"54th CIRP Conference on Manufacturing Systems, 2021"
Towards Digitalized Manufacturing 4.0
22-24 September 2021, Athens, Greece

CIRP CMS 2021 Full Program

Program-at-a-glance

Day 1: 6 Parallel Sessions 08:30 – 17:30 CET*
Day 2: 6 Parallel Sessions 08:30 – 17:00 CET
Day 3: 5 Parallel Sessions 08:30 – 18:00 CET
*Time zone CET (Central European Time)

- **Paper Presentation: 15 min**
- **Questions & Answers (Q/A): 5 min**
- **Manuscript number is the Elsevier ID: (e.g. PROCIR-D-XX-XXXXX)**

Submission Statistics & Publication Information

- **Accepted Papers – 331**
- **Submissions from – 35 Countries**
- **Proceedings will be published on Procedia CIRP (by Elsevier B.V.), which is indexed in the EI Compendex & Scopus databases**
- **Special Issues with selection of enhanced papers in: IJCIM, other journals to be announced**

LMS
Laboratory for Manufacturing Systems & Automation

Abbreviation	Topic
ML	Machine Learning
ONT	Ontologies & Knowledge Management
CPS	Cyber-Physical Systems
DT_IoT	Digital Twins, Internet of Things (IoT) & Simulation
PSM	Planning, Scheduling & Maintenance
PSS	Product-Service Systems (PSS)
BAT	Battery Manufacturing
ROB	Robotic and Assembly Systems
MPD	Manufacturing Processes & Design
SEN	Sensing, Process Monitoring & Control
ADD	Additive Manufacturing
SYS	Manufacturing Systems
MAN	Management
AR/VR/MR	Augmented, Virtual & Mixed Reality
EDU	Education & Teaching
ENG	Energy
LCE	Life-Cycle Engineering
MX	Mixed-Session

Wednesday 22/09/2021 – DAY 1 **Password for DAY 1: cms54day#1**			
08:30 – 09:00 CET **09:00 – 10:00**	***Opening Ceremony*** ***George Chryssolouris (Lab. For Manufacturing Systems and Automation – LMS)*** ***Conference Overview: Dimitris Mourtzis (LMS)*** **Keynote 1: Dimitris Mourtzis "Smart Manufacturing and Tactile Internet Powered by 5G: Investigation of Current Developments, Challenges, and Future Trends"** **Keynote 2: Panagiotis Stavropoulos "The Environmental Impact of Manufacturing and the LMS approach"**		***Zoom Link***
10:00 – 11:40		**MANUFACTURING SYSTEMS (SYS)** **SESSION S1.1** ***Zoom Link S1.1 SYS*** **Session Chair: D. ROMERO**	
	10:00 – 10:20	PROCIR-D-20-00431	Smart Manufacturing as a framework for Smart Mining Vidosav Majstorovic, Vladimir Simeunovic, Radivoje Mitrovic, Dragan Stosic, Sonja Dimitrijevic, Zarko Miskovic,* Radivoje Mitrovica, Dragan Stosic, Sonja Dimitrijevic
	10:20 – 10:40	PROCIR-D-20-00503	**Towards a model for evaluating the investment of reconfigurable and platform-based manufacturing concepts considering footprint adaptability** Stefan Kjeldgaard*, Andreas Leon Jorsal, Vanessa Albrecht, Ann-Louise Andersen, Thomas Ditlev Brunoe, Kjeld Nielsen
	10:40 – 11:00	PROCIR-D-20-00993	**Towards smart manufacturing logistics: A case study of potentials of smart label data in electronics manufacturing** Daniel Mueller*, Florian Vogelsang
	11:00 – 11:20	PROCIR-D-20-00590	**An Ecosystem for Digital Shadows in Manufacturing** Christian Brecher, Manuela Dalibor, Bernhard Rumpe, Katrin Schilling*, Andreas Wortmann
	11:20 – 11:40	PROCIR-D-20-00645	**Towards The Resilient Operator 5.0: The Future of Work in Smart Resilient Manufacturing Systems** David Romero, Johan Stahre*
10:00 – 11:40		**DIGITAL TWINS & INTERNET OF THINGS AND SIMULATION (DT & IoT)** **SESSION S2.1** ***Zoom Link S2.1 DT&IOT*** **Session Chair: G. PUTNIK**	
	10:00 – 10:20	PROCIR-D-20-00388	Simulation of order processing in global production networks Michael Milde*, Fabian Sippl, Gunther Reinhart
	10:20 – 10:40	PROCIR-D-20-00405	**Continuous adaption through real data analysis turn simulation models into digital twins** Leonard Overbeck*, Oliver Brützel, Michael Teufel, Nicole Stricker, Andreas Kuhnle, Gisela Lanza[a]
	10:40 – 11:00	PROCIR-D-20-00440	**Technical and digital twin concept of an industrial heat transfer station for low exergy waste heat** Thomas Kohne*, Max Burkhardt, Lukas Theisinger, Matthias Weigold
	11:00 – 11:20	PROCIR-D-20-00457	**Digital thread in shipbuilding as a prerequisite for the digital twin** Konrad Jagusch,* Jan Sender, David Jericho, Wilko Flügge
	11:20 – 11:40	PROCIR-D-20-00460	**An architecture for sim-to-real and real-to-sim experimentation in robotic systems** Rok Vrabič*, Gasper Škulj, Andrej Malus, Dominik Kozjek, Luka Selak, Drago Bračun, Primož Podržaj
10:00 – 11:40		**MACHINE LEARNING (ML)** **SESSION S3.1** ***Zoom Link S3.1 ML*** **Session Chair: D. CEGLAREK**	
	10:00 – 10:20	PROCIR-D-20-00397	Benchmarking of Data Preprocessing Methods for Machine Learning - Applications in Production Maik Frye*, Johannes Mohren, Robert H. Schmitt
	10:20 – 10:40	PROCIR-D-20-00411	**Identification of welds geometrical elements in ultrasound scans data using deep learning** Etienne Provencal*, Luc Laperrière
	10:40 – 11:00	PROCIR-D-20-00464	**Machine learning based identification of energy states of metal cutting machine tools using load profiles** Lars Petruschke*, Jessica Walther, Max Burkhardt, Max Luther, Matthias Weigold
	11:00 – 11:20	PROCIR-D-20-00470	**Turning Process Monitoring with Deep Neural Network Trained by FEM Simulation** Takashi Misaka*, Jonny Herwan, Ichiro Ogura, Yoshiyuki Furukawa
	11:20 – 11:40	PROCIR-D-20-00484	**Convolutional neural network with dual inputs for time series ice prediction on rotor blades of wind turbines** Markus Kreutz*, Abderrahim Ait Alla, Kamaloddin Varasteh, Jan-Hendrik Ohlendorf, Michael Lütjen, Michael Freitag, Klaus-Dieter Thoben

Wednesday 22/09/2021 – DAY 1 Password for DAY 1: cms54day#1			
10:00 – 11:40		MANUFACTURING PROCESSES & DESIGN (MPD) SESSION S4.1 *Zoom Link S4.1 MPD* Session Chair: S. NEWMAN	
	10:00 – 10:20	PROCIR-D-20-00395	**Simulation of friction between diamond and polycrystalline cubic boron nitride** Ulrich Müller*, Sebastian Prinz, Sebastian Barth, Thomas Bergs
	10:20 – 10:40	PROCIR-D-20-00699	**Influence of heat treatment on the residual stress-related machining distortion of Ti-6Al-4V alloy monolithic parts** M. Landwehr*, F. Oehler, H. Behnken, H. Holling, R. Sambathkumar, P. Ganser, T. Bergs
	10:40 – 11:00	PROCIR-D-20-00722	**Study of the influence of the hardening rule on a multi-step global manufacturing process modeling.** Diego Britez*, Sana Werda, Raynald Laheurte, Philippe Darnis, Olivier Cahuc
	11:00 – 11:20	PROCIR-D-20-00478	**A Real-World Application of Process Mining for Data-Driven Analysis of Multi-Level Interlinked Manufacturing Processes** Alexander Birk, Yannick Wilhelma, Simon Dreher, Christian Flack, Peter Reimann, Christoph Grögerc
	11:20 – 11:40	PROCIR-D-20-00569	**Development of a concept for the use of low-temperature emulsion in drilling of Inconel 718** Timo Rinschede*, Dirk Biermann, Ivan Iovkov, Milan Bücker
10:00 – 11:40		ADDITIVE MANUFACTURING (AD) SESSION S5.1 *Zoom Link S5.1 ADD* Session Chair: O. AVRAM	
	10:00 – 10:20	PROCIR-D-20-00412	**Decision Approach for the Design and Sensor Integration of an LPBF Manufactured Gripper End Effector** Philipp Bickendorf*, Martin Zäpfel, Anurag Salian, Günther Schuh, Georg Bergweiler
	10:20 – 10:40	PROCIR-D-20-00454	**Laser Ablation Adaptive Slicing for Shape Deviation Control of Additively Manufactured Parts** Oliver Avrama*, Marco Menerini, Anneke Orlandini, Anna Valente, Emanuele Carpanzano
	10:40 – 11:00	PROCIR-D-20-00482	**Cost-efficient, true silicon printer with variable material spectrum for individualized medical applications** Sina Martin*, Lukas Gugel, Thomas Martin, Alexander Preis, Sebastian Reitelshöfer, Jörg Franke
	11:00 – 11:20	PROCIR-D-20-00493	**Dynamic modeling of additive manufacturing process chains for end-use part manufacturing** Mathias Wiese, Antal Der, Alexander Leiden, Tim Abraham, Christoph Herrmann, Sebastian Thiede
	11:20 – 11:40	PROCIR-D-20-00496	**Detection of Defects in Solidified Layers within Laser-based Powder Bed Fusion using Active Thermography** Fabian Herzer*, Franswa Abraham, Christoph Tammer, Georg Schlick, Christian Seidel, Johannes Schilp
10:00 – 11:40		MANAGEMENT (MAN) SESSION S6.1 *Zoom Link S6.1 MAN* Session Chair: K. ALEXOPOULOS	
	10:00 – 10:20	PROCIR-D-20-00386	**Modularization Across Managerial Levels and Business Domains; Literature Review & Research Direction** Morten Skogstad Nielsen*, Ann-Louise Andersen, Thomas Ditlev Brunoe, Kjeld Nielsen
	10:20 – 10:40	PROCIR-D-20-00393	**Identification and systematization of strategic technology demands in production** Quirin Gärtner*, Andreas Hofer, Gunther Reinhart
	10:40 – 11:00	PROCIR-D-20-00423	**Time- and Cost-Efficient Specification and Evaluation of Manufacturing Changes through Iterative Information Acquisition** L. Hermann*, A. Weber, A. Beckers, S. Barth, T. Bergsa
	11:00 – 11:20	PROCIR-D-20-00436	**Starting points for digital shop floor management in production enterprises** Alyssa Meissner*, David Scherer, Joachim Metternich
	11:20 – 11:40	PROCIR-D-20-00443	**Maturity-based Development of Strategic Thrusts for Socio-technical Risks** Joern Steffen Menzefricke, Ingrid Wiederkehr, Christian Koldewey, Prof. Dr.-Ing. Roman Dumitrescu*
11:40 – 11:50	Coffee Break		

Wednesday 22/09/2021 – DAY 1 Password for DAY 1: cms54day#1			
11:50 – 13:30		MANUFACTURING SYSTEMS (SYS) SESSION S1.2 *Zoom Link S1.2 SYS* Session Chair: D. ROMERO	
	11:50 – 12:10	PROCIR-D-20-00656	**A Tool for the Comparison of Concept Designs of Reconfigurable Manufacturing Systems** Alessia Napoleone*, Thomas Ditlev Brunoe, Ann-Louise Andersen, Kjeld Nielsen
	12:10 – 12:30	PROCIR-D-20-00687	**Modular Design Method for Reconfigurable Manufacturing Systems** Thomas Ditlev Brunoe*, Daniel GH Soerensen, Kjeld Nielsen
	12:30 – 12:50	PROCIR-D-20-00744	**Smart Manufacturing in the Wooden Single-Family House Industry – Status of Industry 4.0** Alexander Vestin* , Kristina Säfsten
	12:50 – 13:10	PROCIR-D-20-00764	**Data driven automatic parameter inference for robotic assembly programs** Philipp Stephan*, Jessica Fisch, Alperen Can, Oliver Heimann, Gregor Thiele, Jörg Krüger
	13:10 – 13:30	PROCIR-D-20-00975	**Hyperconnected Architecture for High Cognitive Production Plants** Francisco Javier Huertos*, Manuel Masenlle, Beatriz Chicote, Mikel Ayuso
11:50 – 13:30		DIGITAL TWINS & INTERNET OF THINGS AND SIMULATION (DT_IoT) SESSION S2.2 *Zoom Link S2.2 DT&IOT* Session Chair: G. PUTNIK	
	11:50 – 12:10	PROCIR-D-20-00469	A digital twin-based framework for task planning and robot programming in HRC Weibo Ren, Xiaonan Yang, Yan Yan, Yaoguang Hu*, Lixiang Zhang
	12:10 – 12:30	PROCIR-D-20-00486	**Architecture of a Human-Digital Twin as Common Interface for Operator 4.0 Applications** Andreas Löcklin*, Tobias Jung, Nasser Jazdi, Tamás Ruppert, Michael Weyrich
	12:30 – 12:50	PROCIR-D-20-00525	**Evidential Reasoning based Digital Twins for Performance Optimization of Complex Systems** Ananda Chakraborti*, Arttu Heininen, Saara Väänänen, Kari T. Koskinen, Henri Vainio
	12:50 – 13:10	PROCIR-D-20-00546	**A meta-model for modular composition of tailored human digital twins in Production** Elias Montini*, Andrea Bettoni, Michele Ciavotta, Emanuele Carpanzano, Paolo Pedrazzoli
	13:10 – 13:30	PROCIR-D-20-00567	**A digital twin framework for the simulation and optimization of production systems** Itziar Ricondo*, Alain Porto, Miriam Ugarte
11:50 – 13:30		MACHINE LEARNING (ML) SESSION S3.2 *Zoom Link S3.2 ML* Session Chair: D. CEGLAREK	
	11:50 – 12:10	PROCIR-D-20-00485	Regularization-based Continual Learning for Anomaly Detection in Discrete Manufacturing Benjamin Maschler*, Thi Thu Huong Pham, Michael Weyrich
	12:10 – 12:30	PROCIR-D-20-00492	**Data Driven Joining Models for Simulation-based Assembly Learning** Arik Lämmle*, Jonas Krauß, Ramez Awad
	12:30 – 12:50	PROCIR-D-20-00504	**Smart Image Inspection using Defect-Removing Autoencoder** Yusuke Hida*, Savvas Makariou, Sachio Kobayashi
	12:50 – 13:10	PROCIR-D-20-00545	**Industrial Applications of Artificial Intelligence: From Grand Stories of Digital Disruption to Actual Progress** Albrecht Fritzsche*, Philipp Gölzer
	13:10 – 13:30	PROCIR-D-20-00597	**Data-based quality analysis in machining production: Influence of data pre-processing on the results of machine learning models** Amina Ziegenbein*, Joachim Metternich

Wednesday 22/09/2021 – DAY 1 Password for DAY 1: cms54day#1			
11:50 – 13:30		MANUFACTURING PROCESSES & DESIGN (MPD) SESSION S4.2 *Zoom Link S4.2 MPD* Session Chair: S. NEWMAN	
	11:50 – 12:10	PROCIR-D-20-00555	**Influence of Part Geometry and Feature Size on the Resulting Microstructure and Mechanical Properties of the Case Hardening Steel 16MnCr5 processed by Laser Powder Bed Fusion** Matthias Schmitt*, Florian Gerstl, Max Boesele, Max Horn, Georg Schlick, Johannes Schilp, Gunther Reinhart
	12:10 – 12:30	PROCIR-D-20-00570	**Influence of Temperature in Front Face Flow Drilling and Thread Forming of Lightweight Cast Alloys** Nils Felinks*, Yashar Sarafraz, Jannis Saelzer, Frank Walther, Dirk Biermann
	12:30 – 12:50	PROCIR-D-20-00601	**Potential of the Recycling of Grinding Sludge by various Powder Metallurgical Processes** Sebastian Jäger*, Sebastian Weber, Arne Röttger
	12:50 – 13:10	PROCIR-D-20-01180	**Study on Machining Process Performance of Turbine Blade Based by MQL** Ling Chen, Xin Guo*, Zengfeng Duan, Xun Yang
	13:10 – 13:30	PROCIR-D-20-00952	**On assessing grindability of recycled and ore-based crankshaft steel: an approach combining data analysis with material science** Philipp Hoier*, Peter Hammersberg, Uta Klement, Peter Krajnik
11:50 – 13:30		ADDITIVE MANUFACTURING (AD) SESSION S5.2 *Zoom Link S5.2 ADD* Session Chair: O. AVRAM	
	11:50 – 12:10	PROCIR-D-20-00520	**Approach to an optimized printing path for additive manufacturing in construction utilizing FEM modeling** Lukas Lachmayer*, Virama Ekanayaka, André Hürkamp, Annika Raatz
	12:10 – 12:30	PROCIR-D-20-00536	**Upscaling strategies for polymer additive manufacturing: an assessment from economic and environmental perspective for SLS, MJF and DLP** Sebastian Thiede*, Mathias Wiese, Christoph Herrmann
	12:30 – 12:50	PROCIR-D-20-00561	**Effect of heat treatment on residual stress and wear resistance of CX stainless steel manufactured by Selective Laser Melting** Cheng Chang, Xingchen Yan*, Zhaoyang Deng, Qingkun Chu, Sihao Deng, Rodolphe Bolot, Mahdi Chemkhi, Min Liu, Hanlin Liao, Julien Gardan
	12:50 – 13:10	PROCIR-D-20-00579	**Long-term cycle-tests of an additively manufactured soft ring-gripper** Florian Schreiber, Martin Manns
	13:10 – 13:30	PROCIR-D-20-00591	**Parametric compensation scheme for increasing the geometrical accuracy of lattice structures in medical implants produced by powder bed fusion** Max Horn*, Lukas Kocha, Mario Schafnitzel, Matthias Schmitt, Georg Schlick, Johannes Schilp, Gunther Reinhart
11:50 – 13:30		MANAGEMENT (MAN) SESSION S6.2 *Zoom Link S6.2 MAN* Session Chair: K. ALEXOPOULOS	
	11:50 – 12:10	PROCIR-D-20-00445	**Evaluation model for cooperative inventory pooling-systems** Yannic Hafner*, Julius Bock, Christofer Keppler and Johannes Fottner
	12:10 – 12:30	PROCIR-D-20-00452	**Supply Risk Exposure Measurement in Manufacturing Supply Networks: An Index Construction Approach** Marc Wiedenmann*, Andreas Größler
	12:30 – 12:50	PROCIR-D-20-00501	**Concept for Enabling Customer-oriented Data Analytics via Integration of Production Process Improvement Methods and Data Science Methods** Friedrich Morlock, Mario Boßlau
	12:50 – 13:10	PROCIR-D-20-00538	**Investigating the applicability of modular function deployment in the process industry** Rasmus Andersen*, Thomas D. Brunoe and Kjeld Nielsen
	13:10 – 13:30	PROCIR-D-20-00662	**A Methodology for Flexible Configuration of Change Management Processes** Sajedeh Haghi*, Fabian Sippl, Lukas Zink, Gunther Reinhart
13:30 – 14:00	Lunch Break		

Wednesday 22/09/2021 – DAY 1 Password for DAY 1: cms54day#1			
14:00 – 15:40		MANUFACTURING SYSTEMS (SYS) SESSION S1.3 *Zoom Link S1.3 SYS* Session Chair: D. BRISSAUD	
	14:00 – 14:20	PROCIR-D-20-00539	**Reconfigurable Manufacturing Development: Insights on Strategic, Tactical, and Operational Challenges** Carin Rösiö* and Ann-Louise Andersen
	14:20 – 14:40	PROCIR-D-20-01178	**Optimizing reconfigurable manufacturing systems: A Simulation-based Multi-objective Optimization approach** Carlos Alberto Barrera Diaz*, Masood Fathi, Tehseen Aslam, Amos H.C. Ng
	14:40 – 15:00	PROCIR-D-21-00012	**A Smart Manufacturing Cell with Distributed Intelligence** Santhana Pandiyan Muniraj, Carter Apas-Cree, Jordan Roberts Radford, Jan Polzer, Xun Xu
	15:00 – 15:20	PROCIR-D-21-00018	**Solving Facility Layout Problem with safety consideration of Reconfigurable Manufacturing and Assembly Systems** Mariem Besbes*, Yassine IDEL Mahjoub, Therese Bonte, Thierry Berger, Yves Sallez, Marc Zolghadri
	15:20 – 15:40	PROCIR-D-20-00516	**The changing role of shop-floor operators in zero defect manufacturing** Eirin Lodgaard*, Daryl Powell
14:00 – 15:40		DIGITAL TWINS & INTERNET OF THINGS AND SIMULATION (DT_IoT) SESSION S2.3 *Zoom Link S2.3 DT&IOT* Session Chair: A. PADOVANO	
	14:00 – 14:20	PROCIR-D-20-00568	**Effects of Digital Twin Simulation Modelling on a Flexible and Jigless Production Concept in Automotive Body Shops** Günther Schuh, Georg Bergweiler, Mayur Vasant Chougule and Falko Fiedler*
	14:20 – 14:40	PROCIR-D-20-00574	**Enhancing an Intelligent Digital Twin with a Self-organized Reconfiguration Management based on Adaptive Process Models** Timo Müller*, Benjamin Lindemann, Tobias Jung, Nasser Jazdi, Michael Weyrich
	14:40 – 15:00	PROCIR-D-20-00596	**The Digital Twin in Order Processing** Sarah Bernadette Wagner*, Michael Milde, Gunther Reinhart
	15:00 – 15:20	PROCIR-D-20-00598	**Finite element modelling of temperature in cylindrical grinding for future integration in a digital twin** Arttu Heininen*, Romaric Prod'hona, Hossein Mokhtarian, Eric Coatanéa, Kari Koskinen
	15:20 – 15:40	PROCIR-D-20-00615	**Innovative Relations within the Software Application for Industry 4.0** Peter Pavol Monka*, Katarina Monkova
14:00 – 15:40		MACHINE LEARNING (ML) SESSION S3.3 *Zoom Link S3.3 ML* Session Chair: L. MONOSTORI	
	14:00 – 14:20	PROCIR-D-20-00599	**Separating Entangled Workpieces in Random Bin Picking using Deep Reinforcement Learning** Marius Moosmann*, Marco Kulig, Felix Spenrath, Manuel Mönniga, Simon Roggendorf, Oliver Petrovic, Richard Bormann, Marco F. Huber
	14:20 – 14:40	PROCIR-D-20-00602	**Data-driven Analysis of Product Property Propagation to Support Process-integrated Quality Management in Manufacturing Systems** Marc-André Filz*, Sebastian Gellrich, Felix Lang, Jakob Zietsch, Tim Abraham, Christoph Herrmann
	14:40 – 15:00	PROCIR-D-20-00603	**A machine learning-based image processing approach for robotic assembly system** Xi Vincent Wang*, Jaume Soriano Pinter, Zhihao Liu, Lihui Wang
	15:00 – 15:20	PROCIR-D-20-00604	**Deep Transfer Learning for Improved Product Quality Prediction: A Case Study of Aluminum Gravity Die Casting** Sebastian Gellrich*, Marc-André Filz, Anna-Sophia Wilde, Thomas Beganovic, Alexander Mattheus, Tim Abraham, Christoph Herrmann
	15:20 – 15:40	PROCIR-D-20-00622	**Knowledge Discovery in Heterogeneous and Unstructured Data of Industry 4.0 Systems: Challenges and Approaches** Simon Kamm*, Nasser Jazdia, Michael Weyrich

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14:00 – 15:40		MANUFACTURING PROCESSES & DESIGN (MPD) SESSION S4.3 *Zoom Link S4.3 MPD* Session Chair: P. STAVROPOULOS	
	14:00 – 14:20	PROCIR-D-20-00684	**A Technological and Economic Potential Analysis of Measurement Systems in Geometrical Quality Assurance** Philipp Bauer*, Laurin Gottschall, Alejandro Magaña Flores, Andreas Hofer, Gunther Reinhart
	14:20 – 14:40	PROCIR-D-20-00737	**Dynamic properties of an air bearing drive system for manufacturing of twist-free surfaces by start-stop turning** František Žůrek, Thomas Junge*, Andreas Nestler, Stephan Schaller, Andreas Schubert
	14:40 – 15:00	PROCIR-D-20-00489	**Virtual Single Flank Testing – Applications for Industry 4.0** M. Willecke*, J. Brimmers, C. Brecher
	15:00 – 15:20	PROCIR-D-20-00407	**Addressing information asymmetry during design: customer-centric approach to harmonization of car body split-lines** Kostas Stylidis*, Monica Rossi, Jonas Žukas, Rikard Söderberg
	15:20 – 15:40	PROCIR-D-20-01007	**Design and implementation of a holistic framework for data integration in industrial machine and sensor networks** Jonas Hillenbrand*, Philipp Gönnheimer, Eduard Gerlitz, Jürgen Fleischer
14:00 – 15:40		ADDITIVE MANUFACTURING (AD) SESSION S5.3 *Zoom Link S5.3 ADD* Session Chair: E. CARPANZANO	
	14:00 – 14:20	PROCIR-D-20-00610	**Heat treatment effect on 17-4PH stainless steel manufactured by Atomic Diffusion Additive Manufacturing (ADAM)** M.A. Bouaziz, J. Marae Djouda, M. Chemkhi*, M. Rambaudon, J. Kauffmann, F. Hild
	14:20 – 14:40	PROCIR-D-20-00616	**Effects of Mechanical Post-Treatments on Additive Manufactured 17-4PH Stainless Steel Produced by Bound Powder Extrusion** M. Chemkhi*, J. Marae Djouda, M.A. Bouaziz, J. Kauffmann, F. Hild, D. Retraint
	14:40 – 15:00	PROCIR-D-20-00702	**Structural optimization of additively manufactured polymer tools for flexible sheet metal forming** Michael Geueke*, Peter Frohn-Sörensen, Jonas Reuter, Nithin Padavu, Tamara Reinicke, Bernd Engel
	15:00 – 15:20	PROCIR-D-20-00723	**Additively manufactured, particle-filled damping structures with magnetorheological fluids** Kim Torben Werkle*, Christian Menze, Thomas Stehle, Hans-Christian Möhring
	15:20 – 15:40	PROCIR-D-20-00416	**In-Situ defect detection and monitoring for laser powder bed fusion using a multi-sensor build platform** Clemens Maucher*, Kim Torben Werkle, Hans-Christian Möhring
14:00 – 15:40		MANAGEMENT (MAN) SESSION S6.3 *Zoom Link S6.3 MAN* Session Chair: A. PAPACHARALAMPOPOULOS	
	14:00 – 14:20	PROCIR-D-20-00564	**Environment Modeling for Evaluating System Variants in Model-Based Systems Engineering** Dustin White*, Nada Sahlab, Nasser Jazdi, Michael Weyrich
	14:20 – 14:40	PROCIR-D-20-00670	**Risk Management in Factory Planning – A Literature Review** Peter Burggräf, Tobias Adlon, Steffen Schupp*, Jan Salzwedel
	14:40 – 15:00	PROCIR-D-20-00762	**Intelligent waste management system for metalwork-copper industry** P. Aivaliotis, I. Anagiannis, N. Nikolakis, K. Alexopoulos*, S. Makris
	15:00 – 15:20	PROCIR-D-20-00983	**Disruption attributes for low-volume, complex product assembly** Stephan Breiter*, Julia C. Arlinghaus
	15:20 – 15:40	PROCIR-D-21-00016	**Customizable Operation Center for Smart Security Management** Christoph Engel*, Dr. Steffen Menckea, Robert Heumüller, Ricardo Hormann, Hagen Aedtner, Prof. Frank Ortmeier
15:40 – 15:50		Coffee Break	

Wednesday 22/09/2021 – DAY 1 Password for DAY 1: cms54day#1			
15:50 – 17:30		MANUFACTURING SYSTEMS (SYS) SESSION S1.4 *Zoom Link S1.4 SYS* Session Chair: D. BRISSAUD	
	15:50 – 16:10	PROCIR-D-20-00474	**Tools, application areas and challenges of factory simulation in Small and Medium-Sized Enterprises – A Review** Fei Yua*, Chen Zheng
	16:10 – 16:30	PROCIR-D-20-00694	**Towards a robust digital production and logistics network by implementing flexibility measures** Alexandra Birkmaier*, Bernhard Oberegger, Andreas Felsberger, Gerald Reiner, Wilfried Sihn
	16:30 – 16:50	PROCIR-D-20-00966	**Multi-objective operating point optimization of manufacturing systems** Paul Molenda*, Tom Drews, Oliver Oechsle
	16:50 – 17:10	PROCIR-D-20-00417	**How Distributed Ledger Technologies affect business models of manufacturing companies** Johannes Mayer*, Philipp Niemietz, Daniel Trauth, Thomas Bergs
	17:10 – 17:30	PROCIR-D-20-00957	**Decision Support for Frugal Products and Production Systems based on Product-Process-Resource-Skill & Variability Models** Yazgül Fidana*, Arndt Lüder, Kristof Meixner, Laura Baumann, Julia C. Arlinghaus
15:50 – 17:30		DIGITAL TWINS & INTERNET OF THINGS AND SIMULATION (DT_IoT) SESSION S2.4 *Zoom Link S2.4 DT&IOT* Session Chair: A. PADOVANO	
	15:50 – 16:10	PROCIR-D-20-00627	**Concept for Interaction of Hardware Simulation and Embedded Software in a Digital Twin Based Test Environment** Vladimir Kutscher*, Thiago Weber Martins, Johannes Olbort, Reiner Anderl
	16:10 – 16:30	PROCIR-D-20-00641	**A Data-driven Digital Twin of CNC Machining Processes for Predicting Surface Roughness** V.S. Vishnu, Kiran George Varghese, B. Gurumoorthy
	16:30 – 16:50	PROCIR-D-20-00665	**Design and development of Automation Equipment based on Digital Twins and Virtual Commissioning** Jesper Puggaard de Oliveira Hansen*, Elias Ribeiro da Silva, Arne Bilberg, Carsten Bro
	16:50 – 17:10	PROCIR-D-20-00677	**Digital Twin: Finding Common Ground – A Meta-Review** Kim Jessica Kuehner*, Richard Scheer, Steffen Strassburger
	17:10 – 17:30	PROCIR-D-20-00685	**A Framework for Digital Twins for Production Network Management** Martin Benfer*, Sina Peukert, Gisela Lanza
15:50 – 17:30		MACHINE LEARNING (ML) SESSION S3.4 *Zoom Link S3.4 ML* Session Chair: L. MONOSTORI	
	15:50 – 16:10	PROCIR-D-20-00632	**Object detection in factory based on deep learning approach** Li Yi*, Carina Siedler, Yann Kinkel, Moritz Glatt, Patrick Kölsch, Jan C. Aurich
	16:10 – 16:30	PROCIR-D-20-00648	**Systematic Planning of Quality Inspection Strategies in Manufacturing Systems** Marc-André Filz*, Jan Philipp Bosse, Christoph Herrmann
	16:30 – 16:50	PROCIR-D-20-00649	**A computer vision system for saw blade condition monitoring** Nicolas Jourdan*, Tobias Biegel, Volker Knauthe, Max von Buelow, Stefan Guthe, Joachim Metternich
	16:50 – 17:10	PROCIR-D-20-00664	**Machine Learning use case in manufacturing – an evaluation of the model's reliability from an IT security perspective** Beatriz Bretones Cassoli*, Amina Ziegenbein, Joachim Metternich, Siniša Đukanović, Julien Hachenberger, Martin Laabs
	17:10 – 17:30	PROCIR-D-20-00692	**Dealing with High Dimensional Sequence Data in Manufacturing** Uzma Iffat, Eric Roseren, Mohamed Laib*

Wednesday 22/09/2021 – DAY 1 Password for DAY 1: cms54day#1			
15:50 – 17:30		AUGMENTED/VIRTUAL/MIXED REALITY (AR/VR/MR) SESSION S4.4 *Zoom Link S4.4 AR/VR/MR* Session Chair: Session Chair: P. STAVROPOULOS	
	15:50 – 16:10	PROCIR-D-20-00552	**An adaptable framework to provide AR-based work instructions and assembly state tracking using an ISA-95 ontology** Dorothy Gors, Merwan Birem, Roeland De Geest, Corentin Domken, Vasilios Zogopoulos, Steven Kauffmann, Maarten Witters*
	16:10 – 16:30	PROCIR-D-20-00401	**Usability study of a user-friendly AR assembly assistance** Alexander Neb*, David Brandt, Ramez Awad, Silvana Heckelsmüller,Thomas Bauernhansl
	16:30 – 16:50	PROCIR-D-20-00414	**Adapting Augmented Reality Systems to the users' needs using Gamification and error solving methods** Jessica Ulmer*, Sebastian Braun, Chi-Tsun Cheng, Steve Dowey, Jörg Wollert
	16:50 – 17:10	PROCIR-D-20-00475	**Adaptive Spatial Augmented Reality for Industrial Site Assembly** Patrick Rupprecht*, Hans Kueffner-Mccauley, Majesa Trimmel, Sebastian Schlund
	17:10 – 17:30	PROCIR-D-20-00487	**Implications of Virtual Reality on Environmental Sustainability in Manufacturing Industry: A Case Study** Xiaoxia Chen*, Liang Gong, Anton Berce, Björn Johansson, Mélanie Despeisse
15:50 – 17:30		ADDITIVE MANUFACTURING (AD) SESSION S5.4 *Zoom Link S5.4 ADD* Session Chair: E. CARPANZANO	
	15:50 – 16:10	PROCIR-D-20-00727	**Automated porosity assessment of parts produced by Laser Powder Bed Fusion using Convolutional Neural Networks** Jan Klein, Martin Jaretzki*, Michael Schwarzenberger, Steen Ihlenfeldt, Welf-Guntram Drossel
	16:10 – 16:30	PROCIR-D-20-00954	**Development of a systematic approach to identify non-value-adding operations in the LBM process chain** Hajo Groneberga*, Jan Koller, Alexander Mahr, Frank Döpper
	16:30 – 16:50	PROCIR-D-20-00995	**High Strength Aluminium Alloys in Laser-Based Powder Bed Fusion – a Review** Julie Langedahl Leirmo
	16:50 – 17:10	PROCIR-D-20-01165	**IoT and Machine learning for in-situ process control using Laser Based Additive Manufacturing (LBAM) case study** David Miller, Boyang Song*, Michael Farnsworth, Divya Tiwari, Felicity Freeman, Iain Todd, Ashutosh Tiwari
	17:10 – 17:30	PROCIR-D-20-00666	**Development of handling system concepts for additive process chains with Laser** Rainer Horstkotte*, Florian Heinrich, Marcel Prümmer, Kristian Arntz, Thomas Bergs
15:50 – 17:10		MANAGEMENT (MAN) SESSION S6.4 *Zoom Link S6.4 MAN* Session Chair: A. PAPACHARALAMPOPOULOS	
	15:50 – 16:10	PROCIR-D-20-00668	**A maturity model to assess digital employee competencies in industrial enterprises** Markus Steinlechner, Andreas Schumacher*, Benedikt Fuchs, Luisa Reichsthaler, Sebastian Schlund
	16:10 – 16:30	PROCIR-D-20-00752	**Aiming for Industry 4.0 Maturity? The risk of higher digitalization levels in buyer-supplier relationships** Markus Burger*, Melanie Kessler, Julia Arlinghaus
	16:30 – 16:50	PROCIR-D-21-00225	**Workarounds in application and use of manufacturing software as enablers to organizational change** Catrine Eleonor Larssona, Bjørn Andersen, Kristian Martinsen*
	16:50 – 17:10	PROCIR-D-20-00565	**Opportunities for Managing Incremental and Radical Innovation in Production** Mattias Hedman*, Lisa Larsson, Anna Öhrwall Rönnbäck

Thursday 23/09/2021 – DAY 2 Password for DAY 2: cms54day#2			
08:30 – 09:30	***Keynote 3:** Alexandre Dolgui "Combinatorial optimization approaches for the preliminary design of machining systems"* ***Keynote 4:** Sotiris Makris "Industrial human robot collaboration for flexible manufacturing"*		***Zoom Link***
09:30 – 11:10		**MANUFACTURING SYSTEMS (SYS)** **SESSION S1.5** ***Zoom Link S1.5 SYS*** **Session Chair: T. KAIHARA**	
	09:30 – 09:50	**PROCIR-D-20-00488**	**Data-Based Supply Chain Collaboration – Improving Product Quality in Global Production Networks by Sharing Information** Rainer Silbernagel*, Christian Wagner, Alexander Albers, Thies-Uwe Trapp , Gisela Lanza
	09:50 – 10:10	**PROCIR-D-20-00637**	**A visualization framework for product manufacturing data** Liu Xuemei* Yang Xiaolang
	10:10 – 10:30	**PROCIR-D-20-00450**	**Work Center Performance Measurement Based On Multiple Time Series** Roman Ungern-Sternberg*, Christoph Leipoldt, Klaus Erlach
	10:30 – 10:50	**PROCIR-D-20-00459**	**Concept for the development of a Lean 4.0 reference implementation strategy for manufacturing companies** Fabian Dillinger*, Moritz Kagerer, Gunther Reinhart
	10:50 – 11:10	**PROCIR-D-20-00461**	**The productivity impact of the digitally connected 5 – layer stack in manufacturing enterprises** Adolfo Crespo del Castillo, John Patsavellas*,, Konstantinos Salonitis, Christos Emmanouilidis
09:30 – 11:10		**DIGITAL TWINS & INTERNET OF THINGS AND SIMULATION (DT_IOT)** **SESSION S2.5** ***Zoom Link S2.5 DT & IOT*** **Session Chair: A. NASSEHI**	
	09:30 – 09:50	**PROCIR-D-20-00672**	**An Improved Pigeon-inspired Optimization Algorithm for Solving Dynamic Facility Layout Problem with Uncertain Demand** Xu Zhun, Xu Liyun*, Ling Xufeng
	09:50 – 10:10	**PROCIR-D-20-00707**	**A dynamic job rotation scheduling conceptual framework by a human representing digital twin** Venkata Krishna Rao Pabolu,*, Divya Shrivastava
	10:10 – 10:30	**PROCIR-D-20-01179**	**A multi-objective tool selection method using FAHP and cosine similarity** Yuchen Long, Wu Zhao*, Ling Chen
	10:30 – 10:50	**PROCIR-D-20-00757**	**A multi-level model for realizing data-driven maintenance in manufacturing enterprises: Use case of jewelry production** Klaudia Kovacs*, Clemens Heistracher, Jakob Giner, Wilfried Sihn, Jürgen Schneeweiss
	10:50 – 11:10	**PROCIR-D-20-00963**	**Life Cycle of a Digital Resource Twin: Meta-Modeling and Application Example** Martin Sjarov*, Tobias Lechler, Eva Russwurm, Jonathan Fuchs, Florian Faltus, Eike Schäffer, Matthias Brossog, Jörg Franke
09:30 – 11:10		**MACHINE LEARNING (ML)** **SESSION S3.5** ***Zoom Link S3.5 ML*** **Session Chair: K. MARTINSEN**	
	09:30 – 09:50	**PROCIR-D-20-00697**	**AI-based topology optimization of freehand sketches** Enno Garrelts*, Marco Huber, Daniel Roth, Hansgeorg Binz
	09:50 – 10:10	**PROCIR-D-20-00714**	**Condition monitoring of critical industrial assets using high performing low-cost MEMS accelerometers** Agusmian Partogi Ompusunggu*, Kerem Eryılmaz, Karel Janssen
	10:10 – 10:30	**PROCIR-D-20-01014**	**Concept and methodology for automated data preprocessing of object recognition algorithm training** Vlad-Calin Albota*, Stefan Giosan, Raul Matei, Carmen Constantinescu
	10:30 – 10:50	**PROCIR-D-20-00726**	**Holistic Concept Towards a Reference Architecture Model for Predictive Maintenance** Eckart Uhlmann, Julian Polte, Nikolaos-Stefanos Koutrakis*
	10:50 – 11:10	**PROCIR-D-20-00729**	**Transparent and Interpretable Failure Prediction of Sensory Time Series Data with Convolutional Neural Networks** Richard Meyes* Nils Hütten, Tobias Meisen

Thursday 23/09/2021 – DAY 2 Password for DAY 2: cms54day#2			
09:30 – 11:10		AUGMENTED, VIRTUAL AND MIXED REALITY (AR/VR/MR) Session S4.5 *Zoom Link S4.5 AR/VR/MR* Session Chair: J. ANGELOPOULOS	
	09:30 – 09:50	PROCIR-D-20-00522	**A Framework to Establish an Assistance System by Using Reality Technology in Maintenance** Magdalena Bertele, Dominik Lucke*, Johannes L. Jooste
	09:50 – 10:10	PROCIR-D-20-00400	**A novel approach to generate augmented reality assembly assistance automatically from CAD models** Alexander Neb*, David Brandt, Greg Rauhöft, Ramez Awad, Johannes Scholz, Thomas Bauernhansl
	10:10 – 10:30	PROCIR-D-20-00650	**Image-based state tracking in Augmented Reality supported assembly operations** Vasilios Zogopoulos,*, Merwan Birem, Roeland De Geest, Robbert Hofman, Lode Jorissen, Bram Vanherle, Dorothy Gors
	10:30 – 10:50	PROCIR-D-20-00660	**Food 4.0: Implementation of the Augmented Reality Systems in the Food Industry** Sandeep Jagtap*, Prateek Saxena, Konstantinos Salonitis
	10:50 – 11:10	PROCIR-D-20-00673	**The Acceptance of Augmented Reality as a Determining Factor in Intralogistics Planning** Anke Rohacz*, Steffen Strassburger
09:30 – 11:10		ROBOTIC AND ASSEMBLY SYSTEMS (ROB) SESSION S5.5 *Zoom Link S5.5 ROB* Session Chair: S. MAKRIS	
	09:30 – 09:50	PROCIR-D-20-00389	**Development of measuring systems for contact force and relative velocity in robot-guided centrifugal finishing** Marius Ohler*, Tim Schriever, Sebastian Prinz, Sebastian Barth, Thomas Bergs
	09:50 – 10:10	PROCIR-D-20-00394	**Evaluation of a Digital Worker Assistance System to enable Adaptive Task Sharing between Humans and Cobots in Manufacturing** Christina Schmidbauer*, Bernd Hader, Sebastian Schlund
	10:10 – 10:30	PROCIR-D-20-00435	**Leveraging multimodal data for intuitive robot control towards human-robot collaborative assembly** Sichao Liu, Lihui Wang, Xi Vicent Wang, Clayton Cooper, Robert X. Gao
	10:30 – 10:50	PROCIR-D-20-00455	**Automated one-off production in woodworking by Part-to-Tool** Marten Stepputat*, Florian Beuss, Uwe Pfletscher, Jan Sender, Wilko Fluegg
	10:50 – 11:10	PROCIR-D-20-00607	**Identifying human intention during assembly operations using wearable motion capturing systems including eye focus** Martin Manns*, Tadele Belay Tuli, Florian Schreiber
09:30 – 11:10		ENERGY (ENG) SESSION S6.5 *Zoom Link S6.5 ENG* Session Chair: H. BIKAS	
	09:10 – 09:30	PROCIR-D-20-00424	**Energy Anomaly Detection in Industrial Applications with Long Short-term Memory-based Autoencoders** Can Kaymakci*, Simon Wenninger, Alexander Sauer
	09:30 – 09:50	PROCIR-D-20-00439	**Intelligent Energy Systems as Enabler for Increased Resilience of Manufacturing Systems** Dennis Bauer*, Can Kaymakci, Thomas Bauernhansl, Alexander Sauer
	09:50 – 10:10	PROCIR-D-20-00441	**Design Method for Building Automation Control Programs to Enable the Energetic Optimization of Industrial Supply Systems** Daniel Fuhrländer-Völkera*, Martin Lindner, Matthias Weigold
	10:10 – 10:30	PROCIR-D-20-00453	**Method for the economic Evaluation of Waste Heat Recovery Technologies for Bivalent Facilities** Ekrem Köse*, Lukas Willer, Alexander Sauer
	10:30 – 10:50	PROCIR-D-20-00490	**Integration of cyber-physical HVAC systems in Incremental Manufacturing to improve Energy Efficiency and Air Quality** Marcus Vogta*, Jan Schlichter, Franziska Aschersleben, Tim Abraham, Lars Wolf, Christoph Herrmann
11:10 – 11:20	Coffee Break		

Thursday 23/09/2021 – DAY 2 Password for DAY 2: cms54day#2			
11:20 – 13:00		MANUFACTURING SYSTEMS (SYS) SESSION S1.6 *Zoom Link S1.6 SYS* Session Chair: D D'ADDONA	
	11:20 – 11:40	PROCIR-D-20-00446	**Lean Production Systems 4.0: The Impact of the Digital Transformation on Production System Levels** Simon Schumacher*, Felix Aljoscha Schmid, Andreas Bildstein, Thomas Bauernhansl
	11:40 – 12:00	PROCIR-D-20-00705	**Quick-Scan – Towards a Strategy for Quick Response Manufacturing 4.0** Daryl Powell*, Eirin Lodgaard, Maria Flavia Mogos
	12:00 – 12:20	PROCIR-D-20-00418	**Exploring the Concept of Production Platforms - A literature review** Simon Boldt*, Gary Linnéusson, Carin Rösiö
	12:20 – 12:40	PROCIR-D-20-00625	**Potentials of Traceability Systems - a Cross-Industry Perspective** Patrizia Gartner*, Martin Benfer, Andreas Kuhnle, Gisela Lanza
	12:40 – 13:00	PROCIR-D-20-00594	**Transformation of International Manufacturing Networks: Changes in Configuration, Underlying Causes and Potential Patterns** Simon Dreher*, Christian Marchetti
11:20 – 13:00		DIGITAL TWINS & INTERNET OF THINGS AND SIMULATION (DT_IOT) SESSION S2.6 *Zoom Link S2.6 DT & IOT* Session Chair: A. NASSEHI	
	11:20 – 11:40	PROCIR-D-20-00985	**Design and Implementation of a Digital Twin Platform for AM processes** Panagiotis Stavropoulos*, Alexios Papacharalampoloulos, Konstantinos Tzimanis
	11:40 – 12:00	PROCIR-D-21-00009	**Method for the generation of use case related views for Digital Twins** Stefan Kugler*, Alexander Kern, Reiner Anderl
	12:00 – 12:20	PROCIR-D-21-00014	**Comparison between data maturity and maintenance strategy: A case study** Lucas Peter Høj Brasen, Oliver Fuglsang Grooss , Torben Tambo*
	12:20 – 12:40	PROCIR-D-20-00495	**Study on the Configuration Guideline of Objective function for Acceleration/Deceleration Parameter Optimization using a Machine tool simulator** Yuji Fukuoka*, Rui Fukui, Takehito Yoshida, Akihiko Matsumura, Hiroshi Oishi, Shunji Mishina, Azusa Nakajima, Shin'ichi Warisawa
	12:40 – 13:00	PROCIR-D-20-00577	**Scope and delimitation of game engine simulations for ultra-flexible production environments** Liliana Zarco*, Jörg Siegert, Thilo Schlegel, Thomas Bauernhansl
11:20 – 13:00		MACHINE LEARNING (ML) SESSION S3.6 *Zoom Link S3.6 ML* Session Chair: K. MARTINSEN	
	11:20 – 11:40	PROCIR-D-20-00738	**Machine Learning of Parameters for Structural PET Foam Milling** Moritz Haas, Juergen Lenz, Dieter Joenssen, Wolfgang Rimkus*, Ralf Prinz, Dominic Lutz
	11:40 – 12:00	PROCIR-D-20-00743	**Evolutionary optimization of deep-drawing processes on servo screw presses with freely programmable force and motion functions** Sebastian Kriechenbauer*, Peter Müller, Reinhard Mauermann, Welf-Guntram Drossel
	12:00 – 12:20	PROCIR-D-20-00754	**Hybrid Approach for Onsite Monitoring and Anomaly Detection of Cutting Tool Life** Zhenzhi Ying, Liming Shu*, Toru Kizaki, Masatoshi Iwama, Naohiko Sugita
	12:20 – 12:40	PROCIR-D-20-00756	**Scalable anomaly detection in manufacturing systems using an interpretable deep learning approach** Thomas Schlegla*, Stefan Schlegl, Nikolai West, Jochen Deuse
	12:40 – 13:00	PROCIR-D-20-00991	**Impact of Artificial Intelligence on Engineering: Past, Present and Future** Robert W. Blake, Robins Mathew, Abraham George and Nikolaos Papakostas*

Thursday 23/09/2021 – DAY 2 Password for DAY 2: cms54day#2			
11:20 – 13:00		AUGMENTED, VIRTUAL AND MIXED REALITY (AR/VR/MR) SESSION S4.6 *Zoom Link S4.6 AR/VR/MR* Session Chair: J. ANGELOPOULOS	
	11:20 – 11:40	PROCIR-D-20-00713	**Insights from a Digital Lean Startup: Co-creating Digital Tools for Cognitive Augmentation of the Worker** Daryl Powell*, Manuel Oliveira
	11:40 – 12:00	PROCIR-D-20-00715	**Preliminary design of assembly system and operations for large mechanical products using a game engine** George Vasilopoulos, George-Christopher Vosniakos*
	12:00 – 12:20	PROCIR-D-20-00971	**A Smart IoT Platform for Oncology Patient Diagnosis based on AI: Towards the Human Digital Twin** Dimitris Mourtzis*, John Angelopoulos, Nikos Panopoulos, Dimitrios Kardamakis
	12:20 – 12:40	PROCIR-D-20-00499	**AR based Assistance for the Tool Change of Cyber-Physical Systems** Benjamin Röhm*, Johannes Olbort, Reiner Anderl
	12:40 – 13:00	PROCIR-D-20-00953	**Real-time combination of material flow simulation, digital twins of manufacturing cells, an AGV and a mixed-reality application** Marcel Müller*, Jonas Mielke, Yurii Pavlovskyi, Andreas Pape, Steffen Masik, Tobias Reggelin, Sebastian Häberer
11:20 – 13:00		ROBOTIC AND ASSEMBLY SYSTEMS (ROB) SESSION S5.6 *Zoom Link S5.6 ROB* Session Chair: S. MAKRIS	
	11:20 – 11:40	PROCIR-D-20-00494	**FlexARobOS: A modern approach for flexible automation of machine tools** Philipp Blanke*, Simon Storms, Christian Brecher, Michael Königs
	11:40 – 12:00	PROCIR-D-20-00589	**Vision-Based Damage Localization Method for an Autonomous Robotic Laser Cladding Process** Habiba Zahir Imam, Yufan Zheng, Pablo Martinez, Rafiq Ahmad*
	12:00 – 12:20	PROCIR-D-20-00595	**Sustainable human-robot co-production for the bicycle industry** Doris Aschenbrenner*, Åsa Fasth Berglund, Matthijs Netten, Zoltan Rusak, Johan Stahre
	12:20 – 12:40	PROCIR-D-20-00611	**A multi-criteria method to design the collaboration between humans and robots** Alessandra Papetti*, Marianna Ciccarelli, Cecilia Scoccia, Michele Germani
	12:40 – 13:00	PROCIR-D-20-00653	**A comparison of and critical review on cycle time estimation methods for human-robot work systems** Titanilla Komenda*, Mathias Brandstötterb, Sebastian Schlund
11:20 – 13:00		ENERGY (ENG) SESSION S6.6 *Zoom Link S6.6 ENG* Session Chair: H. BIKAS	
	11:20 – 11:40	PROCIR-D-20-00630	**Bottleneck reduction strategies for energy efficiency in the battery manufacturing** Gabriela Ventura Silvaa*, Matthias Thomitzek, Tim Abraham, Christoph Herrmann
	11:40 – 12:00	PROCIR-D-20-00647	**Energy Flexibility in Production Planning** Eduardo Colangelo*, Silke Hartleif, Sebastian Hefner, and Alexander Sauer
	12:00 – 12:20	PROCIR-D-20-00717	**Approach for Efficient Acquisition of Energy Data and Identification of Energy-related Process Parameters in Lithium-Ion Battery Cell Production** Maria Maier*, Susanne Vernim, Gunther Reinhart
	12:20 – 12:40	PROCIR-D-20-00748	**Visualization of Spatially Resolved Energy in Wire Electrical Discharge Machining** Ugur Küpper*, Tim Herrig, Thomas Bergs
	12:40 – 13:00	PROCIR-D-20-00766	**Identifying energy flexible manufacturing layouts in a light metal foundry** Samtleben Stefanie, Schleich Christoph, Schenk Michael
13:00 – 13:30		Lunch Break	

Thursday 23/09/2021 – DAY 2 Password for DAY 2: cms54day#2			
13:30 – 15:10		MANUFACTURING SYSTEMS (SYS) SESSION S1.7 *Zoom Link S1.7 SYS* Session Chair: R. TETI	
	13:30 – 13:50	PROCIR-D-20-00736	**Assessment of Reconfigurability Level within Existing Manufacturing Systems** Simon Boldt*, Carin Rösiö, Adam Bergström, Luisa Jödicke
	13:50 – 14:10	PROCIR-D-20-01183	**Digital Manufacturing as a basis for the development of the Industry 4.0 model** Vojin Vukadinovic*, Vidosav Majstorovic, Jovan Zivkovic, Slavenko Stojadinovic, Dragan Djurdjanovic
	14:10 – 14:30	PROCIR-D-20-01012	**Affective Production Systems: Foundations, Reference Model and Roadmap for Implementation and Validation** Carmen Constantinescu*, Bastian Pokorni, Johannes Wimmer
	14:30 – 14:50	PROCIR-D-20-00984	**Methodology for Assessing, Evaluating and Selecting an Integration and Migration Strategy for Industry 4.0 in SME** **Oliver Oechsle*, Tom Drews, Paul Molenda**
	14:50 – 15:10	PROCIR-D-20-00976	**A method to solve 2D Facility Layout Problem with equipment inputs/outputs constraints using meta-heuristics algorithms** Mariem Besbes*, Marc Zolghadri, Roberta Costa Affonso
13:30 – 15:10		DIGITAL TWINS & INTERNET OF THINGS AND SIMULATION (DT_IoT) SESSION S2.7 *Zoom Link S2.7 DT & IOT* Session Chair: A. PAPACHARALAMPOPOULOS	
	13:30 – 13:50	PROCIR-D-20-00658	**Method for Data-Driven NC-Code Optimization based on Dexel Material Removal Simulation and Tool Holder Vibration Measurements** G. Mauthner*, M. Ehrendorfer, T. Trautner, C. Ramsauer, D. Plakhotnik, F. Bleicher
	13:50 – 14:10	PROCIR-D-20-00728	**Automatic Building of a Repository for Component-based Synthesis of Warehouse Simulation Models** Fadil Kallat*, Jakob Pfrommer, Jan Bessai, Jakob Rehof, Anne Meyer
	14:10 – 14:30	PROCIR-D-20-01170	**Part Quality Prediction in Multistage Machining Processes with Fixtures Based on Locating Surfaces Using Dual Quaternions** Filmon Yacob, Daniel Semere*
	14:30 – 14:50	PROCIR-D-20-00449	**A big data approach for worker's performance evaluation in IoT-enabled manufacturing shopfloors** Ng Chi Sang, Yee Wai Lok, Ray Y. Zhong*
	14:50 – 15:10	PROCIR-D-20-00458	**EuProGigant – A Concept Towards an Industrial System Architecture for Data-Driven Production Systems** Stefan Dumss*, Markus Weber, Clemens Schwaiger, Clemens Sulz, Patrick Rosenberger, Friedrich Bleicher, Manfred Grafinger, Matthias Weigold
13:30 – 15:10		MACHINE LEARNING (ML) SESSION S3.7 *Zoom Link S3.7 ML* Session Chair: J. ANGELOPOULOS	
	13:30 – 13:50	PROCIR-D-20-00949	**X-PHM: Prognostics and health management knowledge-based framework for SME** Nabil Omri*, Zeina Al Masry, Nicolas Mairot, Sylvian Giampiccolo, Noureddine Zerhouni
	13:50 – 14:10	PROCIR-D-20-00996	**A 3D Deep Learning Model for Rapid Prediction of Structural Dynamics of Workpieces During Machining** Ali Maghami, Meshkat Salehi, Matt Khoshdarregi*
	14:10 – 14:30	PROCIR-D-20-01004	**Deep learning-based optical inspection of rigid and deformable linear objects in wiring harnesses** Huong Giang Nguyen*, Jörg Franke
	14:30 – 14:50	PROCIR-D-20-01017	**Automatic assembly quality inspection based on an unsupervised point cloud domain adaptation model** Xiaomeng Zhu*, Himaja Manamasa, Juan Luis Jiménez Sánchez, Atsuto Maki, Lars Hanson
	14:50 – 15:10	PROCIR-D-21-00010	**Conceptual Use Cases for Integrating Artificial Intelligence in Cyber-Physical Twins** Cordula Czwick*, Reiner Anderl

Thursday 23/09/2021 – DAY 2 Password for DAY 2: cms54day#2			
13:30 – 15:10		**BATTERY MANUFACTURING (BAT)** **SESSION S4.7** ***Zoom Link S4.7 BAT*** **Session Chair: P. STAVROPOULOS**	
	13:30 – 13:50	PROCIR-D-20-00398	**Plant Technology for the Industrial Coating Process for Sulfide-Based All-Solid-State Batteries** Célestine Singer*, Hans-Christoph Töpper, Florian J. Günter, Gunther Reinhart
	13:50 – 14:10	PROCIR-D-20-01184	**Disassembly information interoperability for electric vehicle battery in remanufacturing based on STEP standards** Jinhua Xiao*, Weidong Li, Yaqiong Lv, Guangchao Du
	14:10 – 14:30	PROCIR-D-20-00562	**Concept for modelling the influence of electrode corrugation after 15alendaring on stacking accuracy in battery cell production** Dominik Mayer*, Jürgen Fleischer
	14:30 – 14:50	PROCIR-D-20-00688	**CAD-based Automated Robot Offline-Programming Approach for Disassembly of Electric Vehicle Batteries** Joshua Beck*, Alexander Neb, Katharina Barbu
	14:50 – 15:10	PROCIR-D-20-00638	**Introducing Inline Process and Product Analysis for the Lean Cell Finalization in Lithium-Ion Battery Production** Sandro Stock*, Amedeo Ceruti, Florian J. Günter, Gunther Reinhart
13:30 – 15:10		**ROBOTIC AND ASSEMBLY SYSTEMS (ROB)** **SESSION S5.7** ***Zoom Link S5.7 ROB*** **Session Chair: P. KARAGIANNIS**	
	13:30 – 13:50	PROCIR-D-20-00732	**The Role of Automation in Complexities of High-Mix in Low-Volume Production – A Literature Review** Kerstin Johansen*, Sagar Rao, Milad Ashourpour
	13:50 – 14:10	PROCIR-D-20-00746	**A design of Human and overhead Robot Interaction (HoRI) framework for cooperative robotic applications in copper industry** P. Aivaliotisa, D. Kaliakatsos-Georgopoulos, A. Papavasileiou, S. Makris*
	14:10 – 14:30	PROCIR-D-20-00749	**PDCA integrated simulations enable effective deployment of collaborative robots: case of a manufacturing SME** Mohsin Raza*, Ali Ahmad Malik, Arne Bilberg
	14:30 – 14:50	PROCIR-D-20-00981	**Realistic simulation of robotic grasping tasks: review and application** Matthew Connolly, Aswin K Ramasubramanian, Matthew Kelly, Jack McEvoy, Nikolaos Papakostas*
	14:50 – 15:10	PROCIR-D-20-00997	**Quality control of white goods parts using robotic technologies** Panagiotis Karagiannis, Vangelis Xanthakis, George Apostolopoulos, George Michalos, Sotiris Makris*
13:30 – 15:10		**ONTOLOGIES & KNOWLEDGE MANAGEMENT (ONT)** **SESSION S6.7** ***Zoom Link S6.7 ONT*** **Session Chair: A. BERNARD**	
	13:30 – 13:50	PROCIR-D-20-00698	**Ontology-based Process Reengineering to Support Digitalization Of MRO Operations: Application To An Aviation Industry Case** Clemens Gróf*, Alexander Kamtsiuris
	13:50 – 14:10	PROCIR-D-20-01186	**Multi-sourced Modelling for Strip Breakage using Knowledge Graph Embeddings** Zheyuan Chen*, Ying Liu, Agustin Valera-Medina, Fiona Robinson
	14:10 – 14:30	PROCIR-D-20-00432	**Ontology-based data management for adaptable safety functions in cyberphysical production systems** Christian Brecher, Melanie Buchsbaum*, Frances Ziegler, Simon Storms
	14:30 – 14:50	PROCIR-D-20-00502	**Ontology-based production planning under the consideration of system robustness** Berend Denkena, Marc-André Dittrich, Gina Vibora Münch*
	14:50 – 15:10	PROCIR-D-20-00964	**A decision support method for knowledge-based Additive Manufacturing process selection** Harry Bikas, Nikolas Porevopoulos, Panagiotis Stavropoulos*
15:10 – 15:20		**Coffee Break**	

Thursday 23/09/2021 – DAY 2 Password for DAY 2: cms54day#2			
15:20 – 17:00		MANUFACTURING SYSTEMS (SYS) SESSION S1.8 *Zoom Link S1.8 SYS* Session Chair: R. TETI	
	15:20 – 15:40	PROCIR-D-20-00671	**Automated 2D Layout Design of Assembly Line Workstations through Physical Principles** Carsten Seeber*, Marcel Albus, Manuel Fechter, Alexander Neb, Satoshi I. Yoshida
	15:40 – 16:00	PROCIR-D-20-00456	**Resilience-enhancing Workplace Design – An Approach for Workplaces in the Manual Assembly of large-scaled One-off Products** Florian Beuss*, Jan Sender, Wilko Fluegge
	16:00 – 16:20	PROCIR-D-20-00406	**Quantification of Influence of 5G Technology Implementation on Process Performance in Production** Raphael Kiesel*, Kirstin Stichling, Philipp Hemmers, Thomas Vollmer, Robert H. Schmitt
	16:20 – 16:40	PROCIR-D-20-00483	**Operator-centred Lean 4.0 framework for flexible assembly lines** Adrian Miqueo*, Marta Torralba, José A. Yagüe-Fabra
	16:40 – 17:00	PROCIR-D-20-00580	**Exploring digital innovation in the production process: A suggested framework for automation technology solution providers** Hossein Rahnama*, Kerstin Johansen, Lisa Larsson, Anna Öhrwall Rönnbäck
15:20 – 17:00		DIGITAL TWINS & INTERNET OF THINGS AND SIMULATION (DT_IoT) SESSION S2.8 *Zoom Link S2.8 DT & IOT* Session Chair: A. PAPACHARALAMPOPOULOS	
	15:20 – 15:40	PROCIR-D-20-00498	**Multi-objective Optimization of Spraying Trajectory Planning for Large Ship Blocks using Evolutionary Computation** Xuemei Liu*, Yan Feng, Qingfei Zeng , Xiaocai Hu , Zhen Yang
	15:40 – 16:00	PROCIR-D-20-00661	**An efficient cost estimation framework for aerospace applications using Matlab/Simulink** Konstantinos Bacharoudis, Heather Wilson*, Stephen Goodfellow-Jones, Atanas Popov, Svetan Ratchev
	16:00 – 16:20	PROCIR-D-20-00691	**Concept and Architecture for Information Exchange between Digital Twins of the Product (CPS) and the Production System (CPPS)** Anna Vogt, Ralph Klaus Müller*, Thomas Kampa, Rainer Stark, Daniel Großmann
	16:20 – 16:40	PROCIR-D-20-00708	**Development of a method for applying free kinematics for gear profile grinding** Christopher Janßen*, Jens Brimmers, Thomas Bergs
	16:40 – 17:00	PROCIR-D-20-00745	**Prediction assessment methodology for maintenance applications in manufacturing** P. Aivaliotis, Z. Arkouli, D. Kaliakatsos-Georgopoulos, S. Makris*
15:20 – 17:00		MACHINE LEARNING (ML) SESSION S3.8 *Zoom Link S3.8 ML* Session Chair: P. KARAGIANNIS	
	15:20 – 15:40	PROCIR-D-20-00447	**Machine learning based defect detection in a low automated assembly environment** G. Schuh, A. Gützlaff, K. Thomas, M. Welsing*
	15:40 – 16:00	PROCIR-D-20-00491	**Analytical Joining Models for Learning Contact-Rich Cabinet Assembly Tasks from Simulation** Arik Lämmle*, Philipp Rusch, Wilhelm Rust, Matthias Senneka, Ramez Awad
	16:00 – 16:20	PROCIR-D-20-00532	**Predictive analytics in quality assurance for assembly processes: lessons learned from a case study at an industry 4.0 demonstration cell** Peter Burggräf, Johannes Wagner, Benjamin Heinbach, Fabian Steinberg*, Alejandro R. Pérez M., Lennart Schmallenbach, Jochen Garcke, Daniela Steffes-lai, Moritz Wolter
	16:20 – 16:40	PROCIR-D-20-00676	**Deep Reinforcement Learning as an Optimization Method for the Configuration of Adaptable, Cell-Oriented Assembly Systems** Christoph Halbwidl, Thomas Sobottka, Alexander Gaal*, Wilfried Sihn
	16:40 – 17:00	PROCIR-D-20-00693	**Supervised and unsupervised learning in vision-guided robotic bin picking applications for mixed-model assembly** Patrik Fager*, Robin Hanson, Åsa Fasth-Berglund, Sven Ekered

Thursday 23/09/2021 – DAY 2 Password for DAY 2: cms54day#2			
15:20 – 17:00		BATTERY MANUFACTURING (BAT) SESSION S4.8 *Zoom Link S4.8 BAT* Session Chair: P. STAVROPOULOS	
	15:20 – 15:40	PROCIR-D-20-00640	**Knowledge-based identification of production tolerances in battery production** Matthias Thomitzek*, Tim Abraham, Felipe Cerdas, Christoph Herrmann
	15:40 – 16:00	PROCIR-D-20-00663	**A Conceptual Framework towards Data-Driven Models in Electrode Production of Lithium-Ion Battery Cells** Sajedeh Haghi*, Hans-Christoph Töpper, Florian J. Günter, Gunther Reinhart
	16:00 – 16:20	PROCIR-D-20-00675	**Ontology-based Traceability System for Interoperable Data Acquisition in Battery Cell Manufacturing** Jacob Wessel*, Artem Turetskyy, Olaf Wojahn, Tim Abraham, Christoph Herrmann
	16:20 – 16:40	PROCIR-D-20-00404	**DEM Simulations of the Calendering Process: Parameterization of the Electrode Material of Lithium-Ion Batteries** David Schreiner*, Johannes Lindenblatt, Florian J. Günter, Gunther Reinhart
	16:40 – 17:00	PROCIR-D-20-00629	**Marking of Electrode Sheets in the Production of Lithium-Ion Cells as an Enabler for Tracking and Tracing** Alessandro Sommer*, Matthias Leeba, Sajedeh Haghi, Florian J. Günter, Gunther Reinhart
15:20 – 17:00		EDUCATION & TEACHING (EDU) SESSION S5.8 *Zoom Link S5.8 EDU* Session Chair: N. PANOPOULOS	
	15:20 – 15:40	PROCIR-D-20-00533	**Supporting the Digital Transformation: A Low-Threshold Approach for Manufacturing Related Higher Education and Employee Training** Christian Kuhn*, Dominik Lucke
	15:40 – 16:00	PROCIR-D-20-00634	**Continuing Engineering Education (CEE) in Changeable and Reconfigurable Manufacturing using Problem-Based Learning (PBL)** Ann-Louise Andersen*, Carin Rösiö
	16:00 – 16:20	PROCIR-D-20-00959	**A Hybrid Teaching Factory Model for Supporting the Educational Process in COVID-19 era** Dimitris Mourtzis*, Nikos Panopoulos, John Angelopoulos, Stelios Zygomalas, George Dimitrakopoulos, Panos Stavropoulos
	16:20 – 16:40	PROCIR-D-20-00968	**Development and Implementation of a Digital Manufacturing Demonstrator for Engineering Education** Shane Keaveney*. Lydia Athanasopoulou, Vasilis Siatras, Panagiotis Stavropoulos, Dimitris Mourtzis, Denis P. Dowling
	16:40 – 17:00	PROCIR-D-20-00992	**Propositions on the Benefits of the Organizational Education Perspective towards Realizing Industry 4.0-Promises** Alinde Keller*, Susanne M. Weber, Julia C. Arlinghaus
15:20 – 17:00		ONTOLOGIES & KNOWLEDGE MANAGEMENT (ONT) SESSION S6.8 *Zoom Link S6.8 ONT* Session Chair: A. BERNARD	
	15:20 – 15:40	PROCIR-D-20-00680	**Determine similarity of assembly operations using semantic technology** Iris Gräßler, Daniel Roesmann*, Dominik Wiechel, Daniel Preuß, Jens Pottebaum
	15:40 – 16:00	PROCIR-D-20-00711	**Application of configuration principle on knowledge-based engineering for manufacturing system design** Chen Zheng*, Yushu An, Zhanxi Wang, Xiansheng Qin, Fei Yu
	16:00 – 16:20	PROCIR-D-20-00511	**Open semantic modeling for smart production systems** Günter Bitsch, Pascal Senjic*
	16:20 – 16:40	PROCIR-D-20-00391	**Retrieving properties of manufacturing systems from traceability data for performance evaluation and material flow simulation** Heiner Reinhardt*, Marc Münnich, Bastian Prell, Roman Arnold, Fabian Krippner, Marek Weber, Frank Seifert, Matthias Putz
	16:40 – 17:00	PROCIR-D-20-00636	**Rethinking Value – A means to an end for the whispering game** Eivind Reke*, Daryl Powell

Friday 24/09/2021 – DAY 3 Password for DAY 3: cms54day#3			
08:30 – 09:30	***Keynote 5:** Alain Bernard "Integration of additive manufacturing in production systems"* ***Keynote 6:** Kosmas Alexopoulos "Artificial Intelligence for Manufacturing Systems"*		***Zoom Link***
09:30 – 11:10		**PLANNING, SCHEDULING & MAINTENANCE (PSM)** **SESSION S1.9** ***Zoom Link S1.9 PSM*** **Session Chair: N. PAPAKOSTAS**	
	09:30 – 09:50	PROCIR-D-20-00628	**Coordinative scheduling of the mobile robots and machines based on hybrid GA in flexible manufacturing systems** Sheng Qu, Yaoguang Hu*, Weibo Ren, Xiaonan Yang
	09:50 – 10:10	PROCIR-D-20-00643	**Delivery operation time optimization of multi-crane scheduling in steel plate yard** Ma Shumei, Tao Ran,*, Xu Liyun,Yang Liansheng
	10:10 – 10:30	PROCIR-D-20-00471	**A dynamic scheduling method for self-organized AGVs in production logistics systems** Lixiang Zhang, Yan Yan, Yaoguang Hu*, Weibo Ren
	10:30 – 10:50	PROCIR-D-20-00477	**Evolving Dispatching Rules Using Genetic Programming for Multi-objective Dynamic Job Shop Scheduling with Machine Breakdowns** Salama Shady*, Toshiya Kaihara, Nobutada Fujii, Daisuke Kokuryo
	10:50 – 11:10	PROCIR-D-20-00473	**A location-allocation model of maintenance resources based on fault distribution for agricultural machinery maintenance service network** Yipu Yao, Jingqian Wen, Xiaoyang Zhen, Yaoguang Hu*
09:30 – 11:10		**DIGITAL TWINS & INTERNET OF THINGS AND SIMULATION (DT_IoT)** **SESSION S2.9** ***Zoom Link S2.9 DT & IOT*** **Session Chair: P. STAVROPOULOS**	
	09:30 – 09:50	**PROCIR-D-20-00413**	**Linear optimization for dynamic selection of resources in constrained assembly line balancing problems** Marcel Albus*, Carsten Seeber
	09:50 – 10:10	**PROCIR-D-20-00479**	**Double-stage methodology for activity recognition in manual assembly** Joachim P. Doppler, Lisa C. Günther, Christoph Haar
	10:10 – 10:30	**PROCIR-D-20-00706**	**An Assessment Tool for Digital Enhancement of Operators on the Production Shop Floor** Marta Pinzone*, Federica Acerbi, Emrah Arica, Manuel Oliveira, Marco Taisch
	10:30 – 10:50	**PROCIR-D-20-00408**	**Preliminary study on perceived comfort of car seats: A quantitative approach to visual cues** Bastian Quattelbaum*, Kostas Stylidis, Alina Braun, Rikard Söderberg
	10:50 – 11:10	**PROCIR-D-20-00740**	**Identification of workplace-related turnover predictors in production** Svenja Korder*, Moritz Krauel, Susanne Vernim, Gunther Reinhart
09:30 – 11:10		**MACHINE LEARNING (ML)** **SESSION S3.9** ***Zoom Link S3.9 ML*** **Session Chair: G. MICHALOS**	
	09:30 – 09:50	**PROCIR-D-20-00642**	**Study on Conflict-free AGVs Path Planning Strategy for Workshop Material Distribution Systems** Xu Liyun*, Wang Ning, Ling Xufeng*
	09:50 – 10:10	**PROCIR-D-20-00751**	**Simultaneous Production and AGV Scheduling using Multi-Agent Deep Reinforcement Learning** Jens Popper*, Vassilios Yfantis, Martin Ruskowski
	10:10 – 10:30	**PROCIR-D-20-00763**	**Adaptive self-learning distributed and centralized control approaches for smart factories** Oliver Antons, Julia C. Arlinghaus
	10:30 – 10:50	**PROCIR-D-20-00444**	**A Framework for Data-Based Change Impact Analysis in Manufacturing** Fabian Sippl*, Gunther Reinhart
	10:50 – 11:10	**PROCIR-D-20-01016**	**Transfer Learning-enabled Action Recognition for Human-robot Collaborative Assembly** Shufei Li, Junming Fan, Pai Zheng, Lihui Wang

Friday 24/09/2021 – DAY 3 Password for DAY 3: cms54day#3			
09:30 – 11:10		LIFE CYCLE ENGINEERING (LCE) SESSION S4.9 *Zoom Link S4.9 LCE* Session Chair: D. KIRITSIS	
	09:30 – 09:50	PROCIR-D-20-00724	**A life cycle cost analysis method accelerating IoT implementation in SMEs** Yuya Mitake*, Yusuke Tsutsui, Salman Alfarihi, Mar'atus Sholihah, Yoshiki Shimomura
	09:50 – 10:10	PROCIR-D-20-00960	**Comparative analysis of the life cycle assessment for the assembly operations of railcar components** Ilesanmi Daniyan, Khumbulani Mpofu, Boitumelo Ramatsetse, Rumbidzai Muvunzi
	10:10 – 10:30	PROCIR-D-20-00422	**Evaluation of the influence of change drivers on the factory life cycle** Lennart Hingst*, Antal Dér, Christoph Herrmann, Peter Nyhuis
	10:30 – 10:50	PROCIR-D-20-00526	**Life-cycle-Assessment of Cast Stone Manufacturing: A Case Study** Devanshu Mudgal*, Emanuele Pagone, Rayan A. Alkhunani, Konstantinos Salonitis
	10:50 – 11:10	PROCIR-D-20-00433	**Negotiation based approach for collecting and recycling operations in circular economy** Giuseppe Stecca*, Toshiya Kaihara
09:30 – 10:50		MACHINE LEARNING (ML) SESSION S5.9 *Zoom Link S5.9 ML* Session Chair: J. ANGELOPOULOS	
	09:30 – 09:50	PROCIR-D-20-00683	**Synthetic Training Data Generation for Visual Object Identification on Load Carriers** Daniel Schoepflin, Dirk Holst, Martin Gomse, Thorsten Schüppstuhl
	09:50 – 10:10	PROCIR-D-20-00530	**Data Acquisition and Preparation – Enabling Data Analytics Projects within Production** Christoph Schock*, Jonas Dumler, Prof. Dr.-Ing. Frank Doepper
	10:10 – 10:30	PROCIR-D-20-00587	**Adaptive, predictive machine condition assessment for resilient digital solutions** Manja Mai-Ly Pfaff*, Felix Dörrer, Dr.-Ing. Uwe Friess, Dr.-Ing. Michael Praedicow, Prof. Dr.-Ing. Matthias Putz
	10:30 – 10:50	PROCIR-D-20-00967	**A Methodology for the Assessment of Operator 4.0 Skills based on Sentiment Analysis and Augmented Reality** D. Mourtzis*, John Angelopoulos, Vasilis Siatras, Nikos Panopoulos
11:10 – 11:20	Coffee Break		

Friday 24/09/2021 – DAY 3 Password for DAY 3: cms54day#3			
11:20 – 13:00		PLANNING, SCHEDULING & MAINTENANCE (PSM) SESSION S1.10 *Zoom Link S1.10 PSM* Session Chair: N. PAPAKOSTAS	
	11:20 – 11:40	PROCIR-D-20-00472	**A method of constructing the maintenance service network under the redistricting and service provider demand sharing** Xiaoyang Zhen, Jingqian Wen, Yipu Yao, Yaoguang Hu*
	11:40 – 12:00	PROCIR-D-20-00644	**Task Scheduling for Tier-to-tier Four-way Shuttle Warehousing System** Xu Liyun*, Liu Cong, Zhan Xiangnan, Ling Xufeng
	12:00 – 12:20	PROCIR-D-20-00481	**A scenario-based approach to translate strategic perspectives into input parameters of production control** Ida Wonsak*, Harald Bauer, Fabian Sippl, Gunther Reinhart
	12:20 – 12:40	PROCIR-D-20-00521	**Development of a Model for the Implementation of Industry 4.0 Technologies in Rolling Stock Maintenance** Marius Wippel, Dominik Lucke*, Johannes L. Jooste
	12:40 – 13:00	PROCIR-D-20-00551	**Methodology for the assessment of potentials for selection and design of predictive maintenance models** Sahil-Jai Arora*, Christoph Ebbecke, Markus Rabe, Jessica Fisch
11:20 – 13:00		CYBER PHYSICAL SYSTEMS (CPS) SESSION S2.10 *Zoom Link S2.10 CPS* Session Chair: P. STAVROPOULOS	
	11:20 – 11:40	PROCIR-D-20-00462	**Use of Virtual Supply Chain Constructed by Cyber-Physical Systems Concept** Michiko Matsuda*, Tatsushi Nishi, Ryuichi Kamiebisu Mao Hasegawa Alizadeh Roghayyeh Ziang Liu
	11:40 – 12:00	PROCIR-D-20-00467	**Dynamic data acquisition and pre-processing for online behavioral modelling of cyber-physical systems** Brandon K. Sai*, Yannick T. Mayer, Thomas Bauernhansl
	12:00 – 12:20	PROCIR-D-20-00557	**Automatized Generation of Alternatives for Process Monitoring in Cyber-Physical Assembly Systems** Clemens Gonnermann*, Benedikt Zels, Gunther Reinhart
	12:20 – 12:40	PROCIR-D-20-00581	**Adaptive Visual Concept for Controlling Cyber-physical Production Modules based on Cognitive Associations** Jörg Siegert, Liliana Zarco*, Thilo Schlegel, Thomas Bauernhansl
	12:40 – 13:00	PROCIR-D-20-00614	**Towards Asset Administration Shell-based Resource Virtualization in 5G architecture-enabled Cyber-Physical Production Systems** Daniel Stock*, Matthias Schneider, Thomas Bauernhansl
11:20 – 13:00		MACHINE LEARNING (ML) SESSION S3.10 *Zoom Link S3.10 ML* Session Chair: G. MICHALOS	
	11:20 – 11:40	PROCIR-D-20-01019	**Towards the use of artificial intelligence in smart production logistics – A case study applying reinforcement learning** Yongkuk Jeong*, Tarun Kumar Agrawal, Erik Flores-García, Magnus Wiktorsson
	11:40 – 12:00	PROCIR-D-20-00700	**An approach to data structuring and predictive analysis in discrete manufacturing** Christian Dalheim Øiena*, Sebastian Dransfeld
	12:00 – 12:20	PROCIR-D-20-00753	**Vision-Based Associative Robotic Recognition of Working Status in Autonomous Manufacturing Environment** Feiyu Jia, Yongsheng Ma, Rafiq Ahmad*
	12:20 – 12:40	PROCIR-D-20-00758	**Physics-informed neural network (PINN) for improving a thermal model in Stereolithography applications** Agusmian Partogi Ompusunggu*, Georges Tod, Kurt De Grave, Erik Hostens
	12:40 – 13:00	PROCIR-D-20-01181	**Cooperative Co-evolution and Data Mining for Planning Disassemly Sequence and Estimating Time** Yu-Yao Guo,Lei Wang*,Ze-Lin Zhang*,Xu-H Xia, Hui-Xian Zhu

Friday 24/09/2021 – DAY 3 Password for DAY 3: cms54day#3			
11:20 – 13:00		**PRODUCT SERVICE SYSTEMS (PSS)** **SESSION S4.10** ***Zoom Link S4.10 PSS*** **Session Chair: N. ANWER**	
	11:20 – 11:40	**PROCIR-D-20-00451**	**Towards sustainable servitization: A literature review of methods and frameworks** Clarissa A. González Chávez*, Maria Holgado, Anna Öhrwall Rönnbäck, Mélanie Despeisse, Björn Johansson
	11:40 – 12:00	**PROCIR-D-20-00505**	**Business Model Engineering for Smart Product-Service Systems** Mario Boßlau
	12:00 – 12:20	**PROCIR-D-20-00507**	**Identifying Value Creation Patterns for Smart Services** Jannik Reinhold*, Patrick Ködding, Michel Scholtysik, Christian Koldewey, Prof. Dr.-Ing. Roman Dumitrescu
	12:20 – 12:40	**PROCIR-D-20-00690**	**Impact of Manufacturing-as-a-Service: Business Model Adaption for Enterprises** Serdar Bulut*, Martin Wende, Christoph Wagner, Reiner Anderl
	12:40 – 13:00	**PROCIR-D-20-00541**	**Small Automation Technology Solution Providers: Facilitators for Sustainable Manufacturing** Kerstin Johansen, Anna Öhrwall Rönnbäck
11:20 – 13:00		**MIXED SESSION 2** **SESSION S5.10** ***Zoom Link S5.10 MX*** **Session Chair: J. ANGELOPOULOS**	
	11:20 – 11:40	**PROCIR-D-20-00528**	**Machine Vision and Radio-Frequency Identification (RFID) based Real-Time Part Traceability in a Learning Factory** Rishi Kumar*, Omkar Patil, Karthik Nath S., Krishan Rohilla, Kuldip Singh Sangwan
	11:40 – 12:00	**PROCIR-D-20-00600**	**Towards digitalization in production in SMEs – A qualitative study of challenges, competencies and requirements for trainings** Maria Hulla*, Patrick Herstätter, Matthias Wolf, Christian Ramsauer
	12:00 – 12:20	**PROCIR-D-20-00679**	**An Approach for Knowledge-Driven, Flexible Process Generation** Christian Fimmers*, Simon Storms, Werner Herfs, Christian Brecher
	12:20 – 12:40	**PROCIR-D-21-00007**	**Production specific language characteristics to improve NLP applications on the shop floor** Marvin Müller*, Joachim Metternich
	12:40 – 13:00	**PROCIR-D-20-01185**	**Deep Fusion for Energy Consumption Prediction in Additive Manufacturing** Fu Hu*, Jian Qin, Yixin Li, Ying Liu, Xianfang Sun
13:00 – 13:30	**Lunch Break**		

Friday 24/09/2021 – DAY 3 Password for DAY 3: cms54day#3			
13:30 – 15:10		**PLANNING, SCHEDULING & MAINTENANCE (PSM)** **SESSION S1.11** ***Zoom Link S1.11 PSM*** **Session Chair: G. LANZA**	
	13:30 – 13:50	**PROCIR-D-20-00585**	**An Approach for an Integrated Maintenance Strategy Selection considering the Context of the Value-Adding Network** Lennard Sielaff*, Dominik Lucke
	13:50 – 14:10	**PROCIR-D-20-00593**	**A Framework for Selecting Data Acquisition Technology in Support of Railway Infrastructure Predictive Maintenance** Johannes W. van Schalkwyk, Johannes L. Jooste*, Dominik Lucke
	14:10 – 14:30	**PROCIR-D-20-00626**	**Configuration and coordination of manufacturing networks by a multi-objective perspective enabled by simulation and advanced data analytics** Elias Auberger*, Hugo Karre, Matthias Wolf, Heimo Preising, Christian Ramsauer
	14:30 – 14:50	**PROCIR-D-20-00514**	**A Review and Comparison of Production Planning Optimization Models** Melissa Demartini*, Flavio Tonelli, Massimo Pacella, Gabriele Papadia
	14:50 – 15:10	**PROCIR-D-20-00402**	**Predictive maintenance key control parameters for achieving efficient Zero-Defect Manufacturing** Foivos Psarommatis*, Gokan May, Dimitris Kiritsis
13:30 – 15:10		**CYBER PHYSICAL SYSTEMS (CPS)** **SESSION S2.11** ***Zoom Link S2.11 CPS*** **Session Chair: A. PAPACHARALAMPOPOULOS**	
	13:30 – 13:50	**PROCIR-D-20-00617**	**FabOS: Towards an open, distributed, real-time-capable, and secure operating system for production** Martin Lukas, Daniel Stock, Akos Csiszar*
	13:50 – 14:10	**PROCIR-D-20-00701**	**Modelling protocol gateways for cyber-physical systems using Architecture Analysis & Design Language** Patrick Denzler*, Daniel Scheuchenstuhl, Daniel Ramsauer, Wolfgang Kastner
	14:10 – 14:30	**PROCIR-D-20-00747**	**A Fractal Control System Architecture for Next Generation Factories** Maximilian Raphael Visotschnig*, Jürgen Henke, Dominik Lucke
	14:30 – 14:50	**PROCIR-D-20-00761**	**A framework for advanced visualization of predictive analytics in cyber-physical production systems** Georgios Siaterlis, Marco Franke, Konstantin Klein, Karl A. Hribernik, Klaus-Dieter Thoben, Vasilios Siatras, Nikolaos Nikolakis, Pierluigi Petrali, Kosmas Alexopoulos*
	14:50 – 15:10	**PROCIR-D-20-01169**	**A prescriptive maintenance system for intelligent production planning and control in a smart cyber-physical production line** Antonio Padovano*, Francesco Longo, Letizia Nicoletti, Lucia Gazzaneo, Alessandro Chiurco, Simone Talarico
13:30 – 15:10		**MACHINE LEARNING (ML)** **SESSION S3.11** ***Zoom Link S3.11 ML*** **Session Chair: N. NIKOLAKIS**	
	13:30 – 13:50	**PROCIR-D-20-00606**	**A Synthesis-based Tool Path Planning Approach for Machining Operations** Tristan Schäfer, Jim A. Bergmann, Rafael Garcia Carballo, Jakob Rehof, Petra Wiederkehr
	13:50 – 14:10	**PROCIR-D-20-00608**	**Path planning for simulating human motions in manual assembly operations** Tadele Belay Tuli, Martin Manns*, Christian Zöller, Daniel Klein
	14:10 – 14:30	**PROCIR-D-20-00624**	**Assembly specific viewpoint generation as part of a simulation-based sensor planning pipeline** Johann Gierecker*, Thorsten Schüppstuhl
	14:30 – 14:50	**PROCIR-D-20-00403**	**Spatially Resolved Tool Wear Prediction in Finish Milling** Carsten Holst*, Michael Königs, Thomas Bergs, Eduardo Maia Garcia, Philipp Ganser
	14:50 – 15:10	**PROCIR-D-20-00681**	**Towards predictive quality in production by applying a flexible process-independent meta-model** Junjie Liang*, Lukas Pelzer, Kai Müller, Simon Cramer, Christoph Greb, Christian Hopmann, Robert H. Schmitt

CIRP CMS 2021 Full Program

Friday 24/09/2021 – DAY 3 Password for DAY 3: cms54day#3			
		SENSING, PROCESS MONITORING & CONTROL (SEN) **SESSION S4.11** ***Zoom Link S4.11 SEN*** **Session Chair: K. SALONITIS**	
13:30 – 15:10	**13:30 – 13:50**	**PROCIR-D-21-00015**	**Improved empirical wavelet denoising algorithm with application to whirling detection in deep hole drilling process** Yue Si*,Xuyang Li, Lingfei Kong, Jianming Zhen, Yan Li
	13:50 – 14:10	**PROCIR-D-20-00631**	**Artificial Wear for the Assessment of Monitoring Performance** Berend Denkena, Benjamin Bergmann, Tobias H. Stiehl*
	14:10 – 14:30	**PROCIR-D-20-00678**	**A Methodological Approach for Monitoring Assembly Processes** Mathias Nausch*, Philipp Hold, Wilfried Sihn
	14:30 – 14:50	**PROCIR-D-20-00965**	**Quality Monitoring of Manufacturing Processes based on Full Data Utilization** Panagiotis Stavropoulos*, Alexios Papacharalampopoulos, Kyriakos Sabatakakis, Dimitris Mourtzis
	14:50 – 15:10	**PROCIR-D-20-00419**	**Wear monitoring in fine blanking processes using feature-based analysis of acoustic emission signals** Thomas Bergs, Martin Unterberg*, Herman Voigts, Ingo Felix Weiser, Andreas Feuerhack, Daniel Trauth
13:30 – 14:50 **(Only for Session S5.11)**		**MIXED SESSION 1** **SESSION S5.11** **Zoom Link S5.11 MX** **Session Chair: N. PANOPOULOS**	
	13:30 – 13:50	**PROCIR-D-20-01013**	**A generic hybrid Human/Exoskeleton Digital Model towards Digital Transformation of Exoskeletons-integrated workplaces** Claudiu-Alin Rusu*, Carmen Constantinescu, Sergiu-Cosmin Marinescu
	13:50 – 14:10	**PROCIR-D-20-01182**	**Heterogeneous requirement gathering for generative design of robotic manufacturing systems** Chen Zhenga*, Yushu An, Zhanxi Wang, Xiansheng Qin, Fei Yu, Yicha Zhang
	14:10 – 14:30	**PROCIR-D-20-00962**	**A Collaborative Approach on Energy-based Offered Services: Energy 4.0 Ecosystems** Dimitris Mourtzis*, John Angelopoulos, Nikos Panopoulos
	14:30 – 14:50	**PROCIR-D-20-00621**	**Measuring physical and mental strain during manual assembly tasks** Barbara Tropschuh*, Sina Niehues, Gunther Reinhart
15:10 – 15:20	**Coffee Break**		

Friday 24/09/2021 – DAY 3 Password for DAY 3: cms54day#3			
15:20 – 17:00		PLANNING, SCHEDULING & MAINTENANCE (PSM) SESSION S1.12 *Zoom Link S1.12 PSM* Session Chair: G. LANZA	
	15:20 – 15:40	PROCIR-D-20-00481	**Towards Data Acquisition for Predictive Maintenance of Industrial Robots** Corbinian Nentwich*, Gunther Reinhart
	15:40 – 16:00	PROCIR-D-20-00667	**Towards Identifying Data Analytics Use Cases in Product Planning** Maurice Meyer*, Melina Panzner, Christian Koldewey, Prof. Dr.-Ing. Roman Dumitrescu
	16:00 – 16:20	PROCIR-D-20-00970	**Flexible workforce allocation as driver of economic and human-oriented shop floor organization** Sebastian Häberer*, Julia Arlinghausa
	16:20 – 16:40	PROCIR-D-21-00019	**Predictive Maintenance in Industry 4.0: Current Themes** Aymane Sahli*, Richard Evans, Arthi Manohar
	16:40 – 17:00	PROCIR-D-20-00704	**Digitally enhanced quality management for Zero-Defect Manufacturing** Daryl Powell*, Ragnhild Eleftheriadis, Odd Myklebust
15:20 – 17:00		CYBER PHYSICAL SYSTEMS (CPS) SESSION S2.12 *Zoom Link S2.12 CPS* Session Chair: A. PAPACHARALAMPOPOULOS	
	15:20 – 15:40	PROCIR-D-20-01177	**Complexity theory and self-organization in Cyber-Physical Production Systems** Luis Alberto Estrada-Jimenez*, Terrin Pulikottil; Ricardo Silva Peres, Sanaz Nikghadam-Hojjati, Jose Barata
	15:40 – 16:00	PROCIR-D-21-00017	**Facilitating model-based design of cyber-manufacturing systems** Hugo Daniel Macedo, Claudio Sassanelli,, Peter Gorm Larsen, Sergio Terzi
	16:00 – 16:20	PROCIR-D-20-00442	**5G as an enabler for cloud-based machine tool control** Carina Siedler, Jan Mertes, Li Yi, Moritz Glatt*, Christian Schellenberger,Hans D. Schotten, Jan C. Aurich
	16:20 – 16:40	PROCIR-D-20-00548	**Exploring the Learnability of Assembly Tasks Using Digital Work Instructions in a Smart Factory** Sebastian Pimminger*, Werner Kurschl, Lisa Panholzer, Johannes Schönböck
	16:40 – 17:00	PROCIR-D-20-01011	**Design and Configuration of Digital Assistance Systems in Manual Assembly of Variant-rich Products based on Customer Journey Mapping** Bastian Pokorni, Carmen Constantinescu*
15:20 – 16:40		MACHINE LEARNING (ML) SESSION S3.12 *Zoom Link S3.12 ML* Session Chair: N. NIKOLAKIS	
	15:20 – 15:40	PROCIR-D-20-00497	**Behavior of decision forest classification in dynamic manufacturing systems** Markus Böhm*, Thomas Bauernhansl, Sabina Jeschke
	15:40 – 16:00	PROCIR-D-20-00550	**Predictive quality for hypoid gear in drive assembly** Jimmy Chhor*, Stefan Gerdhenrichs, Robert H. Schmitt
	16:00 – 16:20	PROCIR-D-21-00011	**Self-trained CAD assistance for constraining assemblies based on decision trees and support vector classification** Thomas Dasbach*, Robin Lohr , Florian Muth , Reiner Anderl
	16:20 – 16:40	PROCIR-D-20-00721	**Genetic algorithm for the optimization of vision acquisition for on-the-fly position measurement of individual layers in fuel cell stack assembly** Jens Schäfer*, Simeon Allmendinger, Janna Hofmann, Jürgen Fleischer

Friday 24/09/2021 – DAY 3 Password for DAY 3: cms54day#3				
15:20 – 16:40		SENSING, PROCESS MONITORING & CONTROL (SEN) SESSION 4.12 *Zoom Link S4.12 SEN* Session Chair: K. SALONITIS		
	15:20 – 15:40	PROCIR-D-20-00506	**Tool deflection compensation by drive signal-based force reconstruction and process control** Berend Denkena, Benjamin Bergmann, Dennis Stoppel*	
	15:40 – 16:00	PROCIR-D-20-00554	**Comprehensive machine data acquisition through intelligent parameter identification and assignment** Philipp Gönnheimer*, Andreas Karle, Lorenz Mohr, Jürgen Fleischer	
	16:00 – 16:20	PROCIR-D-20-00540	**Real-time locating systems (RTLS) in future factories: technology review, morphology and application potentials** Sebastian Thiede*, Brendan Sullivan, Roy Damgrave, Eric Lutters	
	16:20 – 16:40	PROCIR-D-20-00392	**Real-time Personalized Driver Support System for Pilot Assist Promotion in Different Traffic Conditions** Julia Orlovska*, Casper Wickman, Rikard Söderberg	
17:00 – 18:00	**Best Paper Award** **Round up** **CIRP CMS 2022 Announcement**			***Zoom Link***