

**2023 14th International Conference on
Mechanical and Intelligent
Manufacturing Technologies**

**14th
ICMIMT**

ICII 2023

**2023 9th International Conference on
Information Management and Industrial Engineering**



May 26-28, 2023

Cape Town, South Africa

CONFERENCE PROGRAM

Sponsored by



Hosted by



Patrons



UNIVERSITY
OF
JOHANNESBURG



L-Università
ta' Malta



جامعة أبوظبي
ABU DHABI UNIVERSITY



• PAISI
HILENDARSKI •
UNIVERSITY
OF PLOVDIV

Conference Program

May 26-28, 2023 | Cape Town, South Africa

ICMIMIT 2023

2023 14th International Conference on
Mechanical and Intelligent Manufacturing
Technologies

ICII 2023

2023 9th International Conference on Information Management
and Industrial Engineering



Sponsored by



Hosted by



Patrons



Table of Content

General Information	03
Welcome Message.....	05
Conference Committee	06
Agenda Overview	08
Keynote Speaker	11
Onsite Session 1: Mechanical System Model Analysis and Structural Design	15
Onsite Session 2: Intelligent Manufacturing Technology and Engineering Management.....	26
Online Session 1: Power Machinery and Control Model	27
Online Session 2: Intelligent Manufacturing System and Measurement Technology	18
Online Session 3: Material analysis and manufacturing process	19
Online Session 4: Intelligent Robot and Mechanical System Design	20

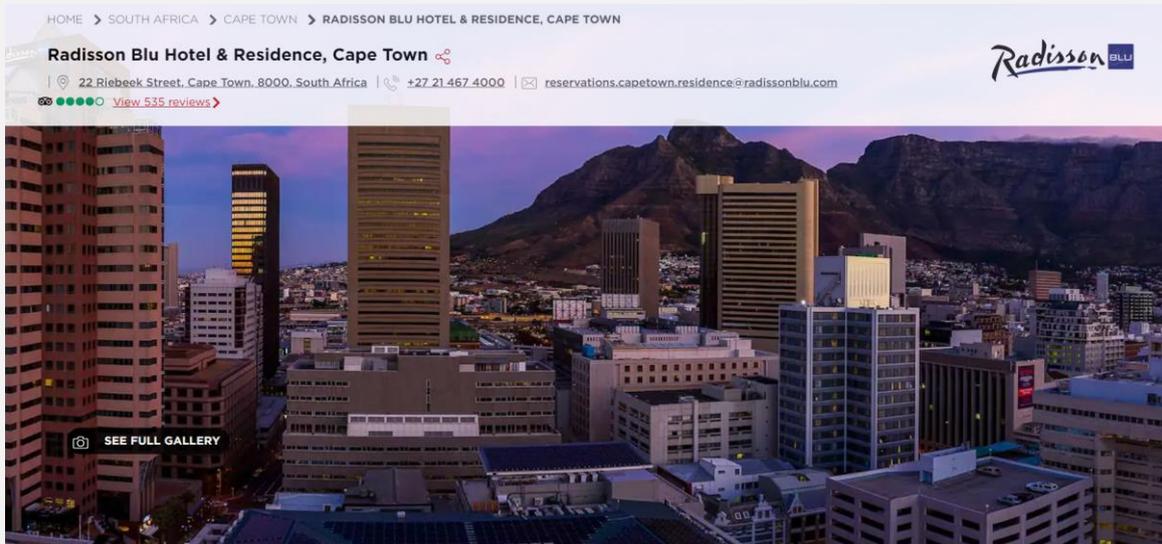
Note

● GENERAL INFORMATION

1 Conference Venue ([click](#))

Radisson Blu Hotel & Residence

Address: 22 Riebeeck Street, Cape Town, South Africa



How to get to the Radisson Blu Hotel & Residence, Cape Town

Easily reach Cape Town International Airport, only 20 kilometers away, and access other parts of the city via the train network and the rapid MyCiti bus route. Victoria & Alfred Waterfront is only 2 kilometers from the hotel, and guests can discover the city's premium shopping experience. Work travelers appreciate the convenience of our central business district location.



From Cape Town International Airport

By airport shuttle:

For airport transfers, talk to our staff before arrival to arrange a pick-up at an additional cost.

By public transport:

Take bus A01 straight to Cape Town Civic Centre 1 4. Walk 900 meters to the hotel or take bus T01 at this stop to Cape Town Waterfront and exit at Cape Town Thibault Square 1. Walk 290 meters and you will reach the hotel.

By car:

The hotel is 21km from the International Airport. Take Nelson Mandela Boulevard (N2) towards Cape Town and follow to Cape Town City Centre. The journey takes around 25 minutes.



From Cape Town Station

On foot:

The hotel is located less than 1km from the train station.

2 Onsite Registration

Registration desk (**Lobby of Radisson Blu Hotel & Residence**) → Inform the staff of your paper ID → Sign-in → Claim your conference kit.

3 Devices Provided by the Organizer

Laptops (with MS-Office & Adobe Reader) / Projectors & Screen / Laser Sticks

4 Materials Provided by the Presenter

Oral Session: Slides (pptx or pdf version). Format 16:9 is preferred.

Official language: English.

5 Duration of Each Presentation

Keynote Speech: 45min, including Q&A / Oral Session: 15min, including Q&A

6 Notice

※ Please wear your delegate badge (name tag) for all the conference activities. Lending your participant card to others is not allowed.

※ Please take good care of your valuables at any time during the conference. The conference organizer does not assume any responsibility for the loss of personal belongings of the participants during conference day.

※ Wear a Mask. Make sure your mask fits well with the nose clip. Avoid hands shaking and Skin-to-skin contact.

※ **UTC+2. Cape Town Standard Time. Please be aware of time difference between this and your region/country.**

7 Online Presentation Tips

 Zoom Download	Room	Meeting ID	Link
	A	863 1590 4225	https://us02web.zoom.us/j/86315904225
	B	896 9126 2461	https://us02web.zoom.us/j/89691262461

Note:

We recommend that you install the Zoom platform on your computer before the conference starts. New users can participate in the Zoom meeting without registration.

Participants who are going to do an online presentation are required to join the rehearsal in Zoom on Friday, May 26. Duration: 3min apiece. Feel free to leave after you finish the test.

◆ Name Setting

Keynote Speaker: KN-Name

Invited Speaker: IS-Name

Committee: Position-Name

Author: Paper ID-Name

Listener: Listener-Name

◆ Useful Links

◇ [Conference Banner](#)

◇ [Zoom Background](#)

● WELCOME MESSAGE

Dear researchers, delegates of conference,

Welcome to Cape Town to attend 2023 14th International Conference on Mechanical and Intelligent Manufacturing Technologies (ICMIMT 2023) and 2023 9th International Conference on Information Management and Industrial Engineering (ICII 2023). The conference is sponsored by IEEE and India International Congress on Computational Intelligence (IICCI) and hosted by the University of Cape Town (South Africa), with patrons from Nelson Mandela Metropolitan University (South Africa), University of Johannesburg (South Africa), and other institutions.

In consideration of health and safety for everyone, ICMIMT 2023 and ICII 2023 are still made offline and online mixed. We feel pity that we cannot gather all together in Cape Town, South Africa due to some travel restrictions. However, we will work hard to provide you with a high-quality conference as always, and with the hope that we can get your support.

The objective of the conferences is to provide a premium platform to bring together researchers, scientists, engineers, academics and graduate students to share up-to-date research results. We are confident that during this time you will get the theoretical grounding, practical knowledge, and personal contacts that will help you build a long term, profitable and sustainable communication among researchers and practitioners in the related scientific areas.

This year we have 4 Keynote Speeches. Prof. Robert Gao (Fellow of IEEE), from Case Western Reserve University, USA; Prof. Satyandra K. Gupta (Fellow of IEEE), from University of Southern California, USA; Prof. Andrew Kusiak (Fellow of the Institute of Industrial and Systems Engineers and the Editor-in-Chief of the Journal of Intelligent Manufacturing), from The University of Iowa, USA and Prof. Khaled Abou-El-Hossein, from Vaal University of Technology, South Africa. In the conferences, we have 6 sessions (In person + Virtual) with topics: Mechanical System Model Analysis and Structural Design; Intelligent Manufacturing Technology and Engineering Management; Power Machinery and Control Model; Material Analysis and Manufacturing Process etc.

Meanwhile, we received more than 126 submissions from research institutions, universities and industries. The papers in the proceedings are accepted after being peer-reviewed by conference committee, international reviewers based on the topic and quality. With the keynote speeches, invited speeches, oral sessions, we'll have an exciting program this year, which will allow participants to present and discuss the latest research and industrial developments in these fields.

On behalf of the organizing committee, we would like to deeply express our heartfelt appreciation to all our delegates, keynote speakers, invited speakers, session chairs, as well as all the committee members involved in the technical evaluation of conference papers and in the organization of the conference for their time, effort, and great contributions.

We also wish that this conference will be an unforgettable and wonderful experience for you.

With Warmest Regards,

Conference Organizing Committees

ICMIMT 2023, ICII 2023

● CONFERENCE COMMITTEE

Advisory Committees

Robert Gao (Case Western Reserve University, USA)

Andrew Kusiak (The University of Iowa, Iowa City, USA)

Conference Chairs

Khaled Abou-El-Hossein (Vaal University of Technology, South Africa)

Ramesh Kuppuswamy (University of Cape Town, South Africa)

Program Chairs

Tien-Chien Jen (University of Johannesburg, South Africa)

Zenghui Wang (University of South Africa, South Africa)

Hong-Seok Park, University of Ulsan, Korea

Francesco Zirilli (Sapienza Università di Roma, Italy)

Publicity Chair

Wu Hui (Hunan Institute of Traffic Engineering, China)

Publication Chair

Thato Dlamini (University of Cape Town, South Africa)

Treasurer

Nguyen Dinh Ngoc, (Saigon University, Vietnam)

Program Co-Chairs

Yanxia Sun (University of Johannesburg, South Africa)

Daniel Madyira (University of Johannesburg, South Africa)

Mardé Helbig (Griffith University, Australia)

Local Organizing Committees

Simon Winberg (University of Cape Town, South Africa)

Duncan Mhacure (University of Cape Town, South Africa)

Patrick Mubiayi (University of South Africa, South Africa)

Lagouge Tartibu (University of Johannesburg, South Africa)

Obafemi O. Olatunji (University of Johannesburg, South Africa)

Technical Program Committees

Oyesola Moses Oluwafemi (Tshwane University of Technology, South Africa)

Kanakana-Katumba Grace (Tshwane University of Technology, South Africa)

LK Tartibu (University of Johannesburg, South Africa)

TJ Kunene (University of Johannesburg, South Africa)

Rosli Bin Ahmad (Universiti Tun Hussein Onn Malaysia, Malaysia)

Iliia Ivanov (Oak Ridge National Laboratory, USA)

Francisco Falcone (Public University of Navarre, Spain)

Desireé Cranfield (Swansea University, UK)

Dickson K.W. Chiu (the University of Hong Kong, Hong Kong)

Alireza Heidari (California South University (CSU), USA & American International Standards Institute (AISI), USA)

Grigorios L. Kyriakopoulos (National Technical University of Athens, Greece)

Irina Neaga (University of Wales Trinity St David, UK)

Yusmadi Yah Jusoh (Universiti Putra Malaysia, Malaysia)

Charnnarong Saikaew (Khon Kaen University, Thailand)

Sisa Pityana (The Council for Scientific and Industrial Research, South Africa)

Subaschandar Narayana Rao, (BIUST, Botswana)

Arif Rochman, (University of Malta, Malta)
Kumuran Kadirgama (Universiti Malaysia Pahang (UMP), Malaysia)
Zwelinzima Mkoko (Nelson Mandela Metropolitan University, South Africa)
Ing. Luca Gualtieri (Free University of Bolzano, Italy)
Wai Siong CHAI (Harbin Institute of Technology, China)
Kedong Zhou (Nanjing University of Science and Technology, China)
Corne Schutte (Department of Industrial Engineering, University of Stellenbosch, South Africa)
Mothibeli Pita (University of South Africa, South Africa)
Daramy Vandi Von Kallon (University of Johannesburg, South Africa)
Topside Ehleketani Mathonsi (Tshwane University of Technology, South Africa)
Vusumuzi Malele (Tshwane University of Technology, South Africa)
Mohamed A. Elkhoul (Sadat Academy for Management Science, Egypt)
Galina Ilieva (University of Plovdiv Paisii Hilendarski, Bulgaria)
Malik Nauman (Universiti Brunei Darussalam, Brunei Darussalam)
Ravi Sekhar (Symbiosis Institute of Technology, Pune, India)
Padmakumar Muthuswamy (Kennametal Inc., Bangalore, India)
Pavlo Maruschak (Ternopil Ivan Pul'uj National Technical University, Ukraine)
Paul Refalo (University of Malta, Malta)
Philip Farrugia (University of Malta, Malta)
Pierre Vella (University of Malta, Malta)
Kangaraj (Thiagarajar College of Engineering Madurai, India)
V. Sivaraman (EGS Pillay Engineering College, India)
Ramanuj Kumar (Deemed University, India)
Ciortea Mihaela (University "1 Decembrie 1918" of Alba Iulia, Romania)

● AGENDA OVERVIEW (UTC+2)

Friday, May 26, 2023		
Onsite Registration	14:00-17:00	Participants Check in & Materials Collection- Lobby of Radisson Blu Hotel & Residence: 1F
Zoom Test for online presenters	09:00-12:00	Room A: 863 1590 4225

Zoom Test Timetable

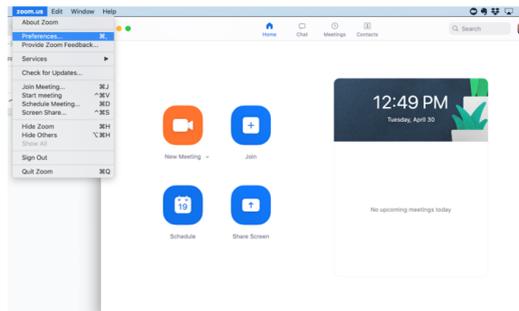
- ◇ Participants who are going to do an online presentation are required to join the rehearsal in Zoom on Friday, May 26, 2023. Duration: 3min apiece. Feel free to leave after you finish the test.
- ◇ We will test control panel including screen sharing, audio, video and "Raise Hand" feature, etc. Please get your presentation slides and computer equipment prepared beforehand.

09:00-09:30	09:30-10:00	10:00-10:30	10:30-11:00
TM039 TM006 TM013 TM029 TM060 TM001 &TM049&TM028&TM057 TM1005&TM1009 TM033 TM048	TM058 TM063 TM069 TM070 TM1008 TM073 TM406 TM045	TM017 TM031 TM074 TM071 TM1004 TM034 TM008	TM076 TM1001 TM055 TM061 TM065 TM054 TM064
11:00~12:00	Alternative time for participants who are unavailable at allocated time. Other online participants, includes but not limited to plenary speaker, keynote speaker, session chair, committee member, listener.		

Zoom Guidance

 You can join the meeting without sign-in process. Just put the meeting ID and join us.

 URL: <https://zoom.us/download>



 Each meeting has a unique 9, 10, or 11-digit number called a **meeting ID** that will be required to join a Zoom meeting.

 For any questions on the meeting day, you can text privately to "Assistant" for help.



Audio muted and video off (both indicated by a red slash).

Click to open the Participants box. This will allow you to "Raise Hand".

To share screen or contents.

Click to open the Chat box. This will allow you to chat with Hosts and Participants.

Saturday, May 27, 2023			
Keynote Speech (Onsite & Online)		Conference Room: Simoom	Room A: 863 1590 4225
Host: Prof. Khaled Abou-El-Hossein , Conference Chair, Vaal University of Technology, South Africa			
09:00-09:10	Opening Speech: Prof. Khaled Abou-El-Hossein , Conference Chair, Vaal University of Technology, South Africa		
09:10-09:55	Keynote Speech I: Digital Twin for Sustainable Manufacturing Prof. Robert Gao , (Fellow of IEEE), Case Western Reserve University, USA		
09:55-10:40	Keynote Speech II: Physics-Informed AI for Enabling Robots to Learn Autonomous Tool Manipulation Prof. Satyandra K. Gupta , (Fellow of IEEE), University of Southern California, USA		
10:40-11:10	Group Photo & Coffee Break: Foyer		
11:10-11:55	Keynote Speech III: TBA Prof. Khaled Abou-El-Hossein , Vaal University of Technology, South Africa		
12:00-13:30	Lunch: Stratus Room Restaurant, 2nd floor		
14:00-14:45	Keynote Speech IV: Digital Manufacturing and Beyond Prof. Andrew Kusiak , The University of Iowa, USA		
Parallel Session (Onsite)			
Onsite Session 1		14:45-18:15	Conference Room: Simoom, 1 st floor
Mechanical System Model Analysis and Structural Design <i>Chairperson: Dr Petronella Nyakudya, University of Johannesburg, South Africa</i>			
Part A 14:45-16:15	TM019 TM022 TM026 TM025-A TM027 TM037	Part B 16:30-18:15	TM044 TM004 TM072 TM075 TM005 TM030 TM042
Onsite Session 2		14:45-18:15	Conference Room: Calima, 1 st floor
Intelligent Manufacturing Technology and Engineering Management <i>Chairperson: Dr Oyesola Moses Oluwafemi, Tshwane University of Technology, South Africa</i>			
Part A 14:45-16:15	TM009 TM021 TM023 TM024 TM1003-A TM404	Part B 16:30-18:15	TM405 TM407-A TM003 TM040 TM050 TM041 TM409
18:20-20:00		Dinner Time: Stratus Room Restaurant, 2nd floor	

Parallel Session (Online)		
Online Session 1	14:45-17:00	Room A: 863 1590 4225
Power Machinery and Control Model Chairperson: Prof. Madindwa Mashinini, University of Johannesburg, South Africa		
Paper ID: TM039 TM006 TM013 TM029 TM060 TM001 TM1005 TM033 TM048		
Online Session 2	14:45-17:00	Room B: 896 9126 2461
Intelligent Manufacturing System and Measurement Technology Chairperson: Prof. Theo van Niekerk, Nelson Mandela University, South Africa		
Paper ID: TM058 TM063 TM069 TM070 TM1008 TM073 TM406 TM049 TM045		
17:00-17:15	Break Time	
Online Session 3	17:15-19:45	Room A: 863 1590 4225
Material Analysis and Manufacturing Process Chairperson: Dr Kanakana-Katumba Grace, Tshwane University of Technology, South Africa		
Paper ID: TM017 TM031 TM074 TM071 TM1004 TM034 TM028 TM1009 TM057 TM008		
Online Session 4	17:15-19:00	Room B: 896 9126 2461
Intelligent Robot and Mechanical System Design Chairperson: Dr Mothibeli Pita, University of South Africa, South Africa		
Paper ID: TM076 TM1001 TM055 TM061 TM065 TM054 TM064		

● KEYNOTE SPEAKER I

Saturday, May 27, 2023 (UTC+2)

09:10-09:55

Conference Room: Simoom

[Room A: 863 1590 4225](#)



**Prof. Robert Gao, Case Western Reserve University, USA
(Fellow of IEEE)**

Speech Title: Digital Twin for Sustainable Manufacturing

Abstract: A decade after the conceptualization of “digital twin” and the revival of artificial intelligence (AI) led by deep neural networks, the manufacturing industry is witnessing their accelerated convergence. Supported by the exponential growth of data arising from widespread deployment of sensors and the continued advancement of computational infrastructure, the advancement of AI technologies over the past decade have not only changed the way how a digital replica of a physical system in manufacturing can be created and updated that looks and behaves like its physical counterpart, but also new possibilities for the digital twin to guide the physical system towards optimized design, operation, and control. The result is improved functionality, productivity, and reliability of a new generation of products that directly contribute to sustainability in manufacturing. This keynote presents an overview of the digital twin technology and its representative applications in manufacturing. After introducing the basic building blocks of digital twin examples of its applications to manufacturing are illustrated. The presentation demonstrates the potential of digital twin as a key enabler in integrating physical science with data science through a digital platform, to facilitate continued advancement of sustainable manufacturing.

Robert Gao is the Cady Staley Professor of Engineering and Department Chair of Me-chanical and Aerospace Engineering at Case Western Reserve University in Cleveland, Ohio. Since receiving his Ph.D. degree from the Technical University of Berlin, Ger-many in 1991, he has been working on physics-based sensing methods, stochastic mod-eling and machine learning for improving the observability of dynamical systems such as manufacturing equipment and processes, with the goal to improve process and product quality control. The outcome of his work has been reflected in more than 400 technical papers, including 180 journal articles, 13 patents, and three books that he co-authored with his co-workers.

Prof. Gao is a Fellow of the IEEE, SME, ASME, and CIRP (International Academy for Production Engineering). He has received multiple honors and awards, including the ASME Blackall Ma-chine Tool and Gage Award, SME Eli Whitney Productivity Award, IEEE Instrumentation and Measurement Society’s Technical Award, IEEE Best Application in Instrumental and Measurement Award, multiple Best Paper awards, and the NSF CAREER award. He is currently serving as a Senior Editor for the IEEE/ASME Transactions on Mechatronics.

● KEYNOTE SPEAKER II

Saturday, May 27, 2023 (UTC+2)

09:55-10:40

Conference Room: Simoom

[Room A: 863 1590 4225](#)



**Prof. Satyandra K. Gupta, University of Southern California, USA
(Fellow of IEEE)**

Speech Title: Physics-Informed AI for Enabling Robots to Learn Autonomous Tool Manipulation

Abstract: Humans' ability to construct and use complex tools makes them different from animals. Many manufacturing applications such as sanding or composite layup require ergonomically challenging tool motions. Robots have successfully reduced the need for humans to perform tedious tasks in mass production applications. Robots are programmed by humans to execute pre-determined tool motions in mass production applications and human programming effort is amortized over a large number of parts. However, high-mix applications require the part changeover to be accomplished within a few minutes, therefore, we cannot rely on humans to program robots when a new part arrives. Unfortunately, at present, the use of robots in high-mix manufacturing applications is very limited, requiring humans to perform ergonomically challenging and physically demanding tasks. Using robots in these applications requires robots to autonomously manipulate tools based on high-level task descriptions and deliver human competitive task performance. This is a challenging problem and addressing it requires leveraging the latest advances in AI. This seminar will present an overview of physics-informed AI technologies that enable robots to learn safe and efficient autonomous tool manipulation. These new technologies serve as the foundation for realizing smart robotic cells for assembly, composite layup, additive manufacturing, inspection, and sanding applications. AI-based planning enables the automated generation of efficient robot trajectories for performing complex tool motions to meet process-specific requirements. Imitation learning enables robots to learn from human experts. The use of synthetic images generated from physics-informed simulations enables the use of deep learning in defect detection. Self-supervised active learning enables the robotic cell to autonomously and safely conduct experiments to learn the process parameters in the most efficient manner. Smart robotic cells increase human productivity and reduce the need for humans to perform ergonomically challenging tasks.

Dr. Satyandra K. Gupta holds Smith International Professorship in the Aerospace and Mechanical Engineering Department and the Department of Computer Science in the Viterbi School of Engineering at the University of Southern California. He is also the founding director of the Center for Advanced Manufacturing at the University of Southern California. Prior to joining the University of Southern California, he was a Professor in the Department of Mechanical Engineering and the Institute for Systems Research at the University of Maryland, College Park. He was also the founding director of the Maryland Robotics Center and the Advanced Manufacturing Laboratory at the University of Maryland. In addition, he served as a Program Director for the National Robotics Initiative at the National Science Foundation from September 2012 to September 2014. Before joining the University of Maryland, he was a Research Scientist in the Robotics Institute at Carnegie Mellon University.

Dr. Gupta is a fellow of the American Society of Mechanical Engineers (ASME), Institute of Electrical and Electronics Engineers (IEEE), Society of Manufacturing Engineers (SME), and Solid Modeling Association (SMA). He serves as the Editor-in-Chief of the ASME Journal of Computing and Information Science in Engineering and as the Editor-in-Chief of the Advanced Manufacturing Book Series by World Scientific Publishing Company. He also serves as a member of the Technical Advisory Committee for Advanced Robotics for Manufacturing (ARM) Institute and a member of the National Materials and Manufacturing Board. He has served as a member of the Autonomy Summer Study Task Force for the Defense Science Board.

● KEYNOTE SPEAKER III

Saturday, May 27, 2023 (UTC+2)

11:10-11:55

Conference Room: Simoom

[Room A: 863 1590 4225](#)



Prof. Khaled Abou-El-Hossein, Vaal University of Technology, South Africa

Speech Title: Ultra-High Precision Machining of Optical Mould Inserts

Abstract: Metal cutting techniques that result in surface roughness in the ranges of few nanometres and form accuracy in the sub-micron region are categorised as ultra-high precision machining (UHPM). In this technology, diamond inserts are used to shape components from various non-ferrous materials by lathe operation. These components are usually optical objects such as flats, convex and concave lenses made from aluminium, copper alloys, silicon, germanium, etc. Diamond turning can also be used to produce mould inserts for plastic optics injections. Optical injection moulds are usually made from high strength aluminium such as AA 6061 and beryllium copper alloys. These materials are easily machined by diamond tools. However, for high requirements mould inserts used for glass moulding, the mould inserts must be made from ultra-hard materials such as tungsten and silicon carbides. UHPM of these materials can be achieved using ultra-high precision grinding spindles.

This presentation will highlight the capabilities of precision engineering when making optics and mould insert manufacturing. Optical components, including freeform, with form accuracy of about 0.1 μm and surface roughness of 1 nm can be produced with diamond machining. Currently, we are busy investigating the process of diamond turning when machining a special grade of aluminium produced by rapid solidification and spin melting. This aluminium grade which enjoys elevated tensile strength (600 MPa) can be used as a mould material for injecting plastic optics.

Dr. Khaled Abou-El-Hossein is a full Professor at Vaal University of Technology, South Africa. His current research focus is on ultrahigh precision diamond machining of optical materials. He obtained his PhD in manufacturing engineering from National Technical University of Ukraine in 2000.

● KEYNOTE SPEAKER IV

Saturday, May 27, 2023 (UTC+2)

14:00-14:45

Conference Room: Simoom

[Room A: 863 1590 4225](#)



Prof. Andrew Kusiak, The University of Iowa, USA
(Fellow of the Institute of Industrial and Systems Engineers and the Editor-in-Chief of the Journal of Intelligent Manufacturing)

Speech Title: Digital Manufacturing and Beyond

Abstract: The ongoing transformation of manufacturing and service industry offers an opportunity to rethink the design of future enterprises. Evolution of manufacturing from digital to its new form labeled, universal manufacturing, is discussed. Five enablers of universal manufacturing are presented, open manufacturing, manufacturing-as-a-service, shared manufacturing, sustainability, and resilience. These enablers form properties of universal manufacturing, with adaptability and affinity that are emerging. A universal manufacturing enterprise is formed based on the models of distributed manufacturing facilities. The emerging standards for interoperability of systems needed for universal enterprises are introduced. The need for data and modeling standards is articulated. Though no global standard for representation of digital manufacturing models in a cloud has been widely adopted, the existing systems engineering methodologies and languages may support the solution needed. The modeling approach followed in this paper is a bottom-up rather than the top-down usually presented in the literature on modern manufacturing.

Dr. Andrew Kusiak is a Professor in the Department of Industrial and Systems Engineering at The University of Iowa, Iowa City. He has chaired two departments, Industrial Engineering, and Mechanical and Industrial Engineering. His current research interests include applications of computational intelligence and big data in manufacturing, automation, renewable energy, sustainability, and healthcare. He has authored or coauthored numerous books and hundreds of technical papers published in journals sponsored by professional societies, such as the Association for the Advancement of Artificial Intelligence, American Society of Mechanical Engineers, Institute of Industrial and Systems Engineers, Institute of Electrical and Electronics Engineers, and other societies. He speaks frequently at international meetings, conducts professional seminars, and consults for industrial corporations. Dr. Kusiak has served in elected professional society positions as well as editorial boards of over fifty journals, including editor positions of five different IEEE Transactions.

Professor Kusiak is a Fellow of the Institute of Industrial and Systems Engineers and the Editor-in-Chief of the Journal of Intelligent Manufacturing.

● ONSITE SESSION 1

Saturday, May 27, 2023 (UTC+2)

14:45-18:15

Conference Room: Simoom, 1st floor

Mechanical System Model Analysis and Structural Design

Chairperson: Dr Petronella Nyakudya, University of Johannesburg, South Africa

14:45-17:15

Part A

- TM019
14:45-15:00
Design for sustainable Additive Manufacturing (DfsAM): Preparation and validation of a transversely isotropic simulation model for FFF components made from virgin and recycled Polypropylene filaments
Niko Nagengast, University of Bayreuth, Germany
- TM022
15:00-15:15
Design, Fabrication and Analysis of a Soft Robotic Gripper using Fluid Elastomer Actuators
Dennis Els, Nelson Mandela University, South Africa
- TM026
15:15-15:30
Investigate the effect of speed on two stage air compressor performance.
Gaonnwe Tshepo, UNISA, South Africa
- TM025-A
15:30-15:45
Material properties identification of polyamide (PA12) processed via selective laser sintering
Chiara Morano, University of Calabria, Italy
- TM027
15:45-16:00
IMPROVEMENT OF A TRI-STAR CLIMBING TROLLEY WHEELS PERFORMANCE FOR OPTIMAL OPERATION
Gaonnwe Tshepo, UNISA, South Africa
- TM037
16:00-16:15
An Autonomous Multirotor UAV for Security Systems in Rural South Africa
Jacques Welgemoed, Nelson Mandela University, South Africa

16:30-18:15

Part B

- TM044
16:30-15:45
Experimental Study of Two-Phase Air-Water Flow Behavior at Different Intake Flow Conditions of an Electric Submersible Pump
Luai M. Alhems, King Fahd University of Petroleum and Minerals, Saudi Arabia
- TM004
16:45-17:00
Computer Aided Design and Evaluation of the Thermal Properties of Automotive Brake Disc and Pad Produced from Locally Sourced Materials
Siviwe Mrausi, Tshwane University of Technology, Pretoria, South Africa
- TM072
17:00-17:15
Modification of a Stockbridge damper
Zakhele Mathews Zondi, Mangosuthu University of Technology, South Africa; Cape Peninsula University of Technology, South Africa
- TM075
17:15-17:30
Fuzzy Inference Engine in Condition Monitoring of Industrial Equipment: An Overview
Calvinia Kealeboga Kgatwe, University of Johannesburg, South Africa
- TM005
17:30-17:45
Investigating the Mechanical Properties of Automotive Brake Disc and Pad Developed from Locally Sourced Materials
Siviwe Mrausi, Tshwane University of Technology, Pretoria, South Africa
- TM030
17:45-18:00
Performance Analysis of 3D printed Pelton Wheel Turbine at Various Pressure Heads
Lebogang Lebea, University of South Africa, South Africa
- TM042
18:00-18:15
Design and numerical analysis of an electrostatic precipitator
Peleki Sekwakwa, University of Johannesburg, South Africa

● ONSITE SESSION 2

Saturday, May 27, 2023 (UTC+2) 14:45-18:15 Conference Room: Calima, 1st floor

Intelligent Manufacturing Technology and Engineering Management

Chairperson: Dr Oyesola Moses Oluwafemi, Tshwane University of Technology, South Africa

14:45-17:15	Part A
TM009 14:45-15:00	Machine Learning Regression to Predict Soil Moisture in Domestic Garden Environments Yu Tang Shan , St John's College, Johannesburg, South Africa
TM021 15:00-15:15	Automated charging and docking station for security UAVs Hermias Nieuwoudt , Nelson Mandela University, South Africa
TM023 15:15-15:30	Investigation of an Advanced Methodology for Automated Quality Inspection of milled CFRP-Edges due to Image Processing of Infrared Images Benjamin Schulze , Fraunhofer IFAM, Germany
TM024 15:30-15:45	Enabling Smart Manufacturing using Cyber-Physical System with the outlook of Manufactronic Moses Oluwafemi Oyesola , Tshwane University of Technology, South Africa
TM1003-A 15:45-16:00	Multi-scale approach for the estimation of the stress-strain response of laser powder bed fusion lattice structure Pietro Magaro' , University of Calabria, Italy
TM404 16:00-16:15	A roadmap for digitally transforming the operations of labour-intensive organisations Tiaan André Loots , Stellenbosch University / ESB Reutlingen, South Africa
16:30-18:15	Part B
TM405 16:30-15:45	Introducing Ideation to Technical Students Using Explorative Teaching Case Study Manthiba Elizabeth Letsoalo , University of Limpopo, South Africa
TM407-A 16:45-17:00	Exploring the Impact of Family Stressors on Financial Behavior: A Study of Croatian Youth Dajana Barbic , Faculty of Economics&Business Zagreb, Croatia
TM003 17:00-17:15	Experimental Investigation into the Performance of a Laboratory Scale Steam Power Plant Gaonnwe Tshepo , UNISA, South Africa
TM040 17:15-17:30	Design and development of a water purifier system Delani Favours Ntobela , University of Johannesburg, South Africa
TM050 17:30-17:45	Industrial Symbiosis: A Panacea to Industrial Waste Management Challenges in Harare Petronella Nyakudya , University of Johannesburg, South Africa
TM041 17:45-18:00	Estimation of water quality indexes to customize the design of a water purifier system Delani Favours Ntobela , University of Johannesburg, South Africa
TM409 18:00-18:15	Personalizing the academics' demographic profiles towards switching and continued use of mobile applications Alfred Thaga Kgopa , Tshwane University of Technology, South Africa

● ONLINE SESSION 1

Saturday, May 27, 2023 (UTC+2)

14:45-17:00

Room A: 863 1590 4225

Power Machinery and Control Model

Chairperson: Prof. Madindwa Mashinini, University of Johannesburg, South Africa

TM039 14:45-15:00	Finite Element Analysis the Axle mount of an Aircraft Landing Gear Yupeng Jin , The University of Sydney, Australia
TM006 15:00-15:15	Performance Investigation of Air Mask: A Novel Personalized Ventilation Device Using CFD Simulation against Virus-laden Aerosols Krystal Ysavel P. Almeria , Industrial Technology Development Institute, Philippines
TM013 15:15-15:30	CFD Analyses of the Aerodynamic Effects on a Quadcopter Propeller in the Proximity of Fixed and Horizontal Moving Obstacles Charbel Hage , University of Burgundy, France
TM029 15:30-15:45	Application of Acoustic Digital Twin Model for Fault Monitoring of Heavy Duty Gearbox Cheng Lin , Southeast University, China
TM060 15:45-16:00	Reliability Analysis of Bending Fatigue of Spiral Bevel Gears Based on Stress-Strength Interference Theory Wen Zhang , Southeast University, China
TM001 16:00-16:15	Computer Aided Modelling and Investigation of the Performance of a Pump Impeller Produced using Fused Deposition Modelling Ilesanmi Afolabi Daniyan , Tshwane University of Technology, Pretoria, South Africa
TM1005 16:15-16:30	Modelling and Simulation of Emission Reduction of Diesel Engine by Phase Change Materials (PCM) Olawale Samuel Fatoba , University of Johannesburg, South Africa
TM033 16:30-16:45	Rotary friction welding of Ti-64 alloy: A review Mthobisi Zulu , Mangosuthu University of Technology, South Africa
TM048 16:45-17:00	Impact of heat exchanger length and porosity in a travelling-wave thermo-acoustic engine Accordance Ntimane , University of Johannesburg, South Africa

● ONLINE SESSION 2

Saturday, May 27, 2023 (UTC+2)

14:45-17:00

Room B: 896 9126 2461

Intelligent Manufacturing System and Measurement Technology

Chairperson: Prof. Theo van Niekerk, Nelson Mandela University, South Africa

TM058 14:45-15:00	Numerical simulation of cell migration and deformation with flow using a coupled lattice Boltzmann and phase-field method Ziyu Mao , Southeast University, China
TM063 15:00-15:15	Exploring the Attention Level of AR-HUD Interface Elements Based on Driving Scenarios Menglian Yu , Southeast University, China
TM069 15:15-15:30	Research on the Effects of Distraction-based Feedback Siwen Yao , Southeast University, China
TM070 15:30-15:45	An Appraisal Method for Web Interfaces Based on Aesthetic Measurement Lingna Zhang , Southeast University, China
TM1008 15:45-16:00	Discussion on the difference in the effect of multiple processing methods of vibration signals of hydropower units Chen Sun , Shanghai University of Electric Power, China
TM073 16:00-16:15	Designing an Economic EWMA Control Chart for Attribute Monitoring under Statistical Constraints Bara' El-Atrash , University of Sharjah, United Arab Emirates
TM406 16:15-16:30	The impact of cloud manufacturing on RAMI 4.0 Elisabeta Mihaela , University "1 Decembrie 1918" Of Alba Iulia, Romania
TM049 16:30-16:45	Design and structural analysis of a welding jig for the part family assembly of the top and lower brackets of a rail car system Ilesanmi Afolabi Daniyan , Tshwane University of Technology, Pretoria, South Africa
TM045 16:45-17:00	Applications of Artificial Neural Network in the prediction of water quality index Tshedza Murivhami , University of Johannesburg, South Africa

● ONLINE SESSION 3

Saturday, May 27, 2023 (UTC+2)

17:15-19:45

Room A: 863 1590 4225

Material Analysis and Manufacturing Process

Chairperson: Dr Kanakana-Katumba Grace, Tshwane University of Technology, South Africa

TM017 17:15-17:30	DESIGN OF AN OVINE FIBER CARDING AND SPINNING MACHINE TO ENHANCE YARN QUALITY AND PRODUCTION IN HIGH ANDEAN AREAS OF PERU Jhosep Sedano Clemente , Continental University, Peru
TM031 17:30-17:45	Investigating the Heat Transfer Characteristics of Fin-prolonged Heat Exchanger for Waste Heat Recovery Muhammad Sibtain , Southeast University, China
TM074 17:45-18:00	Analysis on the Industrial Applications of Flux Cored Arc Welding on an International Scale Allysa Mariel J. Ortiz, Gabriel P. Famadico, Raymund Carlo F. Tanap , Mapúa University, Philippines
TM071 18:00-18:15	Effect of preheating on mechanical properties and microstructural behaviour of friction stir welded copper joints Ngazibini Mayila , University of Johannesburg, South Africa
TM1004 18:15-18:30	Laser Cladding of Titanium Alloys: A Review S.B. Boshoman , University of Johannesburg, South Africa
TM034 18:30-18:45	Analytical Approach for Losses in Differential Amplifier Using Double-Gate MOSFET Thabiso Tekisi , University of KwaZulu-Natal, South Africa
TM028 18:45-19:00	Hard Turning Operation of Alloy Tool Steel (AISI D3) using Cubic Boron Cutting Tool Ilesanmi Afolabi Daniyan , Tshwane University of Technology, Pretoria, South Africa
TM1009 19:00-19:15	Acoustic-Based In-Situ Monitoring of Additive Manufacturing Fabrication: A Review Olawale Samuel Fatoba , University of Johannesburg, Johannesburg, South Africa
TM057 19:15-19:30	Investigation of Surface Roughness of Titanium Alloy (Ti6Al4V) during Turning Operation using the Re-sponse Surface Methodology Ilesanmi Afolabi Daniyan , Tshwane University of Technology, Pretoria, South Africa
TM008 19:30-19:45	Experimental Investigation of the Cutting Performance of SiAlON Ceramic Cutting Tool in Titanium Machining Solomon Phokobye , Tshwane University of Technology, Pretoria, South Africa

● ONLINE SESSION 4

Saturday, May 27, 2023 (UTC+2)

17:15-19:00

Room B: 896 9126 2461

Intelligent Robot and Mechanical System Design

Chairperson: Dr Mothibeli Pita, University of South Africa, South Africa

TM076 17:15-17:30	Optimized Design of Dynamic Stiffness of 6-DOF Tandem Robot Based on Response Surface Method Liangquan Xu , Southeast University, China
TM1001 17:30-17:45	Research on position keeping technology of five axis CNC machine tool under abnormal state in fixed Angle machining of swing shaft Guangku Xue , AVIC Chengdu Aircraft Industrial (Group) CO. LTD, Chengdu, China
TM055 17:45-18:00	Steady-State Vibration Responses of Open Cylindrical Shells Based on Reissner Theory Jian Jiang , Southeast University, China
TM061 18:00-18:15	Multilayer Neural Control of Aircrafts with Disturbance Compensation Zhiying Shi , Nanjing Tech University, China
TM065 18:15-18:30	Evaluation of the Effects of the Application of Roof Spoilers for Light Trucks using Computational Fluid Dynamics (CFD) Christian C. Gao , Mapúa University, Philippines
TM054 18:30-18:45	A Conceptual Design of Two DoF Crawler Tree Planting Robot With Helical Digging Arm Beyda TAŞAR , Fırat University, Turkey
TM064 18:45-19:00	Research on the Application of Metaverse Technology in the US Army Chengong Zhai , Department of Quartermaster Procurement, Army Logistics Academy of PLA, China

