



UNIVERSITY
of DERBY

ICMR2021 Conference Guide



18th International Conference in Manufacturing Research
7 – 10 of September 2021

Virtual Conference hosted by University of Derby, Derby, UK
Conference Website: www.icmr.org.uk



University of Derby Main Headquarter - Website: <https://www.derby.ac.uk/>

18th International Conference in Manufacturing Research

Incorporating the 35th National Conference in
Manufacturing Research

<i>International Conference in Manufacturing Research (ICMR).....</i>	2
<i>Preface.....</i>	3
<i>Organization and Committees.....</i>	4
<i>ICMR2021 Conference Programme.....</i>	6
<i>Keynote Speakers.....</i>	14
<i>ICMR 2021 Conference Proceeding Front Cover and URL.....</i>	18

International Conference in Manufacturing Research (ICMR)

The International Conference in Manufacturing Research (ICMR) is a major event for academics and industrialists who are engaged in manufacturing research. Held annually in the UK (except 2018 in Sweden) since the late 1970s, the conference is renowned as a friendly and inclusive platform that brings together a broad community of researchers who share a common goal: developing and managing technologies and operations that are key to sustaining the success of manufacturing businesses. For over two decades, ICMR has been the main manufacturing research conference organized in the UK, successfully bringing researchers, academics and industrialists together to share their knowledge and experiences. Initiated as a National Conference by the Consortium of UK University Manufacturing and Engineering (COMEH), it became an International Conference in 2003.

COMEH is an independent body established in 1978. Its main aim is to promote manufacturing engineering education, training and research. The Consortium maintains a close liaison with government bodies concerned with the training and continuing development of professional engineers, while responding to the appropriate consultative and discussion of documents and other initiatives. COMEH is represented on the Engineering Professor's council (EPC) and it organizes and supports manufacturing engineering education research conferences and symposia. Hosts for National Conferences on Manufacturing Research (NCOMR) have been:

1985	Nottingham	1994	Loughborough
1986	Napier	1995	Leicester De Montfort
1987	Nottingham	1996	Bath
1988	Sheffield	1997	Glasgow Caledonian
1989	Huddersfield	1998	Derby
1990	-	1999	Bath
1991	Hatfield	2000	East London
1992	Central England	2001	Cardiff
1993	Bath	2002	Leeds Metropolitan

In 2003 the conference title became the International Conference in Manufacturing Research (ICMR) incorporating the NCOMR. The host universities for ICMR have been:

2003	Strathclyde	2012	Aston
2004	Sheffield Hallam	2013	Cranfield
2005	Cranfield	2014	Southampton Solent
2006	Liverpool John Moores	2015	Bath
2007	Leicester De Montfort	2016	Loughborough
2008	Brunel	2017	Greenwich
2009	Warwick	2018	Skövde, Sweden
2010	Durham	2019	Queen's University Belfast
2011	Glasgow Caledonian	2021	University of Derby

Preface

On behalf of the ICMR2021 organising committee, first and foremost we would like to Thank COMEH for inviting University of Derby to host ICMR2021. We would like to take this opportunity to thank all of the contributing authors for their high-quality papers submitted, the reviewers for their time and constructive comments, the keynote speakers for sharing their research with the delegates and the local organizing committee for their meticulous preparation of the conference. Our thanks go to the Programme Committee members who helped to review papers and ensure the high quality of the conference.

We would like to acknowledge the Institute of Innovation for Sustainable Engineering (IISE) and Research, Innovation and Enterprise Centre at the University of Derby, Derby, UK & Rolls Royce – Derby, UK & FESTO and Siemens in Germany, Ireland and UK & Manufacturing Technology Centre (MTC) at Coventry - UK and Institute of Mechanical Engineering (IMechE), UK for their support to this conference.

The theme of ICMR2021 conference is digital manufacturing. Within the context of Industrial 4.0 and Digital Technology, ICMR2021 will bring researchers, academics and industrialists together to share their vision, knowledge, know-how and experience, and discuss emerging trends and new challenges in the field. The conference includes 12 keynote speeches presented by Mr. Ian Scotts, Rolls Royce, Derby, UK, Professor Yingguang Li, Nanjing University of Aeronautics and Astronautics, China, Dr Nandini Chakavort, Manufacturing Technology Centre (MTC), UK, Professor Richard Hill, University of Huddersfield, UK, Dr Mey Goh, Loughborough University, UK, Professor Agus Budiyo, Indonesia, Professor Konstantinos Salonitis, Cranfield University, UK, Professor Khamis Essa, Birmingham University, UK, Mr. Babak Jahanbani, FESTO and Siemens, Germany, UK and Ireland, Professor Paul Wood, IISE, University of Derby, UK, Dr Madhav Mishra, RISE Research Institutes of Sweden, Sweden, Professor José Paulo Ferreira Lousado, Institute of Viseu, Portugal and Professor Mahmoud Shafik, University of Derby, UK. There are 60 papers presented in the proceedings, representing an acceptance rate of 67%.

We look forward to welcoming you all at Derby and wish that every delegate enjoys the conference.

Mahmoud Shafik & Keith Case

(Editors)

Organization and Committees

Conference General Chairs

Chris Bussell and Warren Manning, University of Derby, Derby, UK

Conference Chair

Mahmoud Shafik, University of Derby, Derby, UK

Conference Secretariat

Uchenna Charles Onyema, University of Derby, Derby, UK

Joanna Atkinson, University of Derby, Derby, UK

Conference Organising Committee

Sabuj Malik, University of Derby, Derby, UK

Stephan Reiff-Marganiec, University of Derby, Derby, UK

Paul Wood, IISE, University of Derby, Derby, UK

Louise Pigden, University of Derby, Derby, UK

Kapila Liyanage, University of Derby, Derby, UK

COMEH Committee

Chair: Professor Andrew Thomas, Aberystwyth University

Deputy Chair: Professor Fayyaz Rehman, Southampton Solent University

Treasurer: Professor Peter Ball, University of York

Secretary: Professor Yi Qin, Strathclyde University

Professor Tim Baines, Aston University

Professor Keith Case, Loughborough University

Professor Kai Cheng, Brunel University

Dr Alan Crispin, Manchester Metropolitan University

Professor James Gao, University of Greenwich

Dr Yee Mey Goh, Loughborough University

Professor David Harrison, Glasgow Caledonian University

Professor Yan Jin, Queen's University Belfast

Professor Mehmet Karamanoglu, Middlesex University

Professor Remy Khalil, Homeodynamic Autonomy Limited

Professor Diane Mynors, University of Sussex

Dr Aydin Nassehi, University of Bristol

Professor Linda Newnes, University of Bath

Professor Sameh Saad, Sheffield Hallam University

Dr Mozafar Saadat, University of Birmingham

Professor Essam Shehab, Nazarbayev University

Professor Konstantinos Salonitis, Cranfield University

Professor Mahmoud Shafik, University of Derby

Dr Peter Thorvald, University of Skövde

Professor Weidong Li, Coventry University

Programme Committee

Dr Muhammad Ajmal Azad, University of Derby
Dr Hany Atlam, University of Derby
Professor Tim Baines, Aston University
Professor Peter Ball, University of York
Professor Keith Case, Loughborough University
Professor Kai Cheng, Brunel University
Dr Rizwan Choudhry, University of Derby
Dr Alan Crispin, Manchester Metropolitan University
Professor Mohamed Darwish, Brunel University
Dr Uchenna Diala, University of Derby
Dr Todor Dobrev, University of Derby
Dr Riyadh Elsaadi, University of Derby
Professor Khamis Essa, University of Birmingham
Professor James Gao, University of Greenwich
Dr Yee Mey Goh, Loughborough University
Professor David Harrison, Glasgow Caledonian University
Miss Yagna Yashpalsinh Jadeja, University of Derby
Professor Yan Jin, Queen's University Belfast
Professor Mehmet Karamanoglu, Middlesex University
Professor Riham Khalil, Homeodynamic Autonomy Limited
Professor Weidong Li, Coventry University
Dr Kapila Liyanage, University of Derby
Professor José Paulo Ferreira Lousado, Polytechnic Institute of Viseu
Dr Saim Memon, London South Bank University
Professor Diane Mynors, University of Sussex
Dr Aydin Nassehi, University of Bristol
Professor Linda Newnes, University of Bath
Mr Sulaiman Alshebli, University of Derby
Mr ThankGod Njoku, University of Derby
Mr Uchenna Charles Onyema, University of Derby
Mr Stephen Pearson, University of Derby
Professor Yi Qin, Strathclyde University
Professor Fayyaz Rehman, Southampton Solent University
Professor Essam Shehab, Nazarbayev University
Professor Konstantinos Salonitis, Cranfield University
Professor Sameh Saad, Sheffield Hallam University
Dr Mozafar Saadat, University of Birmingham
Professor Mahmoud Shafik, University of Derby
Dr Leonardo Stella, University of Derby
Professor Andrew Thomas, Aberystwyth University
Dr Peter Thorvald, University of Skövde

ICMR2021 Conference Programme

Tuesday 7th of September 2021

09:30 – 10:00	<p>Session 1: Conference Opening and Welcome – Charis: Mahmoud Shafik & Sabuj Mallik & Stephen Reiff-Marganec Zoom registration link for Session 1 and 2: https://zoom.us/j/92695617296?pwd=Rm5MZ3Myb1BodE5jSjFsNFhCRVo4Zz09 Meeting ID: 926 9561 7296 Passcode: 225233</p> <p>Mahmoud Shafik ICMR2021 Conference Chair, University of Derby, UK</p> <p>Warren Manning Provost Innovation & Research & Enterprise and ICMR2021 Conference General Chair, University of Derby, UK</p> <p>Chris Bussell PVC and Dean of College of Science and Engineering and ICMR2021 Conference General Chair, University of Derby, UK</p>
10:00 - 12:30	<p>Session 2: Keynote Session – Chair: Mahmoud Shafik</p> <p>Past, Present and Future Rolls Royce Engine Design, Development and Manufacturing Ian Scott, Rolls Royce, UK</p> <p>Future of Digital Manufacturing and Impact on UK Industry - Case Studies Nandini Chakravorti, Manufacturing Technology Centre (MTC), UK</p> <p>New Curing Principles and Technologies in Composite Manufacturing and Cultivating Innovative Talents in Engineering Research Yingguang Li, Nanjing University of Aeronautics and Astronautics, China</p>
12:20	Zoom Photo of Conference Participants
12:30 – 13:30	Lunch Break

13:30 – 15:00	Session 3-A Smart Manufacturing Chair: Andrew Thomas Co-chair: Stephen Pearson Zoom registration links: https://zoom.us/j/92244186168?pwd=WjBuZDEyQXovZDJqSndmMFhzTytEdz09 Meeting ID: 922 4418 6168 Passcode: 165387 Join Room 3-A	Session 3-B Additive Manufacturing Chair: Jose Paulo Lousado Co-chair: Leonardo Stella Zoom registration links: https://zoom.us/j/92244186168?pwd=WjBuZDEyQXovZDJqSndmMFhzTytEdz09 Meeting ID: 922 4418 6168 Passcode: 165387 Join Room 3-B	Session 3-C Machine Processes Chair: Keith Case Co-chair: Mey Goh Zoom registration links: https://zoom.us/j/92244186168?pwd=WjBuZDEyQXovZDJqSndmMFhzTytEdz09 Meeting ID: 922 4418 6168 Passcode: 165387 Join Room 3-C
	New manufacturing process and product developments in metal forming industry using Finite Element modelling and optimization techniques <i>Van Bac Nguyen and Martin English.</i>	A model for manufacturing large parts with Wire Arc Additive Manufacturing technology <i>Vo Thanh Hoang, Grandvallet Christelle and Vignat Frédéric</i>	The Effect of Process Parameters on Surface Roughness During Milling of Aluminum 6061 T6 <i>Sajid Raza Zaidi, Dr. Mushtaq Khan, Dr. Hussain Imran Jaffery and Dr. Salman Sagheer Warsi.</i>
	Introducing Functional Tones for Analysing Action Perception in Manufacturing: explaining what affordances cannot <i>Erik Lagerstedt and Ari Kolbeinsson</i>	An investigation into the exploratory use of additive manufacturing in weir design and open channel flow <i>Robert Benham and Fayyaz Rehman.</i>	Development of a novel system for adaptive machining of near-net-shape components <i>Zhengcai Zhao, Shengtao Lin and Yucan Fu.</i>
	Reverse Engineering Application Instruments and Code Reliability: A Comparative Study of Tools <i>Manaqib Zeeshan and Irfan Anjum Manarvi</i>	Legal Considerations for Using Digital Twins in Additive Manufacturing – A review of the literature <i>Jenny Clementson, Jason Teng, Paul Wood and Chris Windmill</i>	Creep-Fatigue Behaviours of Sn-Ag-Cu Solder Joints in Microelectronics Applications <i>Joshua Depiver, Sabuj Mallik, Emeka H Amalu and Yiling Lu.</i>
	Actuator and Process Development for Vibration assisted Turning of Steel, <i>Martin Schwarze, Carlo Rüger, O liver Georgi, Hendrik Rentzsch and Holger Paetzold.</i>	Analysis of the Porous Structures from Laser Powder Bed Fusion Additive Manufacturing. <i>Chang Jiang Wang, Kevin Hazlehurst, Arun Arjunan and Lida Shen.</i>	Constitutive modelling of mechanical behaviour of laser-based Powder Bed Fusion melted Inconel 718 superalloy over a wide range of strain rates <i>Laura Delcuse, Urvashi Gunpath, Slim Bahi, Alexis Rusinek and Paul Wood.</i>

	Theoretical derivation of mean cutting-point space of grinding wheel. <i>Jumpei Kusuyama, Michinosuke Tanaka, Bima Kawase and Yohichi Nakao.</i>	Mental Workload of local vs remote operator in Human-Machine interaction Case Study <i>Melanie Zimmer, Ali Al-Yacoub, Pedro Ferreira, Ella-Mae Hubbard and Niels Lohse.</i>	Collision-free path planning for efficient inspection of free-form surface by using a trigger probe. <i>Zhengcai Zhao, Yao Li, Yucan Fu and Dawei Ding.</i>
15:00 – 15:30	Coffee Break		
15:30 – 17:00	Session 4-A Information and Knowledge Management_2 Chair: Fayyaz Rahman Co-chair: Hany Atlam Zoom registration links: https://zoom.us/j/98198800543?pwd=QzZjZDFMdjcrVEpEVWpxU3d0VHFUQT09 Meeting ID: 981 9880 0543 Passcode: 196555 Join Room 4-A	Session 4-B Digital Manufacturing Chair: Stephen Reiff-Marganiec Co-chair: Todor Dobrev Zoom registration links: https://zoom.us/j/98198800543?pwd=QzZjZDFMdjcrVEpEVWpxU3d0VHFUQT09 Meeting ID: 981 9880 0543 Passcode: 196555 Join Room 4-B	Session 4-C Robotics and Industrial Automation Chair: Mohamed Darwish Co-chair: Mahmoud Shafik Zoom registration links: https://zoom.us/j/98198800543?pwd=QzZjZDFMdjcrVEpEVWpxU3d0VHFUQT09 Meeting ID: 981 9880 0543 Passcode: 196555 Join Room 4-C
	Supersonic laser deposition of self-lubricating coatings <i>Andrew Cockburn, Nicholas Soane, Martin Sparkes and William O'Neill.</i>	The Cognitive Operator 4.0 <i>Peter Thorvald, Åsa Fasth Berglund and David Romero</i>	Comprehensive Simulation of Cooperative Robotic System for Advanced Composite Manufacturing: A Case Study <i>Manman Yang, Leijian Yu, Cuebong Wong, Carmelo Mineo, Erfu Yang, Iain Bomphray, Ruoyu Huang and Scott Brady.</i>
	An investigation of the formability behaviour of high strength aluminium alloys using different heat assisted forming processes <i>Michael Schmiedt, Julian Schlosser, Wolfgang Rimkus, Robert Schneider and David K. Harrison.</i>	Digital Transformation Challenges in the Manufacturing industry <i>Yasser Abdallah, Essam Shehab and Ahmed Al-Ashaab</i>	A tracking platform solution for autonomous vehicles localization in future smart cities using machine learning <i>Uchenna Charles Onyema, Mahmoud Shafik, Todor Dobrev and James Hardy.</i>
	Constitutive modelling of Laser based Powder Bed Fusion melted Inconel 718 superalloy over a wide range of strain rates <i>Laura Delcuse, Slim Bahi, Urvashi Gunpath, Paul Wood and Alexis Rusinek.</i>	Developing a process for creating an optimised training dataset used to train a deep neural network for object detection. <i>Callum Newman, Laura Justham, Yee Mey Goh and Jon Petzing</i>	An industrial self-learning robotic system platform solution for smart factories industrial applications using machine and deep learning <i>Yagna Jadeja, Mahmoud Shafik, Paul Wood and Leonardo Stella.</i>

	Development of Virtual Emulation Modelling on the Reconfigurable Hot Forming Process and its Digital Twin Implementation Perspectives <i>Belal M Aly and Professor Kai Cheng.</i>	Towards Managing Digital Transformation in Manufacturing Firms – Theoretical Framework <i>Yasser Abdallah, Essam Shehab and Ahmed Al-Ashaab.</i>	Lidar based Multi-robotic Arms Cooperation Strategy for the Printing of 3D Structures <i>Nanya Li, Guido Link, Junhui Ma and John Jelonnek.</i>
	Assessing the Enablers and Barriers to Quality and Supply Chain Management Based Approach to Sustainable Operations in the Manufacturing Context <i>Ali Bastas and Kapila Liyanage</i>	Appropriate assembly instruction modes: factors to consider <i>Nathanael Kuipers, Ari Kolbeinsson and Peter Thorvald.</i>	Unmanned Transportation Applications at first-level Air Infrastructure <i>Veikko Kaurila.</i>
Wednesday 8th of September 2021			
10:00 – 12:30	Session 5: Keynote Session – Chair: Mahmoud Shafik Zoom registration link: https://zoom.us/j/94007903096?pwd=dkd4Zmt3Qoi9SZko3OHYwQndwWEJmOT09 Meeting ID: 940 0790 3096 Passcode: 050732		
	Building Mechatronics Industry in Indonesia: Status, Challenges and Progress Agus Budiyo, SME's, Indonesia		
	Building Digital Manufacturing Capability for a Turbulent Economy Richard Hill, University of Huddersfield, UK		
	Towards Data-Driven Models of Human Behaviour in Collaborative Robotics Mey Goh, Loughborough University, UK		
12:30 – 13:30	Lunch Break		

13:30 – 15:00	Session 6-A Information and Knowledge Management_1 Chair: Sameh Saad Co-chair: Muhammad Ajmal Azad Zoom registration links: https://zoom.us/j/99269007488?pwd=RktqNSthYkxaV092R1VBQjhVN080Zz09 Meeting ID: 992 6900 7488 Passcode: 573744 Join Room 6-A	Session 6-B Product Design and Development_1 Chair: Essam Shehab Co-chair: Rizwan Choudhry Zoom registration links: https://zoom.us/j/99269007488?pwd=RktqNSthYkxaV092R1VBQjhVN080Zz09 Meeting ID: 992 6900 7488 Passcode: 573744 Join Room 6-B
	Reduce, Reuse, Recycle: Visual Re-Representation of Aerospace In-Service Design Engineers' Knowledge to Support Reuse. <i>Emily Carey, Steve Culley and Bruce Allen.</i>	Cost Data Visualisation <i>Leigh Kirkwood, Isidro Durazo-Cardenas, Andrew Starr, Andrew Wood, Zijin Feng, Rayan Bin Taleb, Sultan Alhaydhal and Abdullah Alomran.</i>
	Integration of Operation Technology (OT) and Information Technology (IT) through Intelligent Automation in Manufacturing Industries. <i>Elamvazhuthi K and Mr. Kailash Mk.</i>	A Smart Factory Approach to Mass Producing Customised Healthcare Devices for Patients <i>Urvashi Gunpath, Adam Leighton, Gavin Williams, Paul Wood and Steven Attfield.</i>
	Model interdependencies across a shop floor manufacturing process to understand the origin or occurrence of faults in electrical machine manufacturing. <i>zhar Oswaldo Ornelas, Divya Tiwari, Michael Farnsworth and Ashutosh Tiwari.</i>	An Ultrasonic Piezoelectric Micro Power Generator for Public and Industrial Buildings Application <i>Daniel Floyd and Mahmoud Shafik.</i>
	Research into Early-Stage Identification of Entrepreneurs and Innovators with Development of an Identification Guidance Framework <i>Stephen Robert Pearson and Mahmoud Shafik.</i>	Analysis, Design, Optimisation of an Electromagnetic Energy Harvester <i>Uchenna Diala, Yiling Lu and Amar Bousbaine.</i>
	Development of a New Research Methodology Tool - Pearson Visual Relationship Framework <i>Stephen Robert Pearson and Mahmoud Shafik.</i>	Circular Green Technology and Material for the Tire Industry <i>Elamvazhuthi K.</i>
15:00 – 15:30	Coffee Break	

15:30 – 17:00	Session 7-A Composite Manufacturing Chair: Khamis Essa Co-chair: Saim Memon Zoom registration links: https://zoom.us/j/92199095095?pwd=UT15eEplZWpFYjdWZHFpWUxYeUxqUT09 Meeting ID: 921 9909 5095 Passcode: 131389 Join Room 7-A	Session 7-B Industrial Workshop of EU CoRot Project on Robotic Automation in Smart Manufacturing Chair: James Gao Co-chair: Mohammed Elsouiri Zoom registration links: https://zoom.us/j/92199095095?pwd=UT15eEplZWpFYjdWZHFpWUxYeUxqUT09 Meeting ID: 921 9909 5095 Passcode: 131389 Join Room 7-B
	Understanding Uncertainty in Recycling Carbon Fiber Reinforced Composite <i>Arshyn Meirbekov, Essam Shehab, Akniyet Amantayeva, Aidar Suleimen, Serik Tokbolat and Shoaib Sarfraz</i>	Autonomous Mobile robots in high occupancy Aerospace manufacturing. <i>Lancelot Martin, James Gao, Alister Wilson, Chi Hieu Le and Marcus de Ree.</i>
	Oxide Ceramic Matrix Composites Materials for AeroEngine Applications <i>Georgios Karadimas, Konstantinos Salonitis and Konstantinos Georganakis.</i>	Introduction to the CoRoT Project – Improving the design of flexible and responsive manufacturing systems involving autonomous and collaborative robots. <i>Mohammed Sahnoun (CESI)</i>
	Comparison of manufacturing process for unidirectional metal matrix composite (MMC) in titanium alloy reinforced with continuous silicon carbide (SiC) fibres <i>Luigi Sanguigno, Marcello Antonio Lepore and Angelo Rosario Maligno.</i>	Contribution to autonomous feeding of machining centres using mobile manipulators: uncertainty estimation and strategies to achieve high positioning performances. <i>Jean-Francois Brethé (University Le Havre)</i> A use case of mobile manipulators and software libraries in autonomous machining operations using sensor technologies. <i>Romain Rossi (ESIGELEC)</i>
	A Multi-zoned Self-resistance Electric Heating Method for Curing Irregular Fiber Reinforced Composite Parts <i>Shuting Liu, Yingguang Li, Yingxiang Shen and Yee Mey Goh.</i>	Autonomous Mobile Robots in High Occupancy Aerospace Manufacturing. <i>Lancelot Martin (University of Greenwich and BAE Systems)</i>
	Teresa Purse and Brett Parlour. A generic cost estimating approach for a composite manufacturing process assessment <i>Justyna Rybicka, Teresa Purse and Brett Parlour</i>	Development of data model for use in dynamically simulating manufacturing systems for supervision systems. Mario Gonzalez and Allen He (University of Exeter)
17:00 – 18:00	COMEh Meeting Chair: Andrew Thomas Co-chair: Fayyaz Rahman Zoom links: https://zoom.us/j/93400308831?pwd=SDBuUm00REJKY0FkL3JBL203aVo0Zz09 Meeting ID: 934 0030 8831 & Passcode: 547270	

Thursday 9 th of September 2021				
10:00 – 12:30	Session 8: Keynote Sessions – Chair: Mahmoud Shafik Zoom registration links: https://zoom.us/j/99720386718?pwd=SVZNTETaSIRIc1k1NlZ4RDN0Rnp5dz09 Meeting ID: 997 2038 6718 Passcode: 259345			
	Sustainable manufacturing enabled by Industry 4.0 Konstantinos Salonitis, Cranfield University, UK			
	Advanced Processing Routes for Netshape Manufacturing Khamis Essa, Birmingham University, UK			
	Connected Curriculum: A Siemens / Festo Industry 4.0 Education Partnership Babak Jahanbani, Festo & Siemens, UK and Ireland			
12:30 – 13:30	Lunch Break			
13:30 – 15:00	Session 9-A Decision Support and Production Optimization Chair: Weidong Li Co-chair: Kapila Liyanage Zoom registration links: https://zoom.us/j/95064316075?pwd=c3NYTGRkWkRjbS9vMHRqZ1lhRkhXZz09 Meeting ID: 950 6431 6075 Passcode: 340563 Join Room 9-A	Session 9-B Lean and Quality Management Chair: Peter Thorvald Co-chair: Yan Jin Zoom registration links: https://zoom.us/j/95064316075?pwd=c3NYTGRkWkRjbS9vMHRqZ1lhRkhXZz09 Meeting ID: 950 6431 6075 Passcode: 340563 Join Room 9-B	Session 9-C Product Design and Development_2 Chair: Yi Qin Co-chair: Emily Carey Zoom registration links: https://zoom.us/j/95064316075?pwd=c3NYTGRkWkRjbS9vMHRqZ1lhRkhXZz09 Meeting ID: 950 6431 6075 Passcode: 340563 Join Room 9-C	
	Machine learning algorithms comparison for manufacturing applications <i>Mohammed Almani, Omogbai Oleghe, Sandeep Jagtap and Konstantinos Salonitis.</i>	A critical review of smart manufacturing & Industry 4.0 maturity models: Applicability in the oil and gas upstream industry <i>Chinedu Onyeme and Kapila Liyanage.</i>	Factory manufactured modular construction of process plants <i>Paul Wrigley, Paul Wood, Richard Hall, Daniel Robertson and Sam O'Neill</i>	
	An ISM analysis of the critical success factors in ERP implementation <i>Paul Hankin, Mohammed Almani and Konstantinos Salonitis.</i>	Uncertainties in Adoption of Model-Based Definition and Enterprise for High-Value Manufacturing <i>Kamran Goher, Essam Shehab, Ahmed Al-Ashaab and Shoaib Sarfraz.</i>	Intelligent healthcare platform solution and medication management system for elderly people with long term health conditions <i>Riyad Elsaadi and Mahmoud Shafik.</i>	

	Resilience in Industry 4.0 Digital Infrastructures and Platforms <i>Daniel Ribeiro, António Almeida, Filipe Ferreira and Américo Azevedo.</i>	Industry 4.0 Application in Lean Manufacturing- A Systematic Review <i>Sameh Saad.</i>	Design and Development of a Innovative Variable Height Water Sports Pylon <i>Fayyaz Rehman and Charlie Mccallum.</i>
	A Data-driven Method for Predicting Deformation of Machined Parts Using Sparse Monitored Deformation Data <i>Zhiwei Zhao, Yingguang Li, Yee Mey Goh, Changqing Liu and Peter Kinnell.</i>	Digital Twin for Manufacturing Equipment in Industry 4.0 <i>Tomás Moreno, António Almeida, Filipe Ferreira, Américo Azevedo, Narciso Caldas and César Toscano.</i>	Multimodal Biometric Recognition using Iris and Face features <i>Sulaiman Alshebli, Mahmoud Shafik and Fatih Kurugollu.</i>
	Feature Extraction of Time-Series Data using DWT and FFT for Ball Screw Condition Monitoring <i>Nurudeen Alegeh, Munavar Thottoli, Naeem Mian, Andrew Longstaff and Simon Fletcher.</i>	Technology Roadmapping Application in Smart City's Development <i>Sameh Saad.</i>	Creating Generic Models for a Virtual Learning Applications <i>Claire Palmer, Ben Roullier, Muhammad Aamir, Leonardo Stella, Uchenna Diala, Ashiq Anjum, Frank McQuade, Keith Cox and Alex Calvert.</i>
15:00 – 15:30	Coffee Break		
15:30 – 16:45	Session 10: Keynote Session and Conference Closing Remarks Chairs: Mahmoud Shafik & Sabuj Mallik & Stephan Reiff-Margniec Zoom registration links: https://zoom.us/j/93706585565?pwd=RmFOSWFaVERpNDFoZlN1TFZUTyYttdz09 Meeting ID: 937 0658 5565 Passcode: 167865		
	Applied Artificial Intelligence for Industry 4.0 -Based Smart Manufacturing Systems Madhav Mishra, RISE Research Institutes of Sweden, Sweden		
	Advanced Manufacturing Research at the University of Derby's Institute of Innovation in Sustainable Engineering Paul Wood, IISE - University of Derby, UK		
	Impact of Industrial 4.0 on NHS Manufacturing: Towards Digital Healthcare and Greater Patient Care Mahmoud Shafik, University of Derby, UK		
	ICMR2022 Coventry University Weidong Li, Coventry University, UK		
16:45 17:00	Conference Remarks and Closing Session		

Keynote Speakers



Ian Scott, Formal Staff Technologist in the Design Technology Department of Rolls Royce, Ian attended John Port School, leaving in 1980 to join the Royal Air Force and was commissioned as a trainee Engineering Officer. He went to The City University, London, to do a thin sandwich degree in Air Transport Engineering. The placements included 29 Squadron with Phantoms and the BBMF. He left the RAF in 1986 to pursue a career in engineering. Ian first job was with the RB211-524G development team. Ian amongst other tasks, He ran the Fan Blade Containment Test, only the second RR had ever carried out. He moved to the Trent 700 Certification team in 1989 then moved to the Turbines section, and the next year joined the Turbine Design team as a designer. In this role, He spent time designing and optimising the film cooling of the HP Nozzle Guide Vanes amongst other tasks. In 1999 He took up a position in the central CAD team. He became an expert in the CADD5 design system, and deployed 2 upgrades across the company, which broadened my contacts internationally. He was a central member of the PLM selection team, and subsequently implemented several upgrades to PLM as well as generating many of the PLMOPs and BPs. In 2012, He was seconded to Transmissions to carry out some design work on the Trent 1000. He returned to Design Systems Engineering and carried on with the PLM/CAD support role. In 2012, we started developing User-Defined Features for Prelim Design Geometry generation.



Nandini Chakravorti, Deputy Director, Nandini leads the Digital Engineering Group at the MTC. Nandini has PhD on novel methodologies to implement complex multi-modal sensor-based systems and machine learning to support real-time performance monitoring for elite athletes in the UK. Nandini has 10 years industrial experience with many companies, including Samsung, Motorola and Huawei Technologies working on middleware software applications.



Yingguang Li, Professor of Nanjing University of Aeronautics and Astronautics, carried out research in intelligent manufacturing, NC machining and microwave curing principles and technologies for aerospace composites. He directed more than 10 major projects funded by the National Natural Science Foundation of China and aerospace industry. He has registered more than 30 patents for innovation. He was awarded the Second Prize of 2016 Chinese National Award for Technological Invention. Prof Li was elected as Cheung Kong Scholar Chair Professor in 2017, and awarded National Science Fund for Distinguished Young Scholars of China in 2019. He is Associate Editor of Journal of Manufacturing Systems and IMechE Proceedings Part B, and Deputy Director of the Editorial Board of Chinese Journal of Mechanical Engineering.



Agus Budiyo, Co-Chairman of ICTE (Indonesia Center of Technology Empowerment)", Agus received 4 degrees in aeronautics and astronautics from ITB and MIT. His 30 years of experience include 15 years in academia. While serving as a professor (Foreign Professor, KGU-Seoul, 2008-2015; A/Professor of Aerospace, RMIT Melbourne, 2015-2017), he actively engaged in different industries. Wrote 200+ papers and books (published by Springer) leading to startup activities in the US, South Korea, and Indonesia where he co-founded and advises more than 10 technology SMEs. He helped many corporations (BUMN, private companies, and Small Medium Enterprise (SME) or UKM) in Indonesia while actively delivering invited talks, seminars, and workshops worldwide.



Richard Hill, Professor, Head of the Department of Computer Science and Director of the Centre for Industrial Analytics (CIndA) at the University of Huddersfield, UK. Professor Hill is an experienced researcher in the field of distributed systems, cloud computing, and edge analytics, and has in excess of 200 peer-reviewed publications in the areas of Big Data, predictive analytics, the Industrial Internet of Things (IIoT), Industry 4.0 and Cyber Physical Systems. Professor Hill is a Chartered Engineer (CEng, FIET) and has over 20 years' experience of defence, automotive and furniture manufacturing industries, and the UK Public Sector. Professor Hill has recently co-authored the Springer publication *Guide to Industrial Analytics*.



Yee Mey Goh, Senior Lecturer & Associate Professor, Wolfson School of Mechanical, Electrical and Manufacturing Engineering. She has a BEng (Hons) in Mechanical Engineering from University Tenaga Nasional, Malaysia and a PhD in Mechanical Engineering from University of Bristol, UK. She founded Digital Automation Systems Design Lab to enable intelligent automation through modelling of human knowledge, skills and emotions in complex manufacturing processes. To date, her transdisciplinary research has addressed risk and uncertainty in early design of complex, novel and through-life systems and providing robust methodology and models to support decision making in the aerospace, defence, automotive and energy sectors. She chaired the 14th ICMR conference and is a committee member of The Consortium of UK University Manufacturing and Engineering (COMEHE) for the Engineering Professors' Council.



Konstantinos Salonitis (Dip Eng, MSc, PhD, MBA, MEd, PGCAP, CEng FIMechE, FHEA), Professor, head of Sustainable Manufacturing Systems Centre at Cranfield University. Professor Salonitis current research interests include the simulation and modelling of manufacturing processes and systems; the energy efficiency of manufacturing processes and systems; the environmental impact assessment of manufacturing processes; and the lean manufacturing and management. He has a broad track record in funded research projects, having been involved in a number of research projects funded by the EC, the EPSRC, Innovate UK and Newton-Fund. He has published more than 250 research papers in major international journals and internationally referred conferences and authored two books.



Khamis Essa, Reader & Professor AC in Advanced Manufacturing and Process Modelling. He is the Deputy Head of the Advanced Manufacturing Centre at the School of Engineering, the University of Birmingham. His research is focused on advanced manufacturing technologies for instance metal and ceramic Additive Manufacturing (AM), Hot Isostatic Pressing (HIPing) and Incremental Sheet Forming (ISF). He has been developing novel manufacturing routes and applications for aerospace, defence, automotive and biomedical industries. The scientific emphasis of his research is on material and process interaction. He has been also developing holistic modelling for comprehensive understanding of process and material behaviours. His research portfolio has a research income in excess of £14M. His research has been supporting major companies across the world including Rolls-Royce, BAE Systems, MBDA Missiles, MicroTurbo, Ford, European Space Agency and Caterpillar. He has been also supporting Small to Medium enterprises through major ERDF funding programmes such as CASIM2 and SmartFub. Dr Essa has over 90 journal and conference publications in addition to two patents and one textbook.



Babak Jahanbani, Managing Director of Didactic Services Ltd which represents Festo Didactic in the UK and IE. Babak is British – Persian and lives in the UK. He graduated from University of Bradford in 1990 with a degree in Mechanical Engineering. He worked at Lucas Industries (Aerospace and Automotive supplier) for 3 years as a Manufacturing Engineer before moving to Turkey. He worked there for 3 years as an Audit and Quality Manager on a project equipping the state universities with engineering equipment at undergraduate level. He then moved to Lebanon where he set up his own consultancy company. He stayed there for 6 years

and worked on various educational projects, most importantly as a project manager for a World Bank project introducing latest curriculum and engineering equipment across the vocational institutes. He moved back to the UK in 2003 and joined Feedback Instruments Ltd as UK Sales Manager. The company's business was supply of engineering and science equipment to schools, colleges and universities. He set up his own company in 2010 and has since been representing Festo Didactic in the UK and Ireland. Festo Didactic (part of Festo Industry of Germany) is a global supplier of learning systems in engineering and technology. The range of learning systems cover: Fluid Power, Robotics, PLC's, Control, FMS, Industry 4.0, Electrical and Electronics, Mechanical, HVAC, ... from fundamentals through to applications. Festo is at the Forefront of introduction of Industry 4.0 to the education sector in Germany. Festo is also developing Connected Curriculum which links Festo's Cyber Physical Learning Systems to Siemens industrial software for Industry 4.0.



Madhav Mishra, Senior Scientist at the Sensor Systems unit, within the Digital Systems division at RISE Research Institute of Sweden. He is focus on leading research at the intersection of AI/ML in predictive maintenance and smart sensor technology. Dr. Mishra has been active in the area of predictive analytics and machine learning techniques for diagnostics and forecasting. His interests are concerned with the development of Bayesian statistical machine learning, modern condition monitoring techniques, mathematical modelling algorithms, signal

processing and data science process pipeline in application to a wide range of engineering problems. He has published very high-level scientific journals and collaborate and worked with world-class scientific institutions such as NASA. Madhav worked as a researcher at the NASA Ames Research Center, California, USA. Prior to Joining RISE, Madhav worked at Luleå University of Technology as a Senior Research in the area mentioned above. He is currently an Associate Editor, the Institution of Mechanical Engineers, JET- SAGE Journal- and Editorial Board Member of the International Journal of Prognostics and Health Management (IJPHM). Dr. Mishra received a PhD degree at the Division of Operation and Maintenance Engineering from Luleå University of Technology in Sweden within the framework of the SKF-University of Technology Center (UTC). He obtained master's degree in Control Systems Engineering with specialization in Mechatronics from the Netherlands.



José Paulo Lousado, Professor and formal head of Lamego school of technology and management, José holds a Ph.D. in Informatics Engineering from the University of Aveiro, and Degree in Mathematics / Informatics from the University of Beira Interior. He is an Adjunct Professor at IPV / Lamego School of Technology and Management and Researcher at the Polytechnic Institute of Viseu, CISED - Center for Research in Digital Services. He works in Engineering Sciences and Technologies with an emphasis in the Informatics and IoT. His areas of research are healthcare; wearable health monitoring systems;

Sensors; Bioinformatics; Data Mining; Data Warehouse; Multimedia; Databases Systems; Software Project Management; ICT in Education. He was the leader of the INFOPATHS Project (funded by the EU). He regularly reviews papers for several international scientific journals, namely Sensors, Electronics, Energies, RISTI, and Computer Communications. He is a Senior Member of the IEEE.



Paul Wood, Professor of Advanced Manufacturing and Director of the Institute of Innovation in Sustainable Engineering at the University of Derby. Paul gained his PhD in technical manufacturing research at Aston University in 1990 working on a research project funded by British Nuclear Fuels. Graduated in mechanical engineering and since gained 37 years applied experience in advanced manufacturing, product development and materials characterisation in the transport sector. A combined 24 years at the Universities of Warwick (15 years), Strathclyde (3 years) and Derby (6 years), and the balance working in industry as a manufacturing design engineer. He leads a group of 25 staff with a base at Lonsdale House in the centre of Derby. He is accountable for the delivery of all projects at the Institute. Whilst at the Institute, Paul has personally secured, led and delivered large European funded programmes, Rolls-Royce Manufacturing Portfolio projects, Innovate UK funded KTPs and client direct-funded manufacturing research. Current interests are laser powder bed fusion additive manufacturing and machining of nickel based and other exotic alloys for turbomachinery applications. Long established interests include hot sheet forming, superplastic forming and diffusion bonding of Titanium and other alloys for the aerospace sector and development of lightweight crashworthy automobile structures in 5000 and 6000 series aluminium alloys. Paul is currently the UoD lead in an academic partnership funded by the Polish Academy of Sciences (IPPT PAN) collaborating in research in additive manufacturing cellular open cell structures with several partner universities in the EU and USA. Paul is currently supervising a PhD student in additive manufacturing under a collaboration with the University of Lorraine, two Rolls-Royce sponsored PhD studentships in advanced manufacturing and one MTC funded PhD studentship in additive manufacturing. Paul has published over 70 articles in peer reviewed journals and conference proceedings, one book and over 50 industrial reports. Between 2008 and 2012, Paul was BSI's nominated UK principal expert in high rate tensile testing of metals to develop the international standard ISO26203-2 in which 2 of his publications are cited.



Mahmoud Shafik, Professor AC in Intelligent Mechatronics Systems and Digital Technology. Shafik is an international expert who has made a personal distinction and international leadership in the field of Intelligent Systems and Digital Technology, with more than 20-years industrial applied research experience. Shafik has been chairing, leading and delivering several industrial applied research projects from European Commission, Innovate-UK and UK Research Councils of a budget of several millions of pounds and have made a great scientific, economic and social impact in his area of expertise in UK and EU. His research work has brought many innovative outcomes that have been commercially explored by several Small to Medium and Large enterprise organisations across UK, EU and overall the world. He has several publications in international world leading journals and conferences and a number of industrial notes. He has also few patents in his areas of industrial applied research, sustainable engineering and digital technology. Shafik is one of the lead development member of the Institute of Innovation in Sustainable Engineering at the University of Derby & founder and Editor-In-Chief of the International Journal of Robotics and Mechatronics-url: <http://ojs.unsysdigital.com/index.php/ijrm> and Editor-In-Chief of Journal of Traffic and Logistics url: <http://www.jtle.net/> and serving as an editorial board member of few International Journals. He is the plenary speaker of International Conference in Intelligent Traffic and Transportation, <http://www.icitt.org/speaker.html> and the programme chair of the 2021 - 18th international conference in manufacturing research (ICMR2021: <http://www.icmr.org.uk/>). Shafik is currently leading a number of industrial applied research programmes that focus on industrial 4.0, smart manufacturing, digital healthcare, robotics and industrial automation applications. He has been supervising and external examiners for several PhD, and MSc research students across UK and worldwide. He is also serving as an Assessor and Knowledge Transfer Expert for the UK Knowledge Transfer Network, EPSRC, Innovate-UK and EC Programmes. Shafik is currently a visiting professor for a few universities in EU, China, and Middle East. He is the Principal Investigator of the University of Derby, Lead Academic of EEE Engineering programmes and hold the position of University Reader in the Collage of Science and Engineering. For more information of Shafik ongoing research programmes and his professional network please visit: <https://www.linkedin.com/pub/mahmoud-shafik-ph-d/7/237/60> & https://www.researchgate.net/profile/Mahmoud_Shafik.

ICMR 2021 Conference Proceeding Front Cover and URL



Advances in Transdisciplinary
Engineering series

volume 15



Advances in Manufacturing Technology XXXIV



Proceedings of the 18th International
Conference on Manufacturing
Research, incorporating the 35th
National Conference on Manufacturing
Research, 7-10 September 2021,
University of Derby, Derby, UK



EDITED BY
Mahmoud Shafik
Keith Case


IOS Press

URL: <https://ebooks.iospress.nl/bookseries/advances-in-transdisciplinary-engineering>