



**Tshwane University  
of Technology**



**Programme for the**

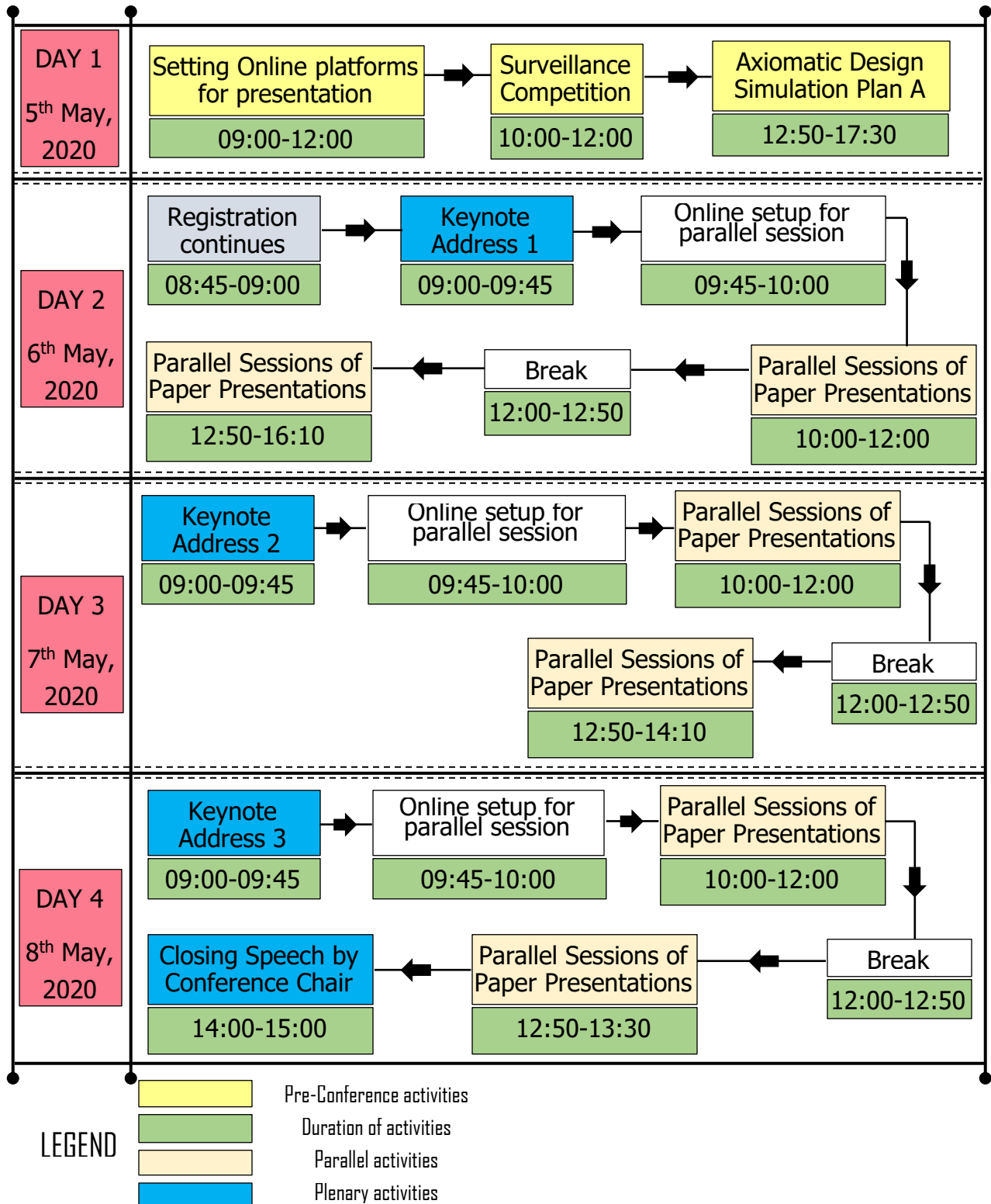
*30<sup>th</sup> CIRP Design Conference*

**05<sup>th</sup> to 08<sup>th</sup> May, 2020**

**Enhancing Design through the 4<sup>TH</sup>  
Industrial Revolution Thinking**

*Kruger National Park (Skukuza Rest Camp)  
South Africa*

# Overview of Conference Programme



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# Committees

## **INTERNATIONAL SCIENTIFIC COMMITTEE**

Prof. K. Mpopu (Republic of South Africa),  
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Prof. J. Fleischer (Germany)  
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Dr. N. Nishino (Japan)

## **LOCAL ORGANISING COMMITTEE**

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University of Technology (VUT)  
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University of Pretoria (UP)  
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VCG Advisory (Pty) Ltd  
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Council for Scientific and Industrial  
Research (CSIR)

## **ADMINISTRATIVE TEAM**

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Prof. Peter Butula  
Prof. John Trimble  
Dr. Olabanji Olayinka Mohammed  
Dr. Ramatsetse Boitumelo  
Dr. Daniyan Ilesanmi  
Dr. Olukorede Adenuga  
Dr. Ogbemhe John  
Mr. Giovanni Monzambe  
Mr. Xolani Skosana  
Ms. Khumbuzile Mdlalose  
Ms. Tsholofelo Mokolopo  
Mr. Trevor Shihundla

# Organizing Committee Partners



**Tshwane University  
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Tshwane University of  
Technology



The International  
Academy for Production  
Engineering



University of Cape Town



*our future through science*  
Council of Scientific and  
Industrial Research



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UNIVERSITEIT  
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Federal University of  
Technology Akure

# Sponsors



Gibela Rail Consortium  
Engineering



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## Conference Programme (All times is in UTC+2.00, Harare Pretoria)

<b>Tuesday, 5<sup>th</sup> May</b>
09:00 – Setting up of Online presentation platforms
10:00 – Surveillance Competition
12:50 – AXIOMATIC DESIGN SIMULATION PLAN A AND LECTURE

<b>Wednesday, 6<sup>th</sup> May</b>				
08:45 – Setting up of Online presentation platforms for plenary session				
09:00 – <b>Plenary Session (Opening session): Keynote Address 1: The ever-increasing complexity of engineered and natural systems that have become part of our lives in modelling and simulation. (Prof Nelwamondo)</b>				
09:45 – Tea/Coffee Break				
10:00 – Parallel Sessions				
Product design and Development ROOM A	Industry 4.0 and Design Concepts in Digital Manufacturing ROOM B	Innovative designs and concepts in manufacturing ROOM C	Design concepts in Additive manufacturing ROOM D	Product design and Development ROOM E
<b>A1-1</b> Design Considerations for the Touch Hand 4 <b>PROCIR-D-19-01243R1</b> Authors: Riaan Stopforth, Kiran Setty, Theo van Niekerk	<b>B1-1</b> Determining Customer-Focused Product Features through Social Network Analysis <b>PROCIR-D-19-01932R1</b> Authors: Xingzhi Wang; Yuchen Wang Ang Liu	<b>C1-1</b> Computer aided modelling and experimental validation for effective milling operation of titanium alloy (Ti6Al4V) <b>PROCIR-D-19-01122R1</b> Authors: Isaac Tlhabadira Ilesanmi Daniyan, Leonard Masu, Khumbulani Mpofu	<b>D1-1</b> Development of Barrel Finishing Machine to Improve Surface Finish of the Wire Arc Additive Manufactured Parts <b>PROCIR-D-19-01089R1</b> Authors: Yuvraj Kumar Madhukar, Anas Ullah Khan, M.E. Manish Patidar, B.E., Anand C	

			Petare, M.E., Rishiraj Chouhan, Pawan Chouhan, Balkrishan Vishwakarma, Umakant Sharma, Satish Kaushal, Deepak Dhepte, Yuvraj Kumar Madhukar,	
<p><b>A1-2</b> The Design Thinking Approach to students STEAM projects <b>PROCIR-D-19-01222R2</b> Authors: Vusumuzi Malele Manthiba E. Ramaboka</p>	<p><b>B1-2</b> Digital Twin-Driven Analysis of Design Constraints <b>PROCIR-D-19-01938</b> Authors: Yuchen Wang Xingzhi Wang Ang Liu</p>	<p><b>C1-2</b> A Computational Approach for Using Social Networking Platforms to Support Creative Idea Generation <b>PROCIR-D-19-01465</b> Authors: Ji Han; Dongmyung Park, Hannah Forbes, Dirk Schaefer</p>	<p><b>D1-2</b> Indirect Additive Manufacturing of resin components using polyvinyl alcohol sacrificial moulds <b>PROCIR-D-19-01462R1</b> Authors: Joaquin Montero Pablo Vitale Sebastian Weber Matthias Bleckmann Kristin Paetzold</p>	<p><b>E1-2</b> The effect of coolant velocity to enhance high speed permanent magnet generator efficiency efficiency <b>PROCIR-D-19-01187R1</b> Authors: Ramesh Kuppuswamy; Colin Richmond Azeem Khan</p>
<p><b>A1-3</b> Literature-based identification of success-relevant influencing factors of distributed product development <b>PROCIR-D-19-01321</b> Authors: Albert Albers Marion A. Weissenberger-Eibl; Katharina Duehr</p>	<p><b>B1-3</b> Industrie 4.0 – An empirical and literature-based study how product engineering is influenced by the digital transformation <b>PROCIR-D-19-01139R1</b> Authors: Albert Albers; Florian Marthaler, Markus Spadinger, Albert Albers</p>	<p><b>C1-3</b> Distributed Camera Architecture for Seamless Detection and Tracking of Dynamic Obstacles <b>PROCIR-D-19-01072R1</b> Authors: Michael Scholz; Jan Steinkamp, Jörg Franke</p>	<p><b>D1-3</b> An Economic Design and Development of the Wire Arc Additive Manufacturing Setup <b>PROCIR-D-19-01204R1</b> Authors: Yuvraj Kumar Madhukar; Anas Ullah Khan, Yuvraj Kumar Madhukar</p>	<p><b>E1-3</b> How to identify relevant product properties in the context of user-product interaction? <b>PROCIR-D-19-01636</b> Authors: Tina Schröppel Jörg Miehling Sandro Wartzack</p>

Katharina Zech; Fanny Seus				
<p><b>A1-4</b></p> <p>A contribution to the design of organizational structures suitable for Systems Engineering  <b>PROCIR-D-19-01149R1</b>  Authors: Lukas Helmut Bretz; Harald Anacker, Roman Dumitrescu,</p>	<p><b>B1-4</b></p> <p>Achieving resilience in the supply chain by applying IoT technology  <b>PROCIR-D-20-00024</b>  Authors: Moayad Al-Talib, Wasen Y. Melhem, Anthony I. Anosike , Jose Arturo Garza Reyes, Simon Peter Nadeem , Anil kumar</p>	<p><b>C1-4</b></p> <p>Enabling electropolishing of Complex selective laser melting Structures  <b>PROCIR-D-19-01314</b>  Authors: Urs Hofmann; Mirko Meboldt; Julian Ferchow</p>	<p><b>D1-4</b></p> <p>Manufacturability Assessment and Design for Additive Manufacturing  <b>PROCIR-D-19-01091R1</b>  Authors: Panagiotis Stavropoulos, Andreas K. Lianos Sotirios outsoukos Harry Bikas Panagiotis Stavropoulos</p>	<p><b>E1-4</b></p> <p>Developing a common understanding of business models from the product development perspective  <b>PROCIR-D-19-01670</b>  Authors: Albert Albers Gustav N. Basedow, Jonas Heimicke, Florian Marthaler, Markus Spadinger, Simon Rapp</p>
<p><b>A1-5</b></p> <p>Supporting Design Problem-exploring with Emergent Technologies  <b>PROCIR-D-19-01315</b>  Authors: Chijioke Obieke Jelena Milisavljevic-Syed, Ji Han</p>	<p><b>B1-5</b></p> <p>Process design and modelling for milling operation of titanium alloy (Ti6Al4V) Using the Taguchi method  <b>PROCIR-D-19-01080R1</b>  Authors: Ilesanmi Afolabi daniyan, Isaac Tlhabadira, Adefemi Adeodu, Solomon Phokobye, Khumbulani Mpofu</p>	<p><b>C1-5</b></p> <p>Ergonomic Design for Sausage Packing Hand Tool  <b>PROCIR-D-20-00021R1</b>  Authors: Haruetai Lohasiriwat, Worachok Chaiwong</p>	<p><b>D1-5</b></p> <p>Axiomatic Design of Customised Additive Manufacturing Artefacts  <b>PROCIR-D-19-01674</b>  Authors: Saint-Clair Toguem Tagne Charyar Mehdi-Souzani Hichem Nouira Nabil Anwer</p>	<p><b>E1-5</b></p> <p>An Approach to Develop Accessible and Affordable Products  <b>PROCIR-D-19-01257R1</b>  Authors: Ravindra Singh; Partha Pratim Das, M.Des</p>
<p><b>A1-6</b></p> <p>Customer-relevant Properties of</p>	<p><b>B1-6</b></p> <p>Review and comparison of the methods of Digital Twin construction</p>	<p><b>C1-6</b></p> <p>Effect of Loading on Stiffener Configurations for an Actiflo Clarifier</p>	<p><b>D1-6</b></p> <p>A Comparison of Layered Tetrahedral and Cartesian meshing in Additive</p>	<p><b>E1-6</b></p> <p>Encapsulation of sensory gripper fingers with silicone rubber</p>



Autonomous Vehicle Concepts <b>PROCIR-D-19-01154</b> R2 Authors: Ferdinand Schockenhoff, Adrian König, Alexander Koch; Markus Lienkamp	<b>PROCIR-D-19-01184</b> R2 Authors: Dmytro Adamenko Steffen Kunnen, Robin Pluhnau, André Loibl, Arun Nagarajah	<b>PROCIR-D-20-00025</b> Authors: Daramy Vandi Von Kallon, P. Maqina, K.N. Baloyi, M.D. Ledwaba, P.Pillay	Manufacturing Simulation <b>PROCIR-D-19-01672</b> Authors: Sebastian Weber; Joaquin Montero, Matthias Bleckmann, Kristin Paetzold	<b>PROCIR-D-19-01252</b> R1 Authors: Sebastian Hogreve; Martin Prigge Kim Oliver; Köbisch Kirsten Tracht
12:00 – Break				
12:50 – Parallel Session				
<b>Product design and Development ROOM A</b>	<b>Industry 4.0 and Design Concepts in Digital Manufacturing ROOM B</b>	<b>Innovative designs and concepts in manufacturing ROOM C</b>	<b>Innovative designs and concepts in manufacturing ROOM D</b>	<b>Product design and Development ROOM E</b>
<b>A1-7</b> Deep Learning for Automated Product Design <b>PROCIR-D-19-01145</b> R1 Authors: Carmen Krahe Antonio Bräunche Alexander Jacob	<b>B1-7</b> Lean Design for the 4th Industrial Revolution <b>PROCIR-D-19-01103</b> R1 Authors: Nathaniel Riley Davis, Aziz Zoher Companiwala, BE; Bernd Muschard, Natalie Petrusch	<b>C1-7</b> Design for Automatic Assembly: A new Approach to Classify Limp components <b>PROCIR-D-19-01193</b> R1 Authors: Jerome Norman Trommnau; Andreas Frommknecht; Jörg Siegert, Onorific; Johannes Wößner, Thomas Bauernhansl	<b>D1-7</b> Project-based learning in an engineering-design course – developing mechanicalengineering graduates for the world of work <b>PROCIR-D-19-01620</b> Authors: Ramesh Kuppuswamy; Duncan Mhakure	<b>E1-7</b> Generic gripper for an unmanned aerial vehicle <b>PROCIR-D-19-01244</b> Authors: Riaan Stopforth; Kiran Setty, Theo van Niekerk
<b>A1-8</b> Design of a Heavy-Duty Soft-Robotic-Gripper <b>PROCIR-D-19-01099</b> R1 Authors: Alexander Müller; Muhammed	<b>B1-8</b> Cyber-Physical Systems formalization in de- and remanufacturing and application to size reduction stage	<b>C1-8</b> Design and Application of a Digital Factory Model for Factory Restructuring <b>PROCIR-D-19-01206</b> R1 Authors: René Hellmuth,	<b>D1-8</b> Conceptualization of a Framework for the Design of Production Systems and Industrial Workplaces	<b>E1-8</b> Releasing principles for dry-adhesive handling of microobjects <b>PROCIR-D-19-01264</b> R1

Aydemir; Arne Glodde Franz Dietrich	<b>PROCIR-D-20-00022</b> R1 Authors: Marco Diani, M.D.Marcello Colledani	Jörg Frohnmayer	<b>PROCIR-D-19-01173</b> R1 Authors: Simon Schumacher, Bastian Pokorni Henry Himmelstoß Thomas Bauernhansl	Authors: Finn Meiners, Kirsten Tracht
<b>A1-9</b> Investigating Factors Influential on the Success of Social Product Development Initiatives <b>PROCIR-D-19-01131</b> R1 Authors: Hannah Forbes Dirk Schaefer , Ji Han, Francis Baumont De Oliveira.	<b>B1-9</b> Real Time IOT-Based Water Quality Management System <b>PROCIR-D-19-01241</b> Authors: Saif Allah H. AlMetwally Mohamed K. Hassan Mohamed H. Mourad	<b>C1-9</b> Towards Automated Automation Capability Assessment leveraging Deep Learning <b>PROCIR-D-19-01309</b> Authors: Raoul G. C. Schönhof; Manuel Fechter	<b>D1-9</b> Automation Potential Analysis of Assembly Processes based on 3D Product Assembly Models in CAD Systems <b>PROCIR-D-19-01231</b> R1 Authors: Alexander Neb Raoul Schoenhof Iyed Briki	<b>E1-9</b> Methodology and Application of Electric Vehicles Battery Packs Redesign for Circular Economy <b>PROCIR-D-20-00023</b> Authors: Luca Gentilini, Elena Mossali, Giulia Merati, Marcello Colledani
<b>A1-10</b> Objective based process model for enhancing the product maturity level in the early phase of a development process <b>PROCIR-D-19-01081</b> R1 Authors: Thilo Richter, David Schmidt, Holger Hahlweg Kamran Behdinan, Albert Albers	<b>B1-10</b> Classification of Industrial Augmented Reality Use Cases <b>PROCIR-D-19-01134</b> R2 Authors: "Daniel Röltgen Roman Dumitrescu,	<b>C1-10</b> A Modular Research Platform – Proof-of-Concept of a Flexible Experiment Setup Developed for Rapid Testing of Simulators, UIs and Human Physiology Sensors <b>PROCIR-D-19-01310</b> Authors: Leif Arne Hatlem, John Chen, Henrikke Dybvik, Martin Steinert	<b>D1-10</b> Modelling and analysis of manufacturing tasks for combined phase-out and ramp-up production <b>PROCIR-D-19-01171</b> R2 Authors: Thomas Bergs; Sebastian Apelt; Jan Rey Sebastian Barth	<b>E1-10</b> Harmonizing cross- departmental Perspectives on Modular Product Families <b>PROCIR-D-19-01671</b> R1 Authors: Erik Greve, Christoph Rennpferdt, Dieter Krause,

<p><b>A1-11</b> Migration of the Lean-Startup approach from High-Tech startups towards product design in large manufacturing companies <b>PROCIR-D-19-01328</b> Authors: Isabella R. Jesemann</p>	<p><b>B1-11</b> TrollBOT: A Spontaneous Networking Tool Facilitating Rapid Prototyping of Wirelessly Communicating Products <b>PROCIR-D-19-01684</b> Authors: Torjus Lines Steffensen; Sampsa Kohtala Håvard Vestad Martin Steinert</p>	<p><b>C1-11</b> Enabling condition based maintenance in precious metals processing <b>PROCIR-D-19-01678</b> Authors: "Paul Tarisai Mativenga, William J Ngoma, Jan-harm Pretorius,</p>	<p><b>D1-11</b> Design for manufacture and assembly of an intelligent single axis solar tracking system <b>PROCIR-D-19-01641R1</b> Authors: Prominent Munanga; Simon Chinguwa; Wilson R. Nyemba</p>	<p><b>E1-11</b> Design of a high-tech vending machine <b>PROCIR-D-19-01704R2</b> Vennan Sibanda, Lorraine Munetsi, Khumbulani Mpfu, Eriyeti Murena, John Trimble</p>
<p><b>A1-12</b> Dealing with development risk and complexity in planning situations within product engineering processes <b>PROCIR-D-19-01221R1</b> Authors: Albert Albers Jonas Heimicke, Christin Scheib</p>	<p><b>B-12</b> Synthetic prototype environment for industry 4.0 testbeds <b>PROCIR-D-19-01660R1</b> Authors: Roy Damgrave; Eric Lutters</p>	<p><b>C1-12</b> Design Automation and Additive Manufacturing for Anatomically Diversified Medical Simulators <b>PROCIR-D-19-01124R1</b> Authors: Christoph Klahn, Kaspar B`uhrerb, Reto Engelib, Mirko Meboldt</p>	<p><b>D1-12</b> Conceptualization and design of a small pyrolysis plant for the sustainable production of paraffin from plastic waste <b>PROCIR-D-19-01640R1</b> Authors: Ngonidzashe L. Shangwa, Simon Chinguwa, Wilson R. Nyemba, Tien-Chien Jen</p>	<p><b>E1-12</b> Alignment of the change to agile through method-supported evaluation of agile principles in physical product development <b>PROCIR-D-19-01637</b> Authors: Albert Albers Jonas Heimicke Sebastian Trost Markus Spadinger</p>
<p><b>A1-13</b> Design of the Top Tether component for the premium car market</p>	<p><b>B1-13</b> A Structured Approach for the instantiation of digital twins <b>PROCIR-D-19-01663R1</b></p>	<p><b>C1-13</b> Issues in distributed Engineering of SMEs over the Collaboration Life Cycle <b>PROCIR-D-19-01329R1</b></p>	<p><b>D1-13</b> Data-driven communication framework as personalized support for</p>	<p><b>E1-13</b> Assessing the Influence of Generational Product Variety on Modular</p>

<p>segment: case on Volvo Cars.</p> <p><b>PROCIR-D-19-01117</b>R1</p> <p>Authors: Kostas Styliadis Elias Al-Saidi, Arun Thomas Erinjery, Lars Lindkvist, Casper Wickman; Rikard Söderberg</p>	<p>Authors: Maaïke Slot; Peter Huisman, ing. Eric Lutters</p>	<p>Authors: Till Blüher Carmen Constantinescu, Marc Rügera</p>	<p>users of Automated Driver Assistance Systems (ADAS)</p> <p><b>PROCIR-D-19-01119</b>R1</p> <p>Authors: Julia Orlovska Casper Wickman, PhD Rikard Söderberg, professor</p>	<p>Product Structures and Components</p> <p><b>PROCIR-D-19-01669</b></p> <p>Authors: "Jan Küchenhof, Caspar Tabel, Dieter Krause,</p>
<p><b>A1-14</b></p> <p>Design of fish processing equipment: exploring cleaning brush performance and material properties to minimize biofilm deposits</p> <p><b>PROCIR-D-19-01116</b>R1</p> <p>Authors: Lars Andre Langøyli Giske; Lasse Henninen Lindstada, Trond Løvdalb, Ola Jon Mork</p>	<p><b>B1-14</b></p> <p>A conceptual framework for the development of smart products for elders within the Industry 4.0 context</p> <p><b>PROCIR-D-19-01692</b></p> <p>Authors: Carolina Sallati; Klaus Schützer</p>	<p><b>C1-14</b></p> <p>Measuring functional independence in design with deep-learning language representation models</p> <p><b>PROCIR-D-19-01676</b>R1</p> <p>Authors: Haluk Akay Sang-Gook Kim</p>	<p><b>D1-14</b></p> <p>Automatic simulation model implementation of robotic production cells in a 3D manufacturing simulation environment</p> <p><b>PROCIR-D-19-01093</b>R1</p> <p>Authors: Arik Laemmle, Carsten Seeber, Elena Kogan</p>	<p><b>E1-14</b></p> <p>Conceptual design of intelligent reconfigurable welding fixture for rail car manufacturing industry</p> <p><b>PROCIR-D-19-01657</b></p> <p>Authors: Walter Seloane, Khumbulani Mpofo, Boitumelo Ramatsetse, Dithoho Modungwa</p>
<p>16:10 – End of Day 1</p>				

## Thursday, 7<sup>th</sup> May

**09:00 – Plenary Session (Opening session): Keynote Address 2:** The state of the art on augmented reality for manufacturing and design issues. (Prof Dini)

09:45 – Tea/Coffee Break

10:00 – Parallel Session

Product design and Development ROOM A	Industry 4.0 and Design Concepts in Digital Manufacturing ROOM B	Innovative designs and concepts in manufacturing ROOM C	Product design and Development ROOM D	Innovative designs and concepts in manufacturing ROOM E
<p><b>A2-1</b> A Metadata Repository for Semantic Product Lifecycle Management <b>PROCIR-D-19-01225</b> Authors: Jens C. Göbel, Thomas Eickhoff, Andreas Eiden</p>	<p><b>B2-1</b> Ideation for digital platforms based on a companies' ecosystem <b>PROCIR-D-19-01659R1</b> Authors: Fabio Wortmann, Kai Ellermann, Arno Kühn, Roman Dumitrescu</p>	<p><b>C2-1</b> Elementary affordances: A study on physical user-product interactions <b>PROCIR-D-19-01638R1</b> Authors: Alexander Wolf, Sandro Wartzack, Jörg Miehling.</p>	<p><b>D2-1</b> A methodology for energy efficiency redesign of smart production systems <b>PROCIR-D-19-01104</b> Authors: Roberto Menghi; Marta Rossi, Alessandra Papetti, Michele Germani</p>	<p><b>E2-1</b> Supporting product design decision with a SysML design history Assistant <b>PROCIR-D-19-01108</b> Authors: Sébastien Bougain; Detlef Gerhard</p>
<p><b>A2-2</b> A Novel Test Bench to Investigate the Effects of the Tool Rotation on Cutting Fluid Jets to Improve the Tool Design via Additive Manufacturing <b>PROCIR-D-19-01181</b></p>	<p><b>B2-2</b> Digitalization of a Lean Product Development Organization <b>PROCIR-D-19-01668R1</b> Authors: Carsten Stechert</p>	<p><b>C2-2</b> Safety, Ergonomics and Efficiency in Human-Robot Collaborative Assembly: Design Guidelines and Requirements <b>PROCIR-D-19-01666</b> Authors: Luca Gualtieri</p>	<p><b>D2-2</b> Visualization of requirements engineering data to analyse the current product maturity in the early phase of product development <b>PROCIR-D-19-01107</b></p>	<p><b>E2-2</b> Model of PGE – Product Generation Engineering by the Example of Autonomous Driving <b>PROCIR-D-19-01693</b> Authors: Albert Albers, Joshua Fahl, Tobias Hirschter, Marvin Endl,</p>

Authors: Thomas Lakner. T. Bergs, D. Schraknepper		Erwin Rauch Renato Vidoni Dominik T. Matt	Authors: Thilo Richter, André Felber, Peter M. Troester, Albert Albers; Kamran Behdinan	Rebecca Ewert, Simon Rapp
<b>A2-3</b> Influencing factors on the retrospective analysis of variation shares with C&C <sup>2</sup> A-based criteria in PGE – Product Generation Engineering <b>PROCIR-D-19-01667R1</b> Authors: Simon Rapp Moritz Barg Thomas Klotz Clemens Birk Albert Albers	<b>B2-3</b> Development of risk-optimized implementation paths for Industry 4.0 based on socio-technical pattern <b>PROCIR-D-19-01690R2</b> Daniela Hobscheidt Arno Kühn, Roman Dumitrescu	<b>C2-3</b> Advancing empirical evidence of iteration stereotypes in the fuzzy front end of product development processes <b>PROCIR-D-19-01136R1</b> Authors: Johannes Heck; Dirk Schaefera , Ji Hana, Francis Baumont De Oliveira	<b>D2-3</b> Development of a Sensor Controlled Convertible Cart-trolley <b>PROCIR-D-19-01218</b> Authors: Modestus Okwu, M.O Okwu, L.K.Tartibu , O.I Olayode	<b>E2-3</b> Opportunities for railway transportation system through artificial intelligence: review <b>PROCIR-D-19-01677</b> Authors: Ndala Yves Mulongo, Grace Kanakana-Katumba
<b>A2-4</b> Optimal assembly sequence based on design for assembly (DFA) rules <b>PROCIR-D-19-01687R1</b> Authors: Melckenbeeck Ine Sofie Burggraeve Bart Van Doninck Jeroen Vancraen Albert Rosich	<b>B2-4</b> A digital modelling approach for design configuration and manufacturing exemplified by a self-balancing scooter <b>PROCIR-D-19-01208</b> Authors: Theresa Breckle; Johannes Burkhart, Manuel Ramsaiera, Markus Till	<b>C2-4</b> Design of process parameters for the manufacturing of wrapped connections with single solid round wires using the explicit finite element analysis single solid round wires using the explicit finite element analysis <b>PROCIR-D-19-01688R1</b> Authors: Florian Hefner Julian Praß	<b>D2-4</b> Design of a Test Stand for Lifetime Assessment of Flat Belts in Power Transmission <b>PROCIR-D-19-01168</b> Authors: Varun Urundolil Kumaran; Markus Zogg, Lukas Weiss, Konrad Wegener	<b>E2-4</b> Petri net controlled virtual commissioning – A virtual design-loop approach <b>PROCIR-D-19-01213</b> Authors: Benjamin Illmer, Martin Karkowski, Michael Vielhaber

		Philipp Kirchner Jörg Franke		
<b>A2-5</b> Development of a design catalogue for the characteristics- and properties-based selection of generic car body components <b>PROCIR-D-19-01680</b> Authors: Johannes Altach Benjamin Bader Tim Fröhlich Dominik Klaiber Thomas Vietor	<b>B2-5</b> Enhancement of human-centered workplace design and optimization with Exoskeleton technology <b>PROCIR-D-19-01230</b> Authors: Daniele Ippolito, Carmen Constantinescu, Claudiu Alin Rusu	<b>C2-5</b> Integrating Carbon Fiber Based Piezoresistive Composites for Flow Characterization in in-vitro Cell Research Equipment <b>PROCIR-D-19-01694</b> Authors: Håvard Vestad, Carlo Kriesi, Martin Steinert	<b>D2-5</b> Design concept for the intralogistics material supply in matrix productions <b>PROCIR-D-19-01191</b> Authors: Christian Lukas Fries; Hans-Hermann Wiendahl; Anwar Al Assadi	<b>E2-5</b> Human-centered design for improving the workplace in the footwear sector <b>PROCIR-D-19-01105</b> Authors: Alessandra Papetti, Marta Rossi Roberto Menghi Michele Germani
<b>A2-6</b> Bridging gender and human-centered design: a design verification study <b>PROCIR-D-19-01702R1</b> Authors: Bahar Khayamian Esfahani, Richard Morris; Mark Erickson	<b>B2-6</b> Meta-model based generation of solution spaces in sheet-bulk metal forming <b>PROCIR-D-19-01673</b> Authors: Christopher Sauer, Benjamin Schleich, Sandro Wartzack	<b>C2-6</b> Gene-inspired Development of Innovative Design: Principles and Algorithm <b>PROCIR-D-19-01689</b> Authors: Wei Zhang Mark Price Trevor Robinson Declan Nolan Peter Kilpatrick Sakil Barbhuiya	<b>D2-6</b> Approach for assessment of suitable automotive component ranges for the application of multi material design <b>PROCIR-D-19-01205</b> Authors: Benjamin Bader Johannes Altach Eiko Türec Thomas Vietor	<b>E2-6</b> Value-centered design of a digital service robotics platform <b>PROCIR-D-19-01679R1</b> Authors: Joern Steffen Menzefricke, Maximilian Frank, Marvin Drewel, Roman Dumitrescu
12:00 – Break				
12:50 – Parallel Session				



Product design and Development ROOM A	Innovative designs and concepts in manufacturing ROOM B	Innovative designs and concepts in manufacturing ROOM C	Product design and Development ROOM D	Innovative designs and concepts in manufacturing ROOM E
<p><b>A2-7</b> On the Applicability of Agile Development Methods to Design for Additive Manufacturing <b>PROCIR-D-19-01675</b> Authors: Jannik Reichwein Sven Vogel Stefan Schork Eckhard Kirchner</p>	<p><b>B2-7</b> Applying Supervised and Reinforcement Learning to Design Product Portfolios in Accordance with Corporate Goals PROCIR-D-19-01112R1 Authors: Michael Riesener, Christian Dölle, Christopher Dierkes Merle-Hendrikje Jank</p>	<p><b>C2-7</b> Application of Artificial Intelligence on Traffic Congestion of Autonomous Vehicles at Signalized Road Intersection <b>PROCIR-D-19-01196</b> Authors: lagouge Tartibu, Isaac Oyeyemi Olayode, Modestus Okwu</p>	<p><b>D2-7</b> Evaluation Model for Mobility Design of Learning Factories <b>PROCIR-D-19-01935</b> Authors: Natalie Petrusch; Wolf Schliepack Holger Kohl</p>	<p><b>E2-7</b> User-friendly, requirement-based assistance for production workforce using an asset administration shell design <b>PROCIR-D-19-01237</b> Authors: Anwar Al Assadi, Chrstian Fries, Manuel Fechter Benjamin Maschler Daniel Ewert, Samir Grimm; Georg Schnauffer Michael Zürn; Sunita Ariali Matthias Reichenbach</p>
<p><b>A2-8</b> Industrial design thinking and innovations propelled by the Royal Academy of Engineering in Sub-Saharan Africa for capacity building <b>PROCIR-D-19-01691R1</b></p>		<p><b>C2-8</b> Systemic Assessment and Selection of Material and Joining Technology Exemplarily Applied on the Automotive Bodywork <b>PROCIR-D-19-01203</b> Authors: Jerome Arndt Kaspar; Saphir A. Choudry,</p>	<p><b>D2-8</b> Dealing with Ecological Validity and User Needs when Developing Simulation Based Training Equipment – Case Study of a Medical Palpation Task Trainer <b>PROCIR-D-19-01939</b></p>	<p><b>E2-8</b> Identification of evaluation criteria for algorithms used within the context of product development <b>PROCIR-D-19-01239</b> Authors: Michael Mendl-Heinisch</p>



Authors: Wilson R. Nyemba, Tauyanashe Chikuku, Jennifer R. Chiroodza, Basil Dube, Keith F. Carter Mku T. Ityokumbul, Lovemore Magombo		Michael Vielhaber,	Authors: Daniel Nygaard Ege; Oscar Lilleløykken Marius Auflem, Martin Steinert	Christian Doellea, Michael Mendl- Heinisch; Niclas Klumpen
14:10 – End of Day 2				

## Friday, 8<sup>th</sup> May

09:00– Plenary Session (Opening session): Keynote Address 3: Cloud manufacturing and sustainable manufacturing, its effective on the environment and the economy on a global scale. (Prof. Lihui Wang)

09:45 – Tea/Coffee Break

10:00 – Parallel Session

Product design and Development ROOM A	Industry 4.0 and Design Concepts in Digital Manufacturing ROOM B	Innovative designs and concepts in manufacturing ROOM C	Product design and Development ROOM D	Innovative designs and concepts in manufacturing ROOM E
<p><b>A3-1</b> Antagonizing Ambiguity – Towards a Taxonomy for Agile Development <b>PROCIR-D-19-01930R2</b> Alexander Atzberger Anne Wallisch, Simon Nicklas, Kristin Paetzold</p>	<p><b>B3-1</b> Optimizing the Design Review Process for Cyber-Physical Systems using Virtual Reality <b>PROCIR-D-19-01940</b> Authors: Stefan Adwernat, Mario Wolf Detlef Gerhard</p>	<p><b>C3-1</b> Cognitive Quality: An Unexplored Perceived Quality Dimension in the Automotive Industry <b>PROCIR-D-19-01683</b> Authors: Alina Maria Braun, Kostas Stylidis Casper Wickman, Rikard Söderberg</p>	<p><b>D3-1</b> Impact and risk analysis in the integrated development of product and production system <b>PROCIR-D-19-01658</b> Authors: Tobias Stürmlinger Dinah Jost Constantin Mandel Matthias Behrendt Albert Albers</p>	<p><b>E3-1</b> Addressing Circularity to Product Designers: Application to a Multi-Cell Power Electronics Converter <b>PROCIR-D-19-01110R1</b> Authors: Maud Rio, Khawla Khannoussi Jean-Christophe Crebier, Researcher Yves Lembeye, Peggy Zwolinski,</p>
<p><b>A3-2</b> Prescriptive Modelling System Design for An Armature Multi-coil Rewinding Cobot <b>PROCIR-D-19-01238-R1</b> Authors: Alice Elizabeth Matenga, Eriyeti Murena, Khumbulani Mpofu</p>	<p><b>B3-2</b> Haptic Interaction in Virtual Reality Environments for Manual Assembly Validation <b>PROCIR-D-19-01937</b> Authors: Simon Kind, Andreas Geiger, Nora Kießling Michael Schmitz, Rainer Stark</p>	<p><b>C3-2</b> Convolutional Neural Network for geometric deviation prediction in Additive Manufacturing <b>PROCIR-D-19-01661</b> Authors: Zuowei Zhu Kévin Ferreira Nabil Anwer Luc Mathieu</p>	<p><b>D3-2</b> An explorative approach to deriving future scenarios: A first comparison of the consistency-based and the catalog-based approach to generating future scenarios <b>PROCIR-D-19-01645</b> Authors: Florian Marthaler,</p>	<p><b>E3-2</b> Design of a small-scale granite stone crusher <b>PROCIR-D-19-01695R2</b> Roy Nyasha Mushonga, Tauyanashe Chikuku, Wilson R. Nyemba, Tendai Sakala</p>

		Kai Guo Lihong Qiao	Andreas Siebe, Gesck Johannes, Albert Alber	
<b>A3-3</b> Functional design and performance evaluation of a metal handheld detector for land mines detection <b>PROCIR-D-19-01859</b> R3 Ilesanmi Afolabi Daniyan, Ph.D Lufuno Madavha, Timothy Laseinde, Khumbulani Mpofo	<b>B3-3</b> The impact of the 4th industrial revolution on the design fields of innovation management <b>PROCIR-D-19-01158</b> R1 Authors: Nadine Niewöhner, Laban Asmar, Daniel Röltgen, Arno Kühn and Roman Dumitrescu	<b>C3-3</b> Smart contract based framework to increase transparency of manufacturing networks <b>PROCIR-D-19-01083</b> R1 Authors: Fabian Tobias Dietrich; Daniel Palma, Louis Louw	<b>D3-3</b> Use of Virtual Reality in Product Development by Distributed Teams <b>PROCIR-D-19-01662</b> Authors: Hans-Patrick Balzerkiewitz, Carsten Stechert	<b>E3-3</b> The Effect of Silane Treated TiO <sub>2</sub> Nanoparticles on The Thermal Performance of Polymer Composites <b>PROCIR-D-19-01697</b> Authors: Kwame Anane-Fenin, Esther Titilayo Akinlabia, Nicolas Perry
<b>A3-4</b> Design of a Control System for a Vending Machine <b>PROCIR-D-19-01944</b> Authors: Vennan Sibanda Solomon Sibanda, Eriyeti Muren, Khumbulani Mpofo	<b>B3-4</b> An Adaptive Industrial Internet of things (IIOTs) Based Technology for Prediction and Control of Cavitation in Centrifugal Pumps <b>PROCIR-D-19-01316</b> R4 Adefemi Adeodu, Ilesanmi Daniyan, Olusegun Omitola, Oluwole Akinola, Esoso Agbor, Chinoyelum Ejimuda	<b>C3-4</b> Conceptualization of the optimal design of a hydroxyl booster dry cell for enhancing efficiency of internal combustion engines <b>PROCIR-D-19-01706</b> R2 Chinguwa Simon, Esther T. Akinlabi, Tien-Chien Jen	<b>D3-4</b> From Design for Assembly to Design for Collaborative Assembly - Product Design Principles for Enhancing Safety, Ergonomics and Efficiency in Human-Robot Collaboration <b>PROCIR-D-19-01665</b> Authors: Luca Gualtieri, Gabriele Pasetti, Monizza Erwin Rauch, Renato Vidoni, Dominik T. Matt	<b>E3-4</b> Manufacturing data-driven process adaptive design method <b>PROCIR-D-19-01934</b> R1 Wei Wei, Jun Yuan, Ang Liu
<b>A3-5</b> Towards a Health 4.0 Framework for the Design of Wearables: Leveraging Human-	<b>B3-5</b> 3D scan process optimisation study for rapid virtualization. <b>PROCIR-D-19-01682</b> R3	<b>C3-5</b> A Systems Approach to Functional Design of a Sustainable State-Owned	<b>D3-5</b> Conceptualization, development and design of a mortar spraying machine	<b>E3-5</b> System-based concept for a mixed reality supported maintenance

Centered and Robust Design <b>PROCIR-D-19-01933</b> Authors: Melania Faraja Bause, MA Hannah Forbesa, Farnaz Nickpoura, Dirk Schaefer	Angus Potter Fitzpatrick Paul K. Collins, Ian Gibson,	Basic Education System in an Emerging Economy <b>PROCIR-D-19-01220R2</b> Authors: Michael Ayomoh	<b>PROCIR-D-19-01642R2</b> Wilson R. Nyemba, Ngonidzashe L. Shangwa, Simon Chinguwa, Charles Mbohwa	phase of an industrial plant <b>PROCIR-D-19-01147</b> Authors: Steffen Kunnen; Dmytro Adamenko; Robin Pluhnau; André Loibl Arun Nagarajah
<b>A3-6</b> From Functions to Structure: towards Architectural Innovations in Aeronautical Products using Energy Flow Approach <b>PROCIR-D-19-01701</b> Authors: Corentin Malchair, M.D. Jérôme Pailhes, Marco Montemurro	<b>B3-6</b> The CASAD Matrix Method: Introduction of a Technique for the Documentation, Analysis, and Optimization of Context-Aware Systems <b>PROCIR-D-19-01311R2</b> Patrick Rosenberger, Manfred Grafinger, Detlef Gerhard, Martin Hennig, Stefan Dumss	<b>C3-6</b> Framework and Functionality Patterns for Smart Service Innovation <b>PROCIR-D-19-01696</b> Authors: Christian Koldewey, Maurice Meyer, Patrick Stockbrügger, Roman Dumitrescu, Jürgen Gausemeier, Fabio Wortmann	<b>D3-6</b> Managing knowledge and parameter dependencies with MBSE in textile product development processes <b>PROCIR-D-19-01217</b> Authors: Ricarda Riedel Georg Jacobs Christian Konrad Rahul Singh Jonathan Sprehe	<b>E3-6</b> Status quo and quo vadis: creativity techniques and innovation methods for generating extended innovation processes <b>PROCIR-D-19-01188</b> Authors: Christian Vocke, Carmen Constantinescu, Daniela Popescu
12:00 – Break				
12:50 – Parallel Session				
<b>Product design and Development ROOM A</b>	<b>Industry 4.0 and Design Concepts in Digital Manufacturing ROOM B</b>	<b>Innovative designs and concepts in manufacturing ROOM C</b>	<b>Innovative designs and concepts in manufacturing ROOM D</b>	<b>Product design and Development ROOM E</b>
<b>A3-7</b> Design for Flexibility – Evaluation Interactions between Product Properties and Production Processes	<b>B3-7</b> Intelligent Transportation Systems, Un-signalized Road Intersections and Traffic Congestion in Johannesburg <b>PROCIR-D-19-01685</b>	<b>C3-7</b> Sampling-based Tolerance-Cost Optimization of Systems with Interrelated Key Characteristics <b>PROCIR-D-19-01132R1</b>	<b>D3-7</b> Beyond Model-Based Systems Engineering towards Manufacturing Excellence <b>PROCIR-D-19-01320R1</b>	<b>E3-7</b> Statistical Model Verification and Validation Concept for Automotive Vehicle

<p><b>PROCIR-D-19-01698R1</b>  Authors: David; Schneider; Tim Fröhlich  Thomas Vietor</p>	<p>Authors: Iagouge Tartibu,  Isaac Olayode Oyeyemi,  Modestus Okwu</p>	<p>Authors: Martin Hallmann;  Benjamin Schleich; Sandro  Wartzack.</p>	<p>Authors: Jonathan Masior, Dipl.-Ing.  Benjamin Schneider  Mehmet Kürümlüoglu,  Dipl.-Ing.  Oliver Riedel</p>	<p>Dynamics Simulation  Simulations  <b>PROCIR-D-19-01082R1</b>  Authors: Benedikt Danquah  Stefan Riedmaier, Johannes Rühm,  Svenja Kalt, Markus Lienkamp</p>
<p><b>A3-8</b>  Development of a Design Education Platform for an Interdisciplinary Teaching Concept  <b>PROCIR-D-19-01686R1</b>  Emil Heyden Jan Küchenhof, Erik Greve,  Dieter Krause</p>	<p><b>B3-8</b></p>	<p><b>C3-8</b></p>	<p><b>D3-8</b>  Understanding energy use in the South African manufacturing industry  <b>PROCIR-D-19-01664R1</b>  Authors: Kelvin Kan Paul Mativenga  Annлизé Marnewick</p>	<p><b>E3-8</b>  Human-centered design approach for manufacturing assistance systems based on design sprints  <b>PROCIR-D-19-01098-R1</b>  Authors: Bastian Pokorni, Jan Zwerina,  Moritz Hämmerle.</p>
<p>14:00 – Closing Speech by Conference Chair</p>				
<p>15:00 – End of Day 3</p>				