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IEI EPITOME

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Members in the News

Dr Krishna Nirmalya Sen, FIE
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The XXXIst International Symposium of the ISSA Construction Section on the theme "How to reach Vision Zero in Construction" was held during 8 to 10 June 2022 at Berlin, Germany .

At the Plenary Session, Dr Krishna Nirmalya Sen of L&T Minerals & Metals SBG made a presentation on the impact of **COVID-19 in Construction Industry** and highlighted the steps taken by Larsen & Toubro to effectively deal with the challenges, retaining the workforce and ensuring prompt resumption of construction activities with exemplary initiatives by the leadership team.

Mr Sanjay Garg, FIE
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Awarded "**COVID Workplace Champion**" certificate by "Royal Society for the Prevention of Accidents (RoSPA)", UK in recognition of his expertise, passion and unwavering commitment to keeping clients, colleagues and communities safe during the COVID pandemic on 14 July 2022. Among nearly 300 nominations from different industry sectors and from 19 countries around the Globe efforts of his were found tangible for this award.

Prof (Dr) Omkar Suresh Vaidya, MIE
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He was awarded **TechSaksham Leader 2022** for enabling students towards IR4.0 Technologies in TechSaksham Program — A CSR initiative by Microsoft and SAP in association with Edunet Foundation, Bangalore on 20 June, 2022.

37th Indian Engineering Congress

December 16-18, 2022

Theme : Role of Engineers for Creating a Sustainable & Self-Reliant India

Organised by : The Institution of Engineers (India)

Hosted by : **Tamil Nadu State Centre**

e-mail: **technical@ieindia.org** | website: **www.ieindia.org**

Publication by Members

Books

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Dr Ankan Bhattacharya is one of the **Editors** of the Book titled '**Internet of Things and Data Mining for Modern Engineering and Healthcare Applications**'.

About the Book:

This book focuses on Internet of Things (IoT) and data mining for modern engineering and healthcare applications, recent technological advancements in microwave engineering and communication, and applicability of newly developed solid-state technologies in biomedical engineering and healthcare for day-to-day applications.

The reader will be able to know the recent advancements in microwave engineering, including novel techniques in microwave antenna design and various aspects of microwave propagation. This book aims to showcase various aspects of communication, networking, data mining, computational biology, bioinformatics, biostatistics and machine learning.

Day-to-day applicability of modern communication and networking technologies is a matter of prime concern. This book covers recent trends in solid-state technologies, VLSI and the applicability of modern electronic devices and biosensing devices in bioinformatics and smart healthcare. Furthermore, it showcases the modern optimization techniques in power system engineering and machine design and discusses the role of solid-state engineering in the development of modern electronic gadgets. Societal benefits of microwave technologies for smooth and hustle-free life are also majorly focused areas.

This book will be of high interest to the researchers, academicians, scientists and industrialists as well who are involved in the role of IoT for modern engineering applications.

Features:

- This book features Internet of Things (IoT) and data mining for modern engineering and healthcare applications, recent technological advancements in microwave engineering and communication, and applicability of newly developed solid-state technologies in biomedical engineering and smart healthcare technologies.
- It showcases the novel techniques in Internet of Things (IoT)-integrated microwave antenna design and various aspects of microwave communication.
- It highlights the role of Internet of Things (IoT) in various aspects of communication, networking, data mining, computational biology, bioinformatics, biostatistics and machine learning.
- It reviews the role of Internet of Things (IoT) in solid-state technologies and VLSI and the applicability of modern electronic devices in bioinformatics and healthcare.
- It highlights the role of Internet of Things (IoT) in power system engineering, optics, RF and microwave energy harvesting and smart biosensing technologies.

Co-editors	Bappadittya Roy, Samarendra Nath Sur, Saurav Mallik & Subhasis Dasgupta
eBook	ISBN 9781003217398
hardback	ISBN 9781032108544
paperback	ISBN 9781032323275
DOI	https://doi.org/10.1201/9781003217398
Edition	1st Edition
First Published	2022
eBook Published	30 August 2022
Pages	280
Publisher	Chapman and Hall/CRC, Routledge, Taylor & Francis Group

Publication by Members

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Dr Santosh Kumar is one of the **Editors** of the Book titled '**Biopolymer-Based Food Packaging: Innovations and Technology Applications**'.

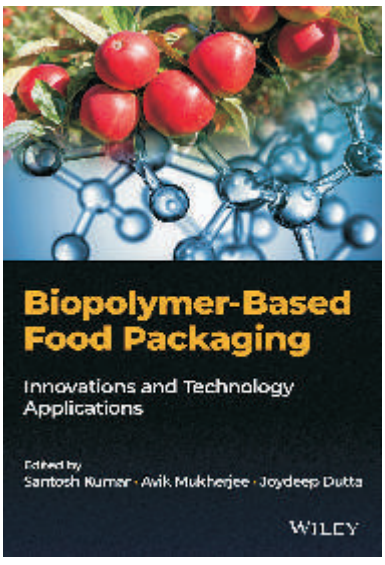
About the Book:

In Biopolymer-Based Food Packaging: Innovations and Technology Applications, a team of accomplished researchers delivers a complete, systematic, and sequential account of the contemporary developments in the application of biopolymers for sustainable food packaging. This book introduces the fabrication, characterization as well as benefits arising from the enhanced functionalities of biopolymer-based food packaging materials.

The authors introduce various polysaccharide, protein, and microbial polymer-based food packaging films and coatings, as well as biopolymer-based blends and nanocomposites. Importance of these materials as active and intelligent food packaging systems is also introduced. Finally, the book explores biopolymer-based edible food packaging, and its efficacy in extending the shelf-life of perishable food items using sustainable materials and processes suitable for the future of circular economies around the world.

Readers will also find:

- A thorough introduction to the incorporation of nanomaterials as fillers to improve the physico-chemical, mechanical, thermal, barrier, optical, and antimicrobial properties of food packaging nanocomposites
- Comprehensive discussions of the use of plant-based bioactive compounds, including essential oils, in biopolymer-based food packaging
- Practical examinations of silver and zinc oxide nanoparticles in food packaging
- In-depth treatments of polylactic acid-based composites for food packaging applications



Biopolymer-Based Food Packaging: Innovations and Technology Applications is an invaluable resource for academic researchers and professionals in food packaging and related industries, as well as research scholars, graduate students, and entrepreneurs working and studying in the field of food preservation, environmental safety, and human health with a focus on the sustainable future.

Co-editors	Avik Mukherjee & Joydeep Dutta
eBook	ISBN 978-1-119-70231-3
Print	ISBN 978-1-119-70225-2
OBook	ISBN 978-1-119-70231-3
DOI	10.1002/9781119702313
First Published	8 April 2022
Publisher	John Wiley & Sons

He is also **Author** of the **Chapters I, II VI, X & XIV** of this Book.

IEI-Springer Journal

Springer

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Publication by Members

Book Chapters

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Book Chapter: Desalination Membrane Management

Pathways and Challenges for Efficient Desalination, Chapter 2, 01 June 2022, pp 18-104, ISBN 978-1-83968-877-5
DOI: 10.5772/intechopen.99723

Abstract: With growing market of membrane technologies the disposal of these spent modules going to be serious issue especially for water industry. Review of status of technologies is briefly highlighted. Keeping this in mind, the various schemes/ protocols can be planned and accordingly exploratory studies have been initiated using AOP based primary techniques such as hydro thermal processes. This chapter presents both the open literature and experimental studies related to spent desalination membranes.

55th ENGINEERS' DAY: 15 September 2022

Theme: Smart Engineering for a Better World

Bharat Ratna Sir M Visvesvaraya

September 15 is celebrated every year in the country since the year 1967 as "Engineers' Day" to commemorate the birthday of the legendary engineer Sir Mokshagundam Visvesvaraya. Sir Visvesvaraya, an eminent Indian engineer and statesman was born in a remote village of Karnataka, the State that is incidentally now the Hi-tech State of the country. Due to his outstanding contribution to the society, Government of India conferred "Bharat Ratna" on this legend in the year 1955. He was also called the precursor of economic planning in India. His learned discourse on Economic Planning in India, Planned Economy for India and Reconstructing India, was the first available document on the planning effort of the country and it is still held as the parent source matter for economic planners. A theme of national importance is chosen every year by the Council of the Institution and deliberated on at its various State/Local Centres to educate the engineering fraternity in general and the society in particular. This year the 55th Engineers' Day will be celebrated all over the country on the theme "Smart Engineering for a Better World".

The 55th Engineers' Day celebration on the theme "Smart Engineering for a Better World" will be celebrated by The Institution of Engineers (India) at its various State & Local Centres to take a stock of various capability and capacity building initiatives undertaken in crucial sectors like road and rail connectivity, drinking water, agriculture, healthcare and nutrition, affordable housing and better governance through induction of smart technologies to achieve Sustainable Development Goals in a phased manner. The societal engineering aspect will also be delved into as it is a deciding parameter in ascertaining the extent of for developing a smart infrastructure of inclusive nature as well as creation of newer job openings. The theme "Smart Engineering for a Better Future" also encompasses issue of environmental sustainability. There is no well established roadmap towards building a smart infrastructure and trying to replicate a generic global template might not work. Such developments are extremely contextual and should reflect challenges, priorities and aspirations at the regional level. The solutions would require synergy between industry, academia and government and should foster an ecosystem where different players can participate and share best practices and develop action plans for switching to a smart infrastructure for a sustainable and prosperous future.

The engineers need to understand that there is tremendous pressure on the existing service infrastructures which are inadequate and not designed to sustain challenges like air pollution, waste management, traffic congestions, effective healthcare and housing for all etc. This will require finding sustainable and inclusive solutions to provide affordable housing, healthcare, nutrition, mass rapid transportation and drinking water especially to the urban populace which may later be replicated in other areas in a phase wise manner.

An interesting commonality in the nature of these challenges is dealing with massive levels of digitization and generation of data. These perceived challenges are veiled opportunities to leverage data science and analytics and thereby induct smart engineering to deal with major global challenges, such as adverse effects of climate change, water scarcity, mixed energy usage, reducing the digital divide among others. The engineering profession is undergoing a paradigm shift with the induction of digitization and emphasis on man-machine interface with induction of logical thinking in machines. Automation and analytics has proved to be decisive and has brought about changes in conceptualization of all major verticals of engineering. Investing in capacity building of smart infrastructure ensuring smart delivery of civic services will serve the broad societal interest with ramifications leading to establishment of effective and accountable governance system congruent to our needs.

As engineers it is important that we adopt smart engineering to leapfrog into new realms in this era of smart engineering for a better tomorrow.

Publication by Members

Papers published in the Journals / Proceedings

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Title of Paper: Do the Environmental Approval Conditions Enable the Best Practice EIA Follow-up and Hence Strengthen the EIA System? An Indian Case Study Analysis

Macro Management & Public Policies, 2022, 4(2), pp 10-19, Online ISSN: 2661-3360

DOI: https://doi.org/10.30564/mmpp.v4i2.4729

Abstract: The environmental approval for a project is generally granted with a set of terms and conditions to the project proponent. The environmental clearance (EC) letters for 33 infrastructure projects were examined for the relevance, adequacy, and enforceability of the EC conditions. Using the basic tenets of the EIA process, it is found that the long list of irrelevant, inadequate, and unenforceable conditions is greenwash and unsuited for best practice EIA follow-up and hence meeting the EIA objectives. The conditions should be directed at measuring the environmental performance of the project to catalyze achieving sustainability targets. The conditions for stringent supervision and frequent inspection of the site activities in the construction phase could help ensure the implementation of the proposed mitigation measures for infrastructure projects. A comprehensive environmental impact assessment framework may use the principles of the ABC analysis to aid prioritize the properly specified EC conditions, resource allocation, and stakeholder engagement for the best practice EIA follow-up and hence strengthen the EIA system.

Keywords: Decision-making, EIA Report, EIA Review, Environmental Clearance, Environmental Clearance Conditions

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Exam Dates for Level C: **September 24 & 30 and October 01, 2022 (0930 – 1730 hrs)**
Exam Dates for Level D: **September 24, 2022 (0930 – 1730 hrs)**
Exam Venue: **Secure and Seamless Online Exam & Assessment**
For more details, please contact:
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Publication by Members

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Title of Paper: Multiobjective Optimization Model for Renewable Energy Sources and Load Demands Uncertainty Consideration for Optimal Design of Hybrid Combined Cooling, Heating, and Power Systems

International Journal of Energy Research, 46(6), 2022, pp 7840–7860

DOI: https://doi.org/10.1002/er.7684

Co-authors: A Prakash & L Umasankar

Abstract: This article proposes a multiobjective optimization model for renewable energy sources (RESs) and load demands uncertainty consideration for optimal design of hybrid combined cooling, heating, and power systems (CCHP). The hybrid CCHP system contains turbine, photovoltaic/thermal collectors, cooler/heater, supply setup, battery, and tank storage. The proposed hybrid method is the joint implementation of Garra Rufa Fish Optimization (GRFO) and Student Psychology Optimization Algorithm (SPOA); hence, it is named GRFO-SPOA approach. An energy converters energy-hub model along storage devices considers the properties of component of offdesign. The uncertainty of solar radiation together with building loads is exhibited at parametric manner and probability distributions. Assuming the uncertainty with system reliability and hybrid CCHP is enhanced to attain the feasible energetic, economic, and environmental benefit utilizing the GRFO-SPOA method. To predict a new set, the GRFO-SPOA method utilizes current datasets in the uncertainty modeling. The decision variables involves capacity of gas turbine and photovoltaic/ thermal collectors, capacity of battery with water storing tank, and operational ratio of heat pump. The proposed method is implemented in MATLAB/Simulink; its efficiency is analyzed with other existing methods, like GA, SSA, and TSA technique. Once the confidence level of the system diminishes as of 0.99 to 0.50, the hybrid CCHP likened with traditional separate production system saves on average 13.7% of main energy and lessens 80% of acid gas emissions carbonic. The annual value saving rate is decreased because the confidence level of the system decreases and the uncertainty maximizes. The sensitivity analysis of the economist frontiers is executed on key economic parameters; therefore, it is obtained as an outcome of annual value saving rate is very sensitive to the value of fossil fuels, and the value of inversion of the star collectors has a stronger impact than that of turbine. The fist-order statistical evaluation parameters, like mean, median, and SD, at 100 iterations for proposed technique is 0.61038, 0.5317, and 0.00543. Computation time utilizing 100, 150, 200, 250, and 500 trails of proposed technique is 48.1740 seconds, 51.2133 seconds, 71.0483 seconds, 60.00126 seconds, and 57.80132 seconds.

Keywords: Battery and Tank, Energy Converters, Photovoltaic/Thermal Collectors, Storage Devices, Turbine

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- Maintained Continued Professional Development (CPD) at a satisfactory level

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The eligible candidate can submit application in the prescribed format to: **The PE Cell, The Institution of Engineers (India), 8 Gokhale Road, Kolkata 700020**
For any query and assistance, please send email to: pe@ieindia.org

Publication by Members

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Title of Paper: Volume Driven Analysis for House Level Water Supply Assessment in an Intermittent Water Supply System

ISH Journal of Hydraulic Engineering (Taylor & Francis), 2022
DOI: https://doi.org/10.1080/09715010.2022.2098683
Co-authors: C R Suribabua & Nivedita Sivakumar

Abstract: Intermittent water supply (IWS) system delivers the drinking water for a short duration of a day. Customers' satisfaction with such a system highly depends on the volume of water delivered at each house service connection rather than the pressure-dependent flow rate. In most of the systems, the supply is made until emptying of the source storage reservoir or tank happens. The advantaged consumers (who belong to the high-pressure zone) receive water quicker than the disadvantaged consumers. As the IWS has trusted with the volume of water delivered, volume-driven analysis (VDA) is required to understand the supply rate at demand nodes and the actual duration of supply to the consumers located across the network. Supply to each house service connection (HSC) depends on the availability of static pressure at the ferrule points in the distribution main. The aggregated volume of water that can be delivered by the node corresponding to the available pressure requires an equivalent arrangement that represents house service connections (HSCs) in the modeling. In the present work, a modified method of volume-driven analysis is presented to simulate the aggregated flow from the HSCs at each node and to evaluate the actual volume of water delivered within the supply duration. The application of the method is illustrated through a hypothetical rural water supply network. The volume of water that can be received by the group of houses and its duration of supply to fulfill the demanded volume can be obtained from the proposed analysis and also it is shown how the uncontrolled withdrawal of water affects the disadvantaged consumers in the water supply system.

Keywords: Intermittent Water Supply, Drinking Water, Pressure Zone, Volume-Driven Analysis, House Service Connection

IEI AWARDS

CALL FOR PAPERS

The **Steel Authority of India Ltd** (SAIL) has instituted two Awards, namely, **SAIL AWARD** and **DR M VISVESVARAYA AWARD** to be given away every year during the Indian Engineering Congress to author/s of the articles adjudged best on selected topics.
The topics for the year 2022 are given hereunder.

SAIL AWARD

Countering Cyclic Downtrends in Steel Industry

DR M VISVESVARAYA AWARD

Contribution of Indian Steel Sector towards Net Zero Emission by 2070

Intending contributors are requested to send the soft copy of the paper by email to **award@ieindia.org** (with subject heading **Paper for SAIL/Dr M Visvesvaraya Award**) and submit four printed copies of their articles to :

Director (Technical)
The Institution of Engineers (India)
8 Gokhale Road, Kolkata 700 020.

Last date of submission: October 15, 2022
For downloading the template of paper and declaration form, please visit the following link:
https://www.ieindia.org/webui/IEI-Activities.aspx#Call_Papers

Publication by Members

Dr Bhushan Ratnakar Bibwe, MIE
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Title of Paper: Mass Modeling of Guava (cv. Allahabad safeda) Fruit with Selected Dimensional Attributes: Regression Analysis Approach

Journal of Food Process Engineering, 45(3), 2022, e13978

DOI: https://doi.org/10.1111/jfpe.13978

Co-authors: Manoj Kumar Mahawar, Kirti Jalgaonkar, Vijay Singh Meena & Dattatreya M Kadam

Abstract: The correlation between physical parameters of guava like axial dimensions, projected area, volume, and mass is essential for developing postharvest machineries especially grading systems. The present study focused on measuring physical characteristics (dimensions, projected area, and volume) of guava (cv. Allahabad safeda), and the development of predictive linear and nonlinear (linear, quadratic, power, and S-curve) models to determine the mass of guava. The fruits were graded based on the maximum equatorial diameter in three grades that is, large (Φ = 66–75 mm), medium (Φ = 54–65 mm), small (Φ = 43–53 mm), and mass modeling was performed. The model equations were also fitted on ungraded fruits samples for comparison purpose. The major, intermediate, minor intercepts, geometric mean diameter, weight, volume, and criteria projected area of the ungraded lot were 63.76 ± 6.03 mm, 59.90 ± 4.71 mm, 59.66 ± 4.43 mm, 61.05 ± 4.76 mm, 126.80 ± 30.88 g, 132.6 ± 35.0 cm^3, and 33.10 ± 8.17 cm^2, respectively. It was observed that predictions of mass models fitted on ungraded fruit lots were found superior to fitted on individual grades. The higher coefficient of determination (R^2) and low mean relative deviation (MRD) indicated that quadratic models based on geometric mean diameter ($R^2 \geq 0.984$,MRD = 2.32) and ellipsoidal volume ($R^2 \geq 0.986$, MRD = 2.28) can effectively predict the mass of guava fruits. The possible applications of established mass models for developing an integrated and effective grading system and the prospective utilization of graded fruits for processing into a variety of value-added products are also discussed.

Keywords: Physical Characteristics, Mass Prediction, Quadratic Model, Processing, Machine, Development, Value Added Products

Title of Paper: Assessment of Bioactive Compounds, Physicochemical Properties, and Microbial Attributes of Hot Air–Dried Mango Seed Kernel Powder: An Approach for Quality and Safety Evaluation of Hot Air–Dried Mango Seed Kernel Powder

Food Analytical Methods, 2022

DOI: https://doi.org/10.1007/s12161-022-02318-y

Co-authors: Ajinath Dukare, Mahesh Kumar Samota, Sandeep Dawange, Manoj Kumar & José M Lorenzo

Abstract: The presence of carbon and nitrogenous compounds in mango processing by-products makes them excellent substrates for the biosynthesis of many microbial metabolites using fermentation processes. Pretreatment of the substrate with retention of crucial growth supporting compounds is vital for designing and optimizing fermentation media for enhanced production of desired metabolites. The present study investigated the effect of hot air drying (HAD) (50, 60, 70, and 80°C) on the bioactive compounds, physio-chemical and mineral profile, fermentable sugar, and microbial safety of mango (cv. chausa) seed kernel powder. Results indicated that different drying temperatures non-significantly ($P<0.05$) affected the carbohydrates, starch (except at 60 and 80°C), nitrogen, and protein content. The pH (except at 70°C), total phenolics, and antioxidant activity decreased with an increase in drying temperatures. Inductively coupled plasma–optical emission spectrometry (ICP-OES) analysis revealed the increase in concentrations of majority minerals with incremental drying temperature. The microbial load of powdered seed kernel after 30 days of room temperature storage was within safe limits, as samples were devoid of food pathogens. Briefly, the study suggests HAD (at 70–80°C) to convert mango kernels into stable powdered form for prolonged storage. The powdered kernels can be utilized in diversified food industry and as a feedstock (with safe storability, preserved bioactive, mainly carbon and nitrogen compounds) for biosynthesis of valuable metabolites via microbial fermentation route.

Keywords: Mango Seed Kernel, Convective Hot Air Drying, Carbohydrates, Bioactive Compounds, Mineral Profile, Microbial Safety

Publication by Members

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Title of Paper: A Critical and Recent Developments on Adsorption Technique for Removal of Heavy Metals from Wastewater —A Review

Chemosphere, 303(2), 2022, 135146, ISSN 0045-6535

DOI: https://doi.org/10.1016/j.chemosphere.2022.135146

Co-authors: Saravanan Rajendran, P Senthil Kumar, Tuan K A Hoang, Karthikeyan Sekar, Kar Yeen Chong, Kuan Shiong Khoo, Hui Suan Ng & Pau Loke Show

Abstract: This review provides a quantitative description of the nano-adsorbent processing and its viability against wastewater detoxification by extracting heavy metal ions. The impact of nano-adsorbent functionalities on specific essential attributes such as the surface area, segregation, and adsorption capacity were comprehensively evaluated. A detailed analysis has been presented on the characteristics of nanomaterials through their limited resistance to adsorb some heavy metal ions. Experimental variables such as the adsorbent dosage, pH, substrate concentration, response duration, temperature, and electrostatic force that influence the uptake of metal ions have been studied. Besides, separate models for the adsorption kinetics and isothermal adsorption have been investigated to understand the mechanism behind adsorption. Here, we reviewed the different adsorbent materials with nano-based techniques for the removal of heavy metals from wastewater and especially highlighted the nano adsorption technique. The influencing factors such as pH, temperature, dosage time, sorbent dosage, adsorption capacities, ion concentration, and mechanisms related to the removal of heavy metals by nano composites are highlighted. Lastly, the application potentials and challenges of nano adsorption for environmental remediation are discussed. This critical review would benefit engineers, chemists, and environmental scientists involved in the utilization of nanomaterials for wastewater treatment.

Keywords: Heavy Metals, Pollution, Remediation, Nanomaterial, Adsorption Kinetics, Adsorption Model

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Title of Paper: Machinability Studies on the Turning of Magnesium Metal Matrix Composites

Archives of Metallurgy and Materials, 67(3), 2022, pp 939-948, ISSN 1733-3490

DOI: https://doi.org/10.24425/amm.2022.139686

URL: http://imim.pl/files/archiwum/Vol3_2022/17.pdf

Co-author: K S Vijay Sekar

Abstract: Magnesium-based MMCs are widely used in structural-based applications due to their lightweight, high hardness, corrosion and wear resistance. Also, machining is an important manufacturing process that is necessary to ensure dimensional accuracy and produce intricate shapes. In this context, the machining of Magnesium based metal matrix composites is undertaken to study the impact of the cutting parameters on the machinability behaviour. In this work, turning of pure Mg/SiCp on a Lathe is done and an in-depth assessment on the machining forces, machined surface quality, chip microstructure, and tool morphology has been carried out using TiAlN coated tooling insert. The analysis revealed that the thrust force decreased due to the thermal softening of the matrix meanwhile the feed force also followed the similar trend at higher cutting speeds because of the minimized built-up edge and cutting depth whereas principal cutting force was

Publication by Members

inconsistent at higher cutting speeds. The surface finish was better at high cutting speed – low feed combination. The chip microstructure revealed that gross fracture propagation at the free surface and variations in the shear bands have occurred at different cutting speeds. Tool studies using SEM analysis revealed wear modes like chipping and built-up edge at low cutting speeds, but with a reduced impact at intermediate cutting conditions, whereas abrasion wear was observed predominantly in the tool nose at higher cutting speeds.

Keywords: Mg-SiCp Composite, Cutting Forces, Surface Quality, Chip Microstructure, Tool Morphology

Title of Paper: Influence of Cutting Parameters on End Milling of Magnesium Alloy AZ31B

Materials Today: Proceedings, 62(2), 2022, pp 933-937, ISSN 2214-7853

DOI: https://doi.org/10.1016/j.matpr.2022.04.075

Co-author: K S Vijay Sekar

Abstract: Magnesium alloys are having the characteristics like light weight, wear, and corrosion resistance. Mg alloys find usage in a wide range of applications such as engine block of automobile parts, laptop cases, aircraft fuselages and mobile outer cases. However, in dry machining, many challenges restrict its development during fitment. In this research work, conventional vertical milling machine was used to conduct end milling operation on Mg AZ31B alloy with coated carbide insert. End milling operations were performed by varying spindle speed, feed per tooth, and constant cutting depth. The chip morphology and tool chip interface temperature were investigated for various cutting conditions. Also, feed force (F_x), thrust force (F_y) and cutting force (F_z) was analyzed to understand the proper material deformation characteristics.

Keywords: Machining, Milling, Mg Alloy, Machining Forces, Chip Morphology, Temperature

Title of Paper: Investigation on the Effect of TiN and Al_2O_3 Coated Tools in the Machining of Ti-6Al-4 V Alloy

Materials Today: Proceedings, 62(2), 2022, pp 920-924, ISSN 2214-7853

DOI: https://doi.org/10.1016/j.matpr.2022.04.071

Co-author: K S Vijay Sekar

Abstract: Machinability studies on hard-to-cut material is very important to understand how to achieve better tool life and select optimal cutting parameters. This paper investigates the chip formation, cutting force, thrust force, temperature, and tool wear when machining Ti-6Al-4 V by comparing two different coated inserts. TiN and Al_2O_3 coated tools were used for this study and their performance was evaluated in the turning process by varying the cutting speed and feed rate at constant depth of cut. The cutting temperature of Al_2O_3 coated tool at chip-tool interface was found higher than TiN coated tool. However, Al_2O_3 produced lesser cutting forces as well as sustained tool life at 52.46 m/min and 0.2 mm/rev.

Keywords: Machining, Ti Alloy, Cutting Force, Tool Wear, Chip Formation, Temperature

Title of Paper: Cutting Forces and Tool Wear Studies on Machining of Hastelloy X

Materials Today: Proceedings, 62(2), 2022, pp 852–857, ISSN 2214-7853

DOI: https://doi.org/10.1016/j.matpr.2022.04.049

Co-authors: K S Vijay Sekar, G Ram Goutham, P Ponsuganth Elangovan & N Naresh Babu

Abstract: Hastelloy based nickel materials are hard to cut category due to their properties like high strength during elevated temperature and excellent stress corrosion resistance. The machinability of such alloy is very much essential during fitment meanwhile tool wear need to be considered with utmost care. This study focused on turning operation of Hastelloy X using different cutting tools under dry conditions with different sets of cutting speeds and feeds. The impact of input cutting conditions on tool wear have been investigated experimentally with three different cutting tools. The turning operation was carried out at two different feeds 0.111 & 0.127 mm/rev and three different cutting speeds 23.86, 37.69 & 57.80 m/min with three different tool inserts. The cutting tool inserts involve an uncoated carbide tool and two coated carbide tools with Titanium Aluminium Nitride (TiAlN) coating and Titanium Nitride (TiN) coating. Optical microscopy and machine vision system were employed to analyze the crater and flank wear. The cutting forces were monitored for different conditions with lathe tool dynamometer. TiAlN coated insert shown better response when compared with other two inserts.

Keywords: Machining, Hastelloy X, Tool Wear, Feed Rate, Cutting Speed

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Title of Paper: An Efficient Authentication and Key-Distribution Protocol for Wireless Multimedia Sensor Network

Indonesian Journal of Electrical Engineering and Computer Science, 27(1), 2022, pp 347-354, p-ISSN: 2502-4752, e-ISSN: 2502-4760
DOI: http://doi.org/10.11591/ijeecs.v27.i1.pp347-354
Co-author: Sangappa Ramachandra Biradar

Abstract: To provide security and privacy for multimedia data transmission, efficient techniques for authorizing and authenticating network users and nodes are required. These challenges have made it a vital and significant area of research in the present decade. Due to resource constraints, existing systems are unable to provide adequate protection against vulnerable behaviors and security assaults such as black-hole, Sybil, man-in-the-middle, and other similar attacks. In this paper, an effective enhanced engineered cementitious composites (ECC) and crypto-basedauthentication with a key exchange mechanism is proposed. The method boosts the effective authentication mechanism and reduces the number of vulnerable activities in the network. The simulation results demonstrate that the suggested technique is robust to malicious assaults and performs mutual authentication efficiently. A cost-benefitanalysis validates that the processing, communication, and storage requirements are much reduced when compared to existing approaches. Furthermore, an informal security analysis demonstrates that the suggested protocol is secure and adaptable to real-time scenarios.
Keywords: Attack Authentication, Key-exchange, Multimedia, Privacy, Wireless Multimedia Sensor Network

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Title of Paper: Fire Resistance of RCC T-beam Under CyclicLoad: A Numerical Study

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DOI: https://doi.org/10.1007/978-981-19-1862-9_67
URL: https://link.springer.com/chapter/10.1007/978-981-19-1862-9_67
Co-authors: Dibya Jyoti Basu & Debasish Bandyopadhyay

Abstract: Fire hazards of RCC bridges and their failures in recent years have warned to check the effect of fire on the structural members, which is very often overlooked in popular design codes. Bridgefire occurring below the superstructure can severely hamper its strength, durability, and further stability. Hence, it is very essential to study the fire resistance of the RCC structural members of bridge-like lifeline structures. This present study aims to develop a thermomechanical model of a simply supported RCC T-beamrepresenting real-life bridge girders. The model is based on at ransient heat-transfer analysis and a coupled temperature–displacement analysis. The cross-sectional temperature of the RCC T-beam is determined following the heat transfer analysis. Higher temperature changes inside structures demonstrate stress redistribution; leading to a rapid deterioration in strength, stiffness, and service life. The second part of this paper aims to analyze the variations in stress on the material fibers due to fire exposure. The changing nonlinear cross-sectional temperature distribution of a bridge girder during the fire exposure may cause it to experience distress in form of thermal cracks. This study also includes the effects of repetitive loading on the T-beam subjected to concrete damage adopting the Concrete Damaged Plasticity (CDP) model for illustration of flexural damage pattern. The entire Finite Element Analysis (FEA) has been carried out using the commercial FEA package ABAQUS. The present study assumes importance as one of the first attempts made to assess the fire resistance of RCC bridge girders.
Keywords: ABAQUS, Coupled Temperature–Displacement Analysis, FE Analysis, Heat Transfer Analysis, RCC T-Beam

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Title of Paper: **Conversion of Waste Plastic into Valuable Fuel by Simple Pyrolysis Process**

Bulletin Monumental, 23(07), 2022, pp 54-60, e-ISSN 0007-473X

DOI: https://doi.org/11.37896/BMJ23.07/5307

Co-authors: S Godwin Barnabas, K Arun Vasantha Geethan & Vijay Ananth Suyamburajan

Abstract: Storage of plastic waste is a very tedious and to the dangerous environment. These plastic wastes does not have the property of decomposition. About 300 million tons of plastic is produced globally each year. Only about 10 percent of that is recycled. Of the plastic that is simply trashed, an estimated seven million tons ends up in the sea each year. So the only way to reduce the plastic waste is by recycling or reusing it. So we are going to reuse the plastic waste and convert them into fuel by a pyrolysis process. In this process the plastic waste is burnt in a closed container and then the gas coming from the burnt plastic is condensed into liquid which can be used as fuels. Even the plastic slag left back in the container can be used in casting and foundry process. This method helps to save the environment from unwanted plastic waste and produces fuels like kerosene, diesel and other petroleum products in a cost efficient way. So establishing this method in a large scale will reduce the deposition of plastic wastes all around the world.

Keywords: Environment, Decomposition, Pyrolysis, Foundry, Deposition

Title of Paper: **New Green Manufacturing Model for End of Life of Automotive Components using Fuzzy Approach**

Positif Journal, 22(07) 2022, pp 236-241, ISSN 0048-4911

DOI: https://doi.org/10.37896/psj30.7/1215

Co-authors: S Godwin Barnabas, K Arun Vasantha Geethan & T Selvasundar

Abstract: The car becomes a commercial product because most of the cars are recycled. Almost 3/4th of the vehicles weight is recycled. Also the end of life cycle process makes the process faster. The material consumption rate for the automotive industry makes its more inspiring. This paves the way of forming the new cycling model for the shredding facility and improving the performance of the recycling process. The new model of recycling shows the gap in identifying the best practise and the betterment of recycling rate.

Keywords: End of Life Cycle, Consumption, Recycling Process, Performance

Title of Paper: **Vital Role of Recent Technologies in Sorting Different Solid Waste Materials in Recycling Process**

Fresenius Environmental Bulletin, 31(05), 2022, pp 5271-5280, ISSN 1018-4619

URL: https://www.prt-parlar.de/download_feb_2022/

Co-authors: Arun Vasantha Geethan Kathiresan, Godwin Barnabas Solomon & Vijay Ananth Suyamburajan

Abstract: This paper aims to highlight the importance of recycling in the present situation. The need of recycling is carried out by analyzing there cycling rate in a globally in a statistical man nerusing Minitab 19.From the analysis the need to maximize the recycling rate with the support of computer vision approaches such as Pre-trainedVGG-16 (VGG16),AlexNet, Support Vector Machine (SVM), K-Nearest Neighbour (KNN) and, Random Forest (RF) and other modern technologies are studied. From the real time studies it was observed that these trained models has accuracy more than 90% compared to the conventional .The computer vision approach is the most efficient way to sort out the recycled materials from the waste collected yard. These trained models and kits has around 400 images database to classify the waste such as plastic, rubber, metal. This sorting model is useful for the local government officials and in there cycling process. Similarly some of the decisions related to check the significance level from the mean values using Minitab 19 statistical software.

Keywords: Computer Vision, Models, Database, Sorting Model,Accuracy, Decision

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Title: **An Experimental Evaluation of the Shear and Impact Strength of Retempered Concrete made with Manufactured Sand and Silica Fume**
Authors: **Kiran M Mane** & **Abhay M Joshi**
D Y Patil College of Engineering and Technology, Kolhapur, Maharashtra
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Government Engineering College, Haveri, Devagiri, Karanataka
DOI: https://doi.org/10.1007/s40030-022-00654-0
Publication date: 06 June 2022
Pages: 707–715

Title: **Analysis of Foaming Properties of Mango Pulp for Foam-mat Drying: Impact of Egg Albumin Concentration and Whipping Time**
Authors: **Aman Kumar** & **Palani Kandasamy**
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DOI: https://doi.org/10.1007/s40030-022-00661-1
Publication date: 13 July 2022
Pages: 717–724

Title: **Cost Analysis of Functional Retrofitting Measures in Buildings**
Authors: **Sushil Kumar Solanki**, **Rishabh Rastogi** & **V K Paul**
School of Planning and Architecture, New Delhi
DOI: https://doi.org/10.1007/s40030-022-00653-1
Publication date: 04 July 2022
Pages: 725–732

Title: **Development of Mixture Design of Pervious Concrete with Changing Coarse Aggregate Size**
Authors: **Tejas Joshi** & **Urmil Dave**
Civil Engineering Department, School of Engineering, Institute of Technology, Nirma University, Ahmedabad, Gujarat
DOI: https://doi.org/10.1007/s40030-022-00660-2
Publication date: 12 July 2022
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Authors: **Maninder Singh**, **Babita Saini** & **H D Chalak**
Department of Civil Engineering, National Institute of Technology, Kurukshetra, Haryana
DOI: https://doi.org/10.1007/s40030-022-00658-w
Publication date: 22 June 2022
Pages: 747–765

Title: **Flexural Behaviour of Concrete Composite Slabs with Different Configurations of Truss Type Shear Connectors**
Authors: **A Kanchanadevi**, **K Ramanjaneyulu** & **V Srinivas**
CSIR-Structural Engineering Research Centre, Taramani, Chennai, Tamil Nadu
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Publication date: 11 July 2022
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DOI: https://doi.org/10.1007/s40030-022-00643-3
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Authors: **T Hemalatha**, **Bhaskar Sangoju** & **P Vasudevan**
CSIR-Structural Engineering Research Centre, Chennai
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Publication date: 06 June 2022
Pages: 797–802

Title: **Investigating the Behavior of Coupled Steel Plate Shear Wall under Cyclic Loading**
Authors: **Behzad Haseli**
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Department of Civil Engineering, National Institute of Technology, Karnataka, Surathkal
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Department of Civil Engineering, Indian Institute of Science, Bengaluru, Karnataka
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Department of Geology, Aligarh Muslim University, Aligarh, Uttar Pradesh
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Authors: **Pinaki Mukherjee**, **Alok Mukherjee** & **Kingshuk Chatterjee**
Government College of Engineering & Ceramic Technology, Kolkata, West Bengal
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Authors: **Reshma Verma**
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Authors: **Jayita Saha**
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Department of Electrical and Computer Engineering, Wayne State University College of Engineering, Farmington Hills, Detroit, MI, USA
DOI: https://doi.org/10.1007/s40031-022-00728-4
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Title: **Improved Direct Torque Controlled PMSM Drive for Electric Vehicles**
Authors: **Ravi Eswar Kodumur Meesala**, **Sivaprasad Athikkal** & **Ranjeev Aruldavid**
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DOI: https://doi.org/10.1007/s40031-022-00720-y
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Title: **Improvement in Fault Tolerant Capability of ST-DTC for Five-Phase Induction Motor using Neural Network**

Authors: **Umakanta Mahanta** & **Bibhu Prasad Panigrahi**
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Pages: 1207–1216

Title: **Increased Energy Harvesting from shaded PV Power Plant using a Fast Converging Fruit fly Algorithm**

Authors: **G Satheesh Krishnan**, **K Sundareswaran** & **Sishaj P Simon**
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Department of Electronics & Communication Engineering, JIS College of Engineering, Kalyani, West Bengal

DOI: https://doi.org/10.1007/s40031-022-00717-7
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Authors: **Jogeswara Sabat** & **Mrutyunjaya Mangaraj**
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DOI: https://doi.org/10.1007/s40031-022-00730-w
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Authors: **Smiti Dey**
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(vi)	Designation	
(vii)	Organization of affiliation	
(viii)	Membership No (please use the prefix F/M/AM as the case may be)	
(ix)	Details of Award/Achievement#	
(x)	Month & Year of Achievement/ Date of Achievement	
(xi)	Supporting Documents/links [which are clearly indicative of the incumbent's achievement(s)]	

 # Reporting of Award of stipend/fellowship at PG/PhD level and awards from esoteric events/communities may be avoided.

Nota Bene

FORMAT FOR PATENT / DESIGNS / TRADE MARKS / GEOGRAPHICAL INDICATIONS BY MEMBERS

A passport size color photograph (scanned image)

(i) Prefix (Er/Dr/Prof)	
(ii) First Name	
(iii) Middle Name (if any)	
(iv) Surname (Last Name)	
(v) Email and Mobile Number	
(vi) Designation	
(vii) Organization of affiliation	
(viii) Membership No (please use the prefix F/M/AM as the case may be)	
(ix) Tick the appropriate BOX	☐ Patent ☐ Designs ☐ Trade Marks ☐ Geographical Indications
(x) Issuing Authority	
(xi) Serial No	
(xii) Patent No	
(xiii) Date of filing (DD/MM/YYYY)	
(xiv) Date of Grant (DD/MM/YYYY)*	
(xv) Patentee	
(xvi) Details of Patent	
(xvii) Term for which the above (ix) has been granted	

** Copy of Certificate of the Grant of Patent*

Nota Bene

FORMAT FOR PUBLICATION(S) BY MEMBERS — PAPERS

A passport size color photograph (scanned image)

(i)	Prefix (Er/Dr/Prof)	
(ii)	First Name	
(iii)	Middle Name (if any)	
(iv)	Surname (Last Name)	
(v)	Email and Mobile Number	
(vi)	Designation	
(vii)	Organization of affiliation	
(viii)	Membership No (please use the prefix F/M/AM as the case may be)	
(ix)	Title of Paper	
(x)	Name of Journal/Proceeding/Technical Volume	
(xi)	Volume No (Not required for Indian Engineering Congress)	
(xii)	Issue No (Not required for Indian Engineering Congress/Annual Technical Volumes of IEI)	
(xiii)	Theme (Only for Technical Volumes of IEI)	
(xiv)	DOI: (Not required for Indian Engineering Congress/Annual Technical Volumes of IEI)	
(xv)	ISSN	
(xvi)	Date of Publication (Date-Month-Year)	
(xvii)	Co-authors (if any)	
(xviii)	Abstract in full	
(xix)	5/6 Keywords	
(xx)	Supporting Documents/links [which are clearly indicative of the incumbent's achievement(s)]	

 # publications in local seminar, conference and symposia will not be accounted

Nota Bene

FORMAT FOR PUBLICATION(S) BY MEMBERS — BOOKS/ BOOK CHAPTERS

A passport size color photograph (scanned image)

(i) Prefix (Er/Dr/Prof)	
(ii) First Name	
(iii) Middle Name (if any)	
(iv) Surname (Last Name)	
(v) Email and Mobile Number	
(vi) Designation	
(vii) Organization of affiliation	
(viii) Membership No (please use the prefix F/M/AM as the case may be)	
(ix) Title of Book	
(x) Title of Book Chapter	
(xi) Book Chapter Number	
(xii) Publisher Details	
(xiii) ISBN	
(xiv) Date of Publication (Date-Month-Year)	
(xv) Co-authors (if any)	
(xvi) About the book (100-150 words)	
(xvii) Supporting Documents (complimentary copies for IEI Headquarters)/links [which are clearly indicative of the incumbent's achievement(s)]	

** accommodate works published in journals/reputed conference proceedings/books for the last one year*

Notification for Advertisement in IEI Epitome

The Institution of Engineers (India) reserves a coveted privilege in being the largest multi-disciplinary professional body of engineers encompassing 15 engineering disciplines with a Corporate membership of over 2.4 lakhs maintaining a national/international presence through hundred twenty five Centres and six Overseas Chapters, Fora's and Organ (Engineering Staff College of India). The Institution has been disseminating the various information through IEI-Epitome and other publications.

We would like to share with you that we are now providing the facility to advertise engineering / technical products/services, information brochure, recruitment notices etc. in our official publication portal IEI Epitome (12 issues-140000 reach online). Besides, IEI Epitome is also uploaded on our website (www.ieindia.org) on a monthly basis and is accessible to all free of cost. Given its immense footprint in the engineering and technical diaspora spanning the globe, IEI with its distinguished heritage of a century provides you the ideal portal to connect with the National and International Engineering and Technical Community at very competitive rates. We invite you to take this unique and privileged opportunity to advertise and communicate your service and product portfolios under our prestigious banner and make us your brand emissaries in your promotional campaigns.

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Date: .....

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Notification for Advertisement in IEI Epitome

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2	Account Number of Beneficiary	005010100002704
3	Account Classification	SB
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5	Branch Code	005
6	The 9 Digit MICR code of the Branch (as appearing on the MICR cheque)	700 211 002
7	IFSC Code of the Bank Branch for RTGS mode	UTIB0000005
8	IFSC Code of the Bank Branch for NEFT mode	UTIB0000005
9	Email ID of Beneficiary for advice of payment by Bank	technical@ieindia.org
10	PAN	AAATT3439Q
11	Name in PAN	The Institution of Engineers (India)
12	GSTIN	19AAATT3439Q1ZR
13	Service Tax Registration Number	AAATT3439QSD027

IEI Industry Excellence Award 2022

Request for Participation

The IEI Industry Excellence Award has been instituted to recognize industry leaders for their innovation, excellence in engineering operations and thereby, to lead their industry in competitive manner. The benchmarks created by the industries in India have included productivity, quality, safety and performance assurance thereby giving India the rightful place in the global markets. Realizing that such industries can provide the leadership to a large number of other industries in the country, it has been considered appropriate by the IEI Council to institute the IEI Industry Excellence Awards in the year 2008.

Applications in specified format (visit link: ***https://www.ieindia.org/webui/IEI-Activities.aspx#industry-excellence-award***) are invited from prospective applicants for IEI Industry Excellence Award 2022. The last date of receipt of application for the Award 2022 is **15 October 2022**. Interested applicants are requested to send their applications (Two hard copies & One soft copy in Pendrive/CD) to the below mentioned address.

The Director [Technical]
The Institution of Engineers (India)
8 Gokhale Road, Kolkata 700 020

Notification for R&D Grant-in-Aid

To promote appropriate technology, assist in building up design & research talents and, most importantly, to help in nurturing potential R&D venture amongst engineering students pursuing Diploma/UG/PG/PhD courses, The Institution of Engineers (India) had instituted the R&D Grant-in-Aid program way back in 2001.

Like every year, the Institution invites applications for the session 2022-2023 for funding industry-oriented R&D projects and research initiatives aimed at improving the life-style of common people from engineering students pursuing full time Diploma/UG/PG/PhD engineering program in AICTE/UGC/NAAC approved Institutions/Colleges/Universities. The application form and guidelines are available in our website **https://www.ieindia.org**. The projects should be carried out under the guidance of faculty members who are Corporate Members of IEI. Membership criteria for student(s), guide(s) and Institution(s) are as follows:

Project Category	Student/Applicant Membership	Guide(s) Membership	Institutional Membership
1. Diploma	Exempted [Membership of Student Chapter is desirable]	AMIE/MIE/FIE	Not Mandatory
2. UG (BE/BTech/ Equivalent)	'Student Member' (SMIE)	AMIE/MIE/FIE	Applicant's Institute should preferably be an Institutional Member with NBA /NAAC Accreditation or valid NIRF Rank
3. PG (ME/MTech/ Equivalent)	AMIE/MIE/FIE	MIE/FIE	Applicant's Institute should preferably be an Institutional Member with NBA /NAAC Accreditation or valid NIRF Rank
4. PhD	AMIE/MIE/FIE	MIE/FIE	Applicant's Institute should preferably be an Institutional Member with NBA /NAAC Accreditation or valid NIRF Rank

The soft copy of the duly filled-up applications (in editable format), as per the pro-forma available in our website **www.ieindia.org**, should be sent through email to **research@ieindia.org** and one printed copy of the same should reach the following address:

Director (Technical)
The Institution of Engineers (India)
8 Gokhale Road, Kolkata 700 020

Applications received in format other than that available on our website will not be accepted. Application should be forwarded through the Guide, Head of the Department or Head of the Institution. Please note that preference will be given to project proposals received from Institutions who are members of The Institution of Engineers (India) and with NBA / NAAC Accreditation or valid NIRF Rank. Kindly go through the guidelines (visit link **https://www.ieindia.org/webui/IEI-Activities.aspx#RnD-Initiative**) carefully before filling up the application.

The grant is not intended for the faculty members who have access to other avenues of research funding. Proposals received will be scrutinized and the recipients of R&D Grant will be informed accordingly.