses of nanomaterials constantly leads to major societal transformations. The wall of traditional subjects collapses in the modern world and we see the spread of one domain's ideas into the next. The coagulation of thoughts can lead us all to the crossroads when the unity of knowledge from many fields can be noticed.

I am confident that debates and conversations at this e-conference will encourage the younger brains to understand the science and technology of nanomaterials.

My congratulations to the whole organizing team and best wishes for the grand success of the event.

Dr. K. S. Rambhad
Co-Convener Message

As a co-convener of the conference, I take great pride in welcoming the great scientists, academicians, young researchers, and students from all over the world to attend the International Conference on Recent Advances in Mechanical Engineering and Nanomaterials (ICRAMEN 2021) during October 16-17, 2021.

In ICRAMEN 2021 you may obtain insights into the latest technology and research that attracts great interest via the gigantic and enthusiastic presence of experts, young, brilliant researchers and outstanding student populations.

ICRAMEN 2021 aims to bring together a multidisciplinary group of scientists and engineers from across the world to present and exchange insights on the conference's primary subject. It encourages top-tier study and globalizes research on quality in general, thereby increasing the worldwide competition for debates, presentations and attention to recent excellent accomplishments in the field of scientific materials.

We are looking forward to an excellent meeting with great scientists from different countries around the world and sharing new and exciting results. *I express pleasure to complement my team of RAME for their sincere hard work in formulating an excellent programme.*

Nand Jee K.