

# **Optimization Techniques and Recent Innovations in Mechanical Engineering (ICOTRIME 2020)**

IOP Conference Series: Materials Science and Engineering  
Volume 1104

Ghaziabad, India  
11 - 12 December 2020

## **Editors:**

**Sanjeev Kumar  
Vinay Sharma  
Pawan Kumar Arora**

ISBN: 978-1-7138-3398-7  
ISSN: 1757-8981

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

This work is licensed under a Creative Commons Attribution 3.0 International Licence.  
Licence details: <http://creativecommons.org/licenses/by/3.0/>.

No changes have been made to the content of these proceedings. There may be changes to pagination and minor adjustments for aesthetics.

Printed with permission by Curran Associates, Inc. (2021)

For permission requests, please contact the Institute of Physics  
at the address below.

Institute of Physics  
Dirac House, Temple Back  
Bristol BS1 6BE UK

Phone: 44 1 17 929 7481  
Fax: 44 1 17 920 0979

[techtracking@iop.org](mailto:techtracking@iop.org)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2633  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# TABLE OF CONTENTS

OPTIMIZATION OF NPIC CONTROLLER USING GENETIC ALGORITHM .....	1
<i>Aditi Saxena, Jitendra Kumar, Vinay Kumar Deolia</i>	
DESIGN AND ANALYSIS OF NOZZLES FOR PNEUMATIC WINDSHIELD WIPER .....	11
<i>Anirban Sur, Nitin Solke, Sharnil Pandiya, Ketan Kotecha</i>	
ASSESSMENT OF BIOFUEL RESOURCE POTENTIAL, PROSPECTS, CHALLENGES AND UTILIZATION IN ETHIOPIA: SOURCING STRATEGIES FOR RENEWABLE ENERGIES- A REVIEW .....	19
<i>Michael G. Bidir, N.K. Millerjothi, Muiyiwa S. Adaramola, Ftwi Y. Hagos, R.C. Singh</i>	
SYNTHESIS AND CHARACTERIZATION OF K <sub>2</sub> SIF <sub>6</sub> HEXAFLUOROSILICATE.....	29
<i>Vartika S. Singh, S.V. Moharil</i>	
JOINING OF ALUMINIUM TO POLYMER BY FRICTION STIR WELDING: AN OVERVIEW .....	35
<i>S Shankar, A Kaushal, S Chattopadhyaya, P Vilaça, F Bennis</i>	
PREDICTION OF BREAKDOWN HOURS OF LOAD HAUL DUMPER BY LONG SHORT TERM MEMORY NETWORK .....	44
<i>Vaibhav Bisht, Sarthak Kumar, Anil Kumar Agrawal, Mohd A H Siddiqui, Somnath Chattopadhyaya</i>	
DESIGNING AND PROTOTYPING FOR CONSERVATION AND EFFECTIVE UTILIZATION OF WASTE HEAT FROM AIR CONDITIONER .....	50
<i>Amit Choudhari, Aditya Rane, Shamir Talkar, Pawan Rayar, Dhananjay Shukla</i>	
NUMERICAL ANALYSIS OF INERTANCE PULSE TUBE REFRIGERATOR.....	56
<i>Mahmadrafik S. Choudhari, B. S. Gawali, Prateek Malwe</i>	
MATERIAL SELECTION AND DESIGN OF SHELL AND TUBE HEAT EXCHANGER FOR THERMOS-SYPHON STEAM GENERATOR .....	64
<i>Nitin S Solke, Anirban Sur, Mandar Sapre</i>	
INFLUENCE OF LOW-FREQUENCY VIBRATION IN DIE SINKING EDM: A REVIEW .....	76
<i>Laxmi Devi, Kamlesh Paswan, Somnath Chattopadhyaya, Alokesh Pramanik</i>	
DECISION MAKING ON THE MACHINING PARAMETERS OF ELECTRICAL DISCHARGE MACHINED AISI D2 TOOL STEEL BY AHP AND PROMETHEE METHOD.....	90
<i>Rakesh Kumar Patel, Mohan Kumar Pradhan</i>	
POTENTIAL FOR ENERGY SAVING IN MUD WALL CONSTRUCTION.....	97
<i>Subhash Mishra, H.K. Rai, Pradeep Barnwal</i>	
A REVIEW ON 3D PRINTED FORCE SENSORS .....	102
<i>H Choudhary, D. Vaithyanathan, H Kumar</i>	
AN INVESTIGATION INTO MICROSTRUCTURE AND MECHANICAL PROPERTIES OF MARAGING STEEL WELDMENT .....	108
<i>Deepak Kumar Gope, Priyanshu Kumar, Somnath Chattopadhyaya, Gowrishankar Wuriti, Tessy Thomas</i>	
A REVIEW ON LASER BEAM MACHINING PROCESS MODELING AND OPTIMIZATION .....	117
<i>V B Magdum, J K Kittur</i>	

SIMULATION DRIVEN APPROACH FOR DERIVING THE PID PARAMETERS FOR THE CONTROL OF AN ELECTRIC RESISTANCE FURNACE (ERF).....	125
<i>Prabhat Dev, Sidharth Jain, Harish Kumar</i>	
ANALYSIS OF ELASTIC DEFLECTION OF SINGLE POINT CUTTING TOOL AND OPTIMIZATION OF CUTTING SPEED IN TURNING OPERATION BY USING MADM METHOD.....	132
<i>Saurabh Dewangan, Somnath Chattopadhyaya, Amar Sharma, Varun Chaudhary, Ritwik Rohan</i>	
CHARACTERIZATION OF DISSIMILAR FRICTION STIR WELDED JOINTS OF ALUMINIUM ALLOYS BY SIMULATION AND EXPERIMENTATION .....	143
<i>R Kumar, A Kumar, S Chattopadhyaya, U Kumar, D Gope</i>	
INFLUENCE OF LASER POWER AND WELDING SPEED ON DENDRITE STRUCTURE GROWTH OF LOW POWER PULSED LASER WELDED SUPER ALLOY .....	154
<i>Uday Kumar, Somnath Chattopadhyaya, A K Das, Ratnesh Kumar, Shubham Sharma, Kaori Nagai</i>	
LATEST TRENDS IN ADDITIVE MANUFACTURING.....	163
<i>M.V.D Sai Kalyan, Harish Kumar, Leeladhar Nagdeve</i>	
DEVELOPMENT AND ANALYSIS OF MATHEMATICAL MODEL OF CAPILLARY FOR CONVENTIONAL REFRIGERANTS R22, R427A, R407C, R32, R410A.....	177
<i>Animesh Pandey, Akash, Deshdeep Gambhir, Naveen Solanki</i>	
EFFECTS OF MODULUS OF ELASTICITY ON AIRFLOW IN HUMAN RESPIRATORY AIRWAY .....	189
<i>Rakesh Kumar Shukla, Sandeep Tiwari, Ashutosh Kumar</i>	
MECHANICAL CHARACTERIZATION & PHASE EVALUATION OF ODS ALUMINUM ALLOY .....	195
<i>Satyajeet Kumar, Jay Shankar Kumar, Sandeep Tiwari, Sachendra, Om Prakash, Shailesh Kumar Singh</i>	
A COMPARATIVE STUDY OF HAND OPERATED WATER PURIFIER .....	202
<i>Anil Kumar, Shriram Hegde, Shailesh Kumar Singh</i>	
EXPERIMENTAL INVESTIGATION OF WE54 MAGNESIUM RARE EARTH METAL ALLOYS BY AGEING TREATMENT .....	210
<i>Sachendra, Shailesh Kumar Singh, Ujjwal, Satyajeet Kumar, Kuldeep Singh</i>	
A REVIEW ON EXERGY ANALYSIS OF EJECTOR REFRIGERATION SYSTEM.....	215
<i>Sameer Kumar Verma, Satyajeet Kumar, Gulshan Sachdeva</i>	
EXPERIMENTAL INVESTIGATION OF THE AISI H-13 DIE STEEL BY WIRE-CUT EDM.....	224
<i>Ujjwal, Sachendra, Shailesh Kumar Singh</i>	
ASSESSMENT OF ENVIRONMENTAL PERFORMANCES OF SMALL AND MEDIUM SCALE INDIAN INDUSTRIES IN THE CONTEXT OF GREEN SUPPLY CHAIN MANAGEMENT (GSCM) .....	228
<i>Sanjeev Kumar, Somnath Chattopadhyaya, Sandeep Tiwari</i>	
STUDY OF EFFECT OF MACH NUMBER ON COEFFICIENT OF DRAG OF SOUNDING ROCKET BY COMPUTATIONAL METHOD .....	236
<i>Ashutosh Kumar, Rakesh Kumar Shukla, Kushagra S. Gusain, Aakash Sadar</i>	

APPLICATIONS OF SOLAR PHOTOVOLTAIC'S TO POWER STAND-ALONE AREA AND STREET LIGHTING .....	241
<i>Om Prakash, Satyajeet Kumar, Pramod Kumar</i>	
COMPARATIVE STUDY OF ELECTRICAL DISCHARGE MACHINING, ELECTRICAL DISCHARGE DRILLING AND ELECTRICAL DISCHARGE DIAMOND DRILLING OF NIMONIC 75 .....	250
<i>Rajeev Kumar, Somnath Chattopadhyaya, Sanjeev Kumar, G.K. Singh, U.K. Vates</i>	
PERFORMANCE ANALYSIS OF ERS USING R134A - AN EXPERIMENTAL INVESTIGATION (PART 1) – EJECTOR DESIGN AND PERFORMANCE ANALYSIS .....	258
<i>Vikas Kumar, Sandeep Tiwari, Gulshan Sachdeva, Vaibhav Jain, Vishal Mittal, Paras Sharma, Vipin Rajput, Homenidhi Bhardwaj</i>	
PERFORMANCE ANALYSIS OF ERS USING R134A - AN EXPERIMENTAL INVESTIGATION (PART 2) – SYSTEM DESIGN .....	266
<i>Vikas Kumar, Sandeep Tiwari, Gulshan Sachdeva, Vaibhav Jain, Devanshu, Paras Raghav, Ankush Nagar, Uttam</i>	
PERFORMANCE ANALYSIS OF ERS USING R134A - AN EXPERIMENTAL INVESTIGATION (PART 3) – EXPERIMENTAL RESULTS.....	273
<i>Vikas Kumar, Sandeep Tiwari, Gulshan Sachdeva, Vaibhav Jain</i>	
EXERGY ANALYSIS OF HEAT ASSISTED EJECTOR REFRIGERATION SYSTEM USING R1234YF .....	280
<i>Bharat Sharma, Gulshan Sachdeva, Vikas Kumar</i>	
GENERATIVE DESIGN METHOD (GDM) – A STATE OF ART .....	290
<i>Rajneesh Jaisawal, Vandana Agrawal</i>	
THE STUDY OF RECOIL REDUCING COMPACT AIR PRESSURE DEVICE (CAPD).....	298
<i>Abhimanyu Saxena, M Dixit, M Rashid, S C Nigam, S K Singh</i>	
CONTINUAL IMPROVEMENT THROUGH ISO 9001 – AN EVIDENCE BASED AUDIT CONDUCTED IN 200 ORGANIZATIONS.....	307
<i>Karri Naveen, Rohan Senanayake, Chithirai Pon Selvan</i>	
PRECIPITATION BEHAVIOUR OF LOW CARBON MICROALLOYED STEEL.....	311
<i>Harikesh Singh, Ashish Kumar Singh, Zakir Ali Hyderi, M.K. Banerjee</i>	
REVIEW OF RECENT ADVANCEMENTS MADE IN FLEXIBLE ENERGY STORAGE DEVICES .....	322
<i>H Kumar, K Kumar, H K Bhardwaj</i>	

**Author Index**