APMS 2019
Conference Program
September 1st – 5th Austin, TX

Advances in Production Management Systems

Toward Smart Production Management Systems
<table>
<thead>
<tr>
<th></th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Welcome Message</td>
</tr>
<tr>
<td>4</td>
<td>Summary</td>
</tr>
<tr>
<td>5</td>
<td>General Information</td>
</tr>
<tr>
<td>6</td>
<td>Hotel Map</td>
</tr>
<tr>
<td>7</td>
<td>Venue</td>
</tr>
<tr>
<td>8-9</td>
<td>Conference Floor Maps</td>
</tr>
<tr>
<td>10</td>
<td>Registration</td>
</tr>
<tr>
<td>11</td>
<td>Social Activities</td>
</tr>
<tr>
<td>12-13</td>
<td>Lunch Information</td>
</tr>
<tr>
<td>14</td>
<td>Keynote Speakers</td>
</tr>
<tr>
<td>15</td>
<td>Industrial Tours</td>
</tr>
<tr>
<td>16</td>
<td>Conference Overview</td>
</tr>
<tr>
<td>20</td>
<td>Doctoral Workshop Program</td>
</tr>
<tr>
<td>22</td>
<td>Research Workshop Schedule</td>
</tr>
<tr>
<td>23</td>
<td>Detailed Agenda</td>
</tr>
<tr>
<td>47</td>
<td>Committees</td>
</tr>
<tr>
<td>52</td>
<td>Sponsors</td>
</tr>
</tbody>
</table>
Welcome Message

Dear Members of the IFIP WG 5.7 and the Participants of the APMS 2019,

On behalf of the Organizing Committee, the Program Committee, and the hosting institution (Texas State University), it is our great pleasure to welcome you to Austin, Texas, for the Advances in Production Management Systems Conference. We are looking forward to inspiring presentations and fruitful discussions during this event which coincides with the 40th anniversary of IFIP WG 5.7.

APMS 2019 in Austin, Texas brings together leading international experts from academia, industry, and government in the general area of production systems to discuss globally pressing issues in smart manufacturing, operations management, supply chain management, and sustainable and reconfigurable manufacturing. The popular research topics in APMS 2019 include data-driven production management, digital twin, augmented and virtual reality, human-machine interface, and cyber-physical production systems. These are the key components of the fourth industrial revolution and the main research thrusts in smart manufacturing and Industry 4.0 research community. The core challenge is how to improve the effectiveness and efficiency of production systems and, at the same time, enhance their sustainability and intelligence. Also, redefining the role of humans in the new generation of automated production systems is a major challenge faced by researchers and practitioners.

We thank the local staff, participants, session chairs, keynote and plenary speakers for helping us build this very exciting conference program. The Local Organizing Committee made every possible effort to make sure that your participation will be scientifically rewarding and a pleasurable experience. We appreciate the generous support from our sponsors, namely, Texas State University- College of Science and Engineering, the University of Texas at Dallas - Naveen Jindal School of Management, AlphaNodus, and Penn State Service Enterprise Engineering.

Thank you all for attending APMS 2019 and welcome to Austin!

Farhad Ameri
Conference Chair

Kathryn Stecke
Program Chair

Dimitris Kiritsis
WG5.7 Chair

Gregor von Cieminski
WG5.7 Secretary
Objectives and Scopes

APMS 2019 in Austin, Texas, brings together leading international experts from academia, industry, and government in the area of production systems to discuss globally pressing issues in smart manufacturing, operations management, supply chain management, and Industry 4.0. The conference features several sessions filled with original, high-impact academic contributions, which will be published in the Springer Series ACIT. Industrial viewpoints and insights will be shared through industry keynotes by world-renowned industry leaders. High-quality papers will be fast tracked to several peer-reviewed archival journals, including Production Planning and Control (PPC). The conference is supported by the International Federation of Information Processing (IFIP) and is organized by the IFIP Working Group 5.7 on Advances in Production Management Systems which was established 1978.

Program

The program includes presentations and discussions of peer-reviewed papers, in addition to insightful keynote speeches. The program also includes a doctoral workshop that provides young researchers the opportunity to present research proposals (September 1st), special sessions that help raise visibility on focus topics in a particular scientific or applications area (September 2nd-4th), and industry tours, for participants to visit manufacturing facilities (September 5th).
General Information
The APMS 2019 International Conference — Advances in Production Management Systems will be held on September 1st through the 5th in Austin, Texas, USA.

Thursday, September 5th, 8:30 a.m.-12:00 noon

Venue

The Hilton Austin

500 East 4th Street, Austin Texas, 78701, USA

Located adjacent to the Austin Convention Center, the Hilton Austin boasts 801 modern rooms and 80,000 sq. ft. of newly renovated meeting space. Just one block away from the Austin’s famed 6th Street, the hotel embodies the taste, texture, and aesthetics of “Bat City.”

As a starting point or a place to round off a day of exploration, the Hilton Austin brings the flavor of the city under one roof. In addition to the full-service Starbucks, housed in the Hilton, Cannon + Belle artistically reinterprets comfort food, while Austin Taco Project redefines the boundaries of a “proper” taco.
Registration Desk

The registration desk will be located on the 6th floor outside Salon J. The registration desk will be open during the following hours.

- **Sunday:** September 1st, - 8:00 a.m. to 5:00 p.m.
- **Monday:** September 2nd, - 8:00 a.m. to 5:00 p.m.
- **Tuesday:** September 3rd, - 8:00 a.m. to 5:00 p.m.

Instructions for Presentations

Presenters are allotted 12-15 minutes total presentation time depending on the duration of the session. Session chairs have been instructed to retain control of the schedule.

The preferred file type for presentations is Microsoft PowerPoint (.pptx-Format recommended). All presenters are instructed to bring their presentation on a USB memory stick. All presenters are responsible for the correct display of their presentations. We recommend to test the presentation before the session.
Social Activities

Welcome Reception
September 1st, 2019

**Place:** The Hilton Austin | 4th Floor 400–402
**Time:** 6:30 p.m.–8:00 p.m.
**Dress:** Casual

All participants and accompanying guests are cordially invited to an informal gathering at the welcome reception of APMS 2019. Drinks and snacks will be served.

Gala Dinner
September 3rd, 2019

**Place:** Fogo de Chão Brazilian Steakhouse
**Time:** 6:30 p.m.–8:30 p.m.
**Dress:** Smart Casual

**Address:** 309 E 3rd St, Austin, TX 78701
Monday, September 2nd, 2019

**Iron Cactus**
12:30 p.m.–1:45 p.m.

606 Trinity St.
Austin, TX 78701
(512) 472-9240

---

Tuesday, September 3rd, 2019

**Easy Tiger**
11:45 a.m.–1:00 p.m.

709 E. 6th St.
Austin, TX 78701
(512) 614-4972

---

Wednesday, September 4th, 2019

**Easy Tiger**
12:00 p.m.–1:15 p.m.

709 E. 6th St.
Austin, TX 78701
(512) 614-4972
Keynote Speakers

Dr. Asbjørn Rolstadås
Professor Emeritus, Mechanical and Industrial Engineering
Norwegian University of Science and Technology, Faculty of Engineering
Monday, September 2nd, 9:00 a.m. Salon J
Managing Risk and Opportunities in Complex Projects

Dr. Karthik Ramani
Donald W. Feddersen Professor of Mechanical Engineering
Professor of Electrical and Computer Engineering (by courtesy)
Professor of Educational Studies, College of Education (by courtesy)
Purdue University
Tuesday, September 3rd, 10:15 a.m. Salon J
Redesigning Manufacturing Machines, Design Tools, and Robotics for Smart Human Augmented Spatial Interfaces

Dr. Chip White
Schneider National Chair of Transportation & Logistics
H. Milton Stewart School of Industrial and Systems Engineering
Georgia Institute of Technology
Tuesday, September 3rd, 11:00 a.m. Salon J
Digitalization and Cybersecurity for Trusted Next Generation Supply Chains
Industrial Tours

The conference program includes two industry tours with site visits to Amazon Fulfillment Center and EOS North America. The morning Amazon Tour will be repeated in the afternoon.

Amazon Fulfillment Center:
Amazon tours provide a broad, high-level overview of fulfillment center operations for general audiences. The one-hour walking tour will take the group through the operations process of what happens after a customer clicks "Buy" on Amazon.com. Guests must wear flat, closed-toe and closed-heel shoes (no sandals, clogs or high heels). We recommend wearing comfortable shoes or sneakers. Additionally, long hair must be pulled above the shoulders, and long-hanging jewelry, scarves and ties are not permitted. No cameras or other video equipment are allowed on the tour. Guests may bring cellphones, as long as they do not use their phones to take pictures or audio/video recordings.

Tour buses will depart from the North Entrance of the Hilton on 5th street.

EOS North America
Thursday, September 5th

| Morning Tour | Departure from Hilton | 8:30 a.m.-8:45 a.m. |
| Tour         | 9:30 a.m.-11:30 a.m.  |
| Arriving at Hilton | 12:00 noon |

Amazon Fulfillment Center
Thursday, September 5th

| Morning Tour | Departure from Hilton | 8:30 a.m. |
| Tour         | 9:30 a.m.-11:30 a.m.  |
| Arriving at Hilton | 11:30 a.m. |

| Afternoon Tour | Departure from Hilton | 12:30 p.m. |
| Tour          | 1:30 p.m.-2:30 p.m.   |
| Arriving at Hilton | 3:30 p.m. |
Conference Overview
Sessions Overview

MONDAY

9:00A.M. - 10:30A.M.  I  SALON J  
Opening Ceremony

11:00A.M. - 12:30P.M.  I  615A  
Blockchain in Supply Chain Management

11:00A.M. - 12:30P.M.  I  602  
Production Management in Food Supply Chains

11:00A.M. - 12:30P.M.  I  616B  
The Operator 4.0 and the Internet of Things, Services and People

11:00A.M. - 12:30P.M.  I  615B  
Production Planning and Control

11:00A.M. - 12:30P.M.  I  616A  
Research Workshop

1:45PM. - 3:15PM.  I  616A  
Operations Management in Engineer-to-Order Manufacturing

1:45PM. - 3:15PM.  I  602  
Production Management in Food Supply Chains

1:45PM. - 3:15PM.  I  616B  
Operator 4.0 and the Internet of Things, Services and People

1:45PM. - 3:15PM.  I  615B  
Sustainability and Production Management

1:45PM. - 3:15PM.  I  615A  
Variety and Complexity Management in the Era of Industry 4.0

3:45PM. - 5:15PM.  I  616A  
Operations Management in Engineer-to-Order Manufacturing

3:45PM. - 5:15PM.  I  602  
Production Management in Food Supply Chains

3:45PM. - 5:15PM.  I  615B  
Participatory Methods for Supporting Career choices in Industrial Engineering, Management and Education

3:45PM. - 5:15PM.  I  616B  
The New Frontiers of Service Engineering: Designing and Delivering Smart Services in The Digital Age

3:45PM. - 5:15PM.  I  615A  
Variety and Complexity Management in the Era of Industry 4.0

TUESDAY

8:30A.M. - 9:45A.M.  I  615B  
Intelligent Diagnostics and Maintenance Solutions for Smart Manufacturing, an SM and CPPS SIG workshop

8:30A.M. - 9:45A.M.  I  616B  
Smart Factory and IOT

8:30A.M. - 9:45A.M.  I  602  
Product and Asset Life Cycle Management in Smart Factories of Industry 4.0

8:30A.M. - 9:45A.M.  I  616A  
Production Planning and Control

8:30A.M. - 9:45A.M.  I  615A  
Variety and Complexity Management in the Era of Industry 4.0

10:15A.M. - 11:45A.M.  I  SALON J  
Keynote Address 2 and 3

1:00P.M. - 2:15P.M.  I  616B  
Cyber Physical Systems

1:00P.M. - 2:15P.M.  I  616A  
Lean Production

1:00P.M. - 2:15P.M.  I  602  
Product and Asset Life Cycle Management in Smart Factories of Industry 4.0

1:00P.M. - 2:15P.M.  I  615A  
Sustainability and Reconfigurability of Manufacturing Systems

1:00P.M. - 2:15P.M.  I  615B  
Supply Chain Planning and Optimization

2:30P.M. - 3:45P.M.  I  616B  
Collaborative Technology

2:30P.M. - 3:45P.M.  I  602  
Data-driven Production Management

2:30P.M. - 3:45P.M.  I  616A  
Lean Production

2:30P.M. - 3:45P.M.  I  615A  
Sustainability and Reconfigurability of Manufacturing Systems

2:30P.M. - 3:45P.M.  I  615B  
Supply Chain Planning and Optimization

4:00PM. - 5:15PM.  I  SALON J  
Plenary Session 1: Emerging Challenges and Research Opportunities in Smart Services

WEDNESDAY

8:30AM - 10:00AM  I  616B  
Knowledge Management in Design and Manufacturing

8:30AM - 10:00AM  I  615B  
Collaborative Technology

8:30AM - 10:00AM  I  616A  
Industry 4.0 Implementations

8:30AM - 10:00AM  I  615A  
Supply Chain Planning and Optimization

10:30AM - 12:00PM  I  SALON J  
Plenary Session 2: Towards Smart Production Management Systems: Things, Services and People

1:15PM - 2:45PM  I  616B  
Collaborative Product Development

1:15PM - 2:45PM  I  616A  
ICT for Collaborative Manufacturing

1:15PM - 2:45PM  I  615A  
Machine Learning in Production Management

1:15PM - 2:45PM  I  615B  
Workflow and Inventory Planning

3:15PM - 4:45PM  I  SALON J  
Closing Ceremony
## Conference Overview

### Sunday

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30</td>
<td>Doctoral Workshop Intro</td>
</tr>
<tr>
<td>8:45</td>
<td>Doctoral Workshop (Session 1 and 2)</td>
</tr>
<tr>
<td>9:00</td>
<td>Coffee Break (30 min.)</td>
</tr>
<tr>
<td>9:15</td>
<td>Doctoral Workshop (Session 3 and 4)</td>
</tr>
<tr>
<td>9:30</td>
<td>Lunch Break (60 min.)</td>
</tr>
<tr>
<td>9:45</td>
<td>Lunch Break (75 min.)</td>
</tr>
<tr>
<td>10:00</td>
<td>Coffee Break (30 min.)</td>
</tr>
<tr>
<td>10:15</td>
<td>Doctoral Workshop (Session 5)</td>
</tr>
<tr>
<td>10:30</td>
<td>Lunch Break (60 min.)</td>
</tr>
<tr>
<td>10:45</td>
<td>Lunch Break (75 min.)</td>
</tr>
<tr>
<td>11:00</td>
<td>Doctoral Workshop Closing</td>
</tr>
<tr>
<td>11:15</td>
<td>WG 5.7 Meeting (Room 602)</td>
</tr>
<tr>
<td>11:30</td>
<td>Welcome Reception (90 min.)</td>
</tr>
</tbody>
</table>

### Monday

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30</td>
<td>Opening Ceremony Keynote Address 1 Paper 138</td>
</tr>
<tr>
<td>8:45</td>
<td>Parallel Session #1</td>
</tr>
<tr>
<td>9:00</td>
<td>Parallel Session #2</td>
</tr>
<tr>
<td>9:15</td>
<td>Parallel Session #3</td>
</tr>
<tr>
<td>9:30</td>
<td>Coffee Break (30 min.)</td>
</tr>
<tr>
<td>9:45</td>
<td>Coffee Break (30 min.)</td>
</tr>
<tr>
<td>10:00</td>
<td>Opening Ceremony Keynote Address 1 Paper 138</td>
</tr>
<tr>
<td>10:15</td>
<td>Parallel Session #1</td>
</tr>
<tr>
<td>10:30</td>
<td>Parallel Session #2</td>
</tr>
<tr>
<td>10:45</td>
<td>Parallel Session #3</td>
</tr>
<tr>
<td>11:00</td>
<td>Coffee Break (30 min.)</td>
</tr>
<tr>
<td>11:15</td>
<td>Coffee Break (30 min.)</td>
</tr>
<tr>
<td>11:30</td>
<td>Opening Ceremony Keynote Address 1 Paper 138</td>
</tr>
<tr>
<td>11:45</td>
<td>Parallel Session #1</td>
</tr>
<tr>
<td>12:00</td>
<td>Parallel Session #2</td>
</tr>
<tr>
<td>12:15</td>
<td>Parallel Session #3</td>
</tr>
<tr>
<td>12:30</td>
<td>Coffee Break (30 min.)</td>
</tr>
<tr>
<td>12:45</td>
<td>Coffee Break (30 min.)</td>
</tr>
<tr>
<td>13:00</td>
<td>Opening Ceremony Keynote Address 1 Paper 138</td>
</tr>
<tr>
<td>13:15</td>
<td>Parallel Session #1</td>
</tr>
<tr>
<td>13:30</td>
<td>Parallel Session #2</td>
</tr>
<tr>
<td>13:45</td>
<td>Parallel Session #3</td>
</tr>
<tr>
<td>14:00</td>
<td>Coffee Break (30 min.)</td>
</tr>
<tr>
<td>14:15</td>
<td>Coffee Break (30 min.)</td>
</tr>
<tr>
<td>14:30</td>
<td>Opening Ceremony Keynote Address 1 Paper 138</td>
</tr>
<tr>
<td>14:45</td>
<td>Parallel Session #1</td>
</tr>
<tr>
<td>15:00</td>
<td>Parallel Session #2</td>
</tr>
<tr>
<td>15:15</td>
<td>Parallel Session #3</td>
</tr>
<tr>
<td>15:30</td>
<td>Coffee Break (30 min.)</td>
</tr>
<tr>
<td>15:45</td>
<td>Coffee Break (30 min.)</td>
</tr>
<tr>
<td>16:00</td>
<td>Opening Ceremony Keynote Address 1 Paper 138</td>
</tr>
<tr>
<td>16:15</td>
<td>Parallel Session #1</td>
</tr>
<tr>
<td>16:30</td>
<td>Parallel Session #2</td>
</tr>
<tr>
<td>16:45</td>
<td>Parallel Session #3</td>
</tr>
<tr>
<td>17:00</td>
<td>Coffee Break (30 min.)</td>
</tr>
<tr>
<td>17:15</td>
<td>Coffee Break (30 min.)</td>
</tr>
<tr>
<td>17:30</td>
<td>Opening Ceremony Keynote Address 1 Paper 138</td>
</tr>
<tr>
<td>17:45</td>
<td>Parallel Session #1</td>
</tr>
<tr>
<td>18:00</td>
<td>Parallel Session #2</td>
</tr>
<tr>
<td>18:15</td>
<td>Parallel Session #3</td>
</tr>
<tr>
<td>18:30</td>
<td>Coffee Break (30 min.)</td>
</tr>
</tbody>
</table>
**SCHEDULE OVERVIEW**

- **Tuesday Sessions are 75 minutes**

**Tuesday**
- Parallel Sessions #4
- Coffee Break (30 min.)
- Keynote Address (2 and 3)
- Lunch Break (75 min.)
- Parallel Session #5
- Coffee Break (15 min.)
- Parallel Session #6
- Coffee Break (15 min.)
- Plenary Session #1

**Wednesday**
- Parallel Sessions #7
- Coffee Break (30 min.)
- Plenary Session #2
- Lunch Break (75 min.)
- Parallel Session #8
- Coffee Break (30 min.)

**Thursday**
- Industrial Tours Amazon Fulfillment Center (8:30–12:30)
- EOS Additive Manufacturing (8:30–12:30)
- Industrial Tours Amazon Fulfillment Center (12:30–3:15)
- Gala Dinner (120 min.)
- Closing Ceremony
Doctoral Workshop Program

Sunday, September 1st, 2019

8:30 a.m. – 10:15 a.m.
615AB

**Doctoral Workshop - Opening Session**
615AB
Chair: Gregor von Cieminski

---

10:30 a.m. – 12:00 noon
615AB

---

**Doctoral Workshop - Session 1**
615AB
Chair: Boonserm Kulvatunyou

**Toward Zero-Defect Manufacturing for Machine Tools Using Systematic Virtual Quality Control and Real-time Prediction and Prevention**
Paul-Arthur Dreyfus
EPFL, Switzerland
Discussant: David Romero

**Design and Assessment of Decision-Making Process for Data-Driven Maintenance Provision in Product-Service System**
Roberto Sala
University of Bergamo, Italy
Discussant: João Mendes dos Reis

---

**Doctoral Workshop - Session 2**
616AB
Chair: Gregor von Cieminski

**Organization of Sales for Smart Product Service Systems**
Benedikt Moser
Institute for Industrial Management at RWTH Aachen University, Germany
Discussant: Paolo Gaiardelli

**Learning Factory Concept for Norwegian SMEs**
Kavin Kathiresh Vijayan
Norwegian University of Science and Technology, Norway
Discussant: Gregor von Cieminski

---

**Doctoral Workshop - Session 3**
615AB
Chair: Boonserm Kulvatunyou

**Asset Management in Manufacturing: How to Manage Information and Data?**
Adalberto Polenghi
Politecnico di Milano, Italy
Discussant: Farhad Ameri
Planning Delivery Dates in Engineer-To-Order Manufacturing
Swapnil Bhalla
Norwegian University of Science and Technology, Norway
Discussant: Paolo Gaiardelli

Doctoral Workshop - Session 4
616AB
Chair: Gregor von Cieminski

A Framework for Manufacturing Companies to Support Them in Undertaking a Sustainable Path by Applying Circular Economy Principles
Federica Acerbi
Politecnico di Milano, Italy
Discussant: Gregor von Cieminski

Operations Management in Hospital Laboratories
Aili Birita Bertnum
NTNU
Discussant: Gul Kremer

Doctoral Workshop - Session 5
615AB
Chair: Boonserm Kulvatunyou

EHR-PDCA - A Framework Proposal for the Interoperability and Health Data Management
Neusa Maria Andrade
UNIP, Brazil
Discussant: David Romero

Doctoral Workshop - Closing Session
615AB
Chair: Boonserm Kulvatunyou
**Understanding, Structuring and Configuring Engineer-To-Order Supply Chains**

Jonathan Gosling  
Logistics Systems Dynamics Group, Logistics and Operations Management Section, Cardiff Business School, Cardiff University, Cardiff, UK  
goslingj@cardiff.ac.uk

**ABSTRACT:** In recent years, there has been increasing interest in research concerning engineer-to-order (ETO) systems, particularly from academics who are interested in high value, complex engineering products in sectors such as construction, maritime, and machine tools. This presentation reflects on themes of “understanding, structuring and configuring” in ETO operations and supply chains, which emerges from recently published papers by collaborations between researchers in Cardiff University (UK), Jönköping University (Sweden) and Politecnico di Milano (Italy). First, it is proposed that it is possible to understand engineer-to-order situations through the lens of customer penetration concepts. Second, and building on this understanding, it is possible to structure New Product Development (NPD) efforts by taking a holistic view that aligns NPD processes with market drivers and trade-off considerations. Third, there is a need to configure engineering and production activities, taking into account

---

**Extending Little’s Law to Single Order Throughput Times**

Hermann Lödding  
Hamburg University of Technology  
Institute of Production Management and Technology

**ABSTRACT:** Little’s Law probably is the most often applied equation in operations management. A simple extension of Little’s Law allows to model the throughput times of individual orders opening manifold opportunities to analyze manufacturing control policies.
Detailed Agenda
Detailed Agenda

Monday, September 2nd, 2019

9:00 a.m. – 10:30 a.m.

Opening Ceremony
SALON J

KEYNOTE 1: Managing Risk and Opportunities in Complex Projects
Asbjørn Rolstadås
Norwegian University of Science and Technology

The APMS Conference and IFIP WG5.7 in the 21st Century - A Bibliometric Study
Makenzie Keepers¹, David Romero², Thorsten Wuest¹
¹:West Virginia University, United States of America; ²:Tecnológico de Monterrey, México

11:00 a.m. – 12:30 p.m.

Blockchain in Supply Chain Management
615A
Chair: Volker Stich

Towards a Blockchain Based Traceability Process: A Case Study from Pharma Industry
Ferdinando Chiaccchio¹, Diego D’Urso¹, Lucio Compagno¹, Marcello Chiarenza¹, Luca Velardita²
¹:Università degli Studi di Catania, Italy; ²:SIFI SPA, Information and Communication Technology

An Architecture of IoT-based Product Tracking with Blockchain in Multi-Sided B2B Platform
Shantanoo Desai¹², Quan Deng¹, Stefan Wellsandt¹², Klaus-Dieter Thoben¹²
¹: BIBA - Bremer Institut für Produktion und Logistik GmbH, Hockschulring 20, 28359 Bremen, Germany; ²: Faculty of Production Engineering, University of Bremen, Badgasteiner Straße 1, 28359 Bremen, Germany

Blockchain as Middleware+
David Holtkemper¹, Günther Schuh²
¹: Institute for Industrial Management, Germany; ²: WZL at RWTH Aachen Universit, Germany

Blockchain Application Supporting the Manufacturing Value Chain
Bjorn Jager, Terje Bach, Simen Alexander Pedersen
Molde University College, Norway

Design of a Blockchain-driven System for Product Counterfeiting Restraint in the Supply Chain
Sotiris P. Gayialis, Evripidis Kechagias, Georgios A. Papadopoulos, Grigoris D. Konstantakopoulos
National Technical National Technical University of Athens, School of Mechanical Engineering, Iroon Polytechniou 9, 15780, Athens, Greece

Production Management in Food Supply Chains
Chair: Irenilza de Alencar Nääs
Neuro-fuzzy System for the Evaluation of Soya Production and Demand in Brazilian Ports
Emerson Rodolfo Abraham\textsuperscript{1}, João Gilberto Mendes dos Reis\textsuperscript{1}, Aguinaldo Eduardo de Souza\textsuperscript{1}, Adriane Paulieli Colossetti\textsuperscript{2}
\textsuperscript{1}: Universidade Paulista UNIP, Brazil; \textsuperscript{2}: Sunsetti Treinamentos e Serviços

Port Logistic Support Areas (PLSA) for Exporting Grains: A Case-study in the Largest Port in Latin America
Clayton Gerber Mangini\textsuperscript{1,2}, Ireniţa de Alencar Náãs\textsuperscript{1}, Antônio Carlos Estender\textsuperscript{1,3}, Meykson Rodrigues Alves Cordeiro\textsuperscript{1}, Agnaldo Vieira Silva\textsuperscript{1}
\textsuperscript{1}: Paulista University-Graduate Program in Production Engineering, Brazil; \textsuperscript{2}: FATEC Baixada Santista – Rubens Lara. 11045-900, SP, Brazil; \textsuperscript{3}: FATEC Franco da Rocha – São Paulo. 04028-002, SP, Brazil

Port Terminals Assessment: An Empirical Analysis of Requirements of Brazilian National Plan of Port Logistics
Aguinaldo Eduardo De Souza\textsuperscript{1}, João Gilberto Mendes dos Reis\textsuperscript{2}, Ataide Pereira Cardoso Junior\textsuperscript{3}, Emerson Rodolfo Abraham\textsuperscript{4}, Oduvaldo Vendrametto\textsuperscript{4}, Renato Marcio dos Santos\textsuperscript{4}, Roberta Sobral Pinto\textsuperscript{4}
\textsuperscript{1}: Paulista University - UNIP, PPGEP, São Paulo, Brazil, UNIBR, São Vicente, Brazil; \textsuperscript{2}: Paulista University - UNIP, PPGEP, São Paulo, Brazil; \textsuperscript{3}: Paulista University - UNIP, PPGEP, São Paulo, Brazil, UFGD, PPGA, Dourados, Brazil; \textsuperscript{4}: Paulista University - UNIP, PPGEP, São Paulo, Brazil; \textsuperscript{5}: Paulista University - UNIP, PPGEP, São Paulo, Brazil; \textsuperscript{6}: Paulista University - UNIP, PPGEP, São Paulo, Brazil; \textsuperscript{7}: UNISA, Universidade Santo Amaro, São Paulo, Brazil

An Evaluation of Brazilian Ports for Corn Exportation Using Multicriteria Analysis
Aguinaldo Eduardo de Souza\textsuperscript{1}, João José Giardulli Junior\textsuperscript{2}, João Gilberto Mendes dos Reis\textsuperscript{3}, Ataide Pereira Cardoso Junior\textsuperscript{4}, Paula Ferreira da Cruz Correia\textsuperscript{5}, Ricardo Zandonadi Schimidt\textsuperscript{6}, José Benedito Sacomano\textsuperscript{7}, Márcia Terra da Silva\textsuperscript{8}
\textsuperscript{1}: Paulista University - UNIP, PPGEP, São Paulo, Brazil, UNIBR, São Vicente, Brazil; \textsuperscript{2}: Paulista University - UNIP, PPGEP, São Paulo, Brazil; \textsuperscript{3}: Paulista University - UNIP, PPGEP, São Paulo, Brazil; \textsuperscript{4}: Paulista University - UNIP, PPGEP, São Paulo, Brazil; \textsuperscript{5}: Paulista University - UNIP, PPGEP, São Paulo, Brazil; \textsuperscript{6}: Paulista University - UNIP, PPGEP, São Paulo, Brazil; \textsuperscript{7}: Paulista University - UNIP, PPGEP, São Paulo, Brazil; \textsuperscript{8}: Paulista University - UNIP, PPGEP, São Paulo, Brazil

CNN-based Growth Prediction of Field Crops for Optimizing Food Supply Chain
Shunsuke Itsuka\textsuperscript{1}, Nobutada Fujii\textsuperscript{1}, Daisuke Kokuro\textsuperscript{1}, Toshiya Kihara\textsuperscript{1}, Shinichi Nakano\textsuperscript{1}
\textsuperscript{1}: Kobe University, Japan; \textsuperscript{2}: Hyogo Prefectural Technology Center for Agriculture, Forestry and Fisheries, Japan

The Operator 4.0 and the Internet of Things, Services and People (1) An SM & CPPS SIG Workshop Session
616B
Chair: David Romero
11:00 a.m. – 12:30 p.m.

Empowering and Engaging Solutions for Operator 4.0: Acceptance and Foreseen Impacts by Factory Workers
Eija Kaasinen, Susanna Aromaa, Päivi Heikkilä, Marja Liinasuo
VTT Technical Research Centre of Finland Ltd, Finland

Process Innovation in Learning Factories: Towards a Reference Model
Maria Stoettrup Schioenning Larsen, Astrid Heidemann Lassen, Kjeld Nielsen
Aalborg University, Denmark

Investments of the Automotive Sector and the Industry 4.0. Brazilian Case
Sergio Miele Ruggero, Nilza Aparecida dos Santos, José Benedito Sacomano, Marcia Terra da Silv
Universidade Paulista UNIP, Brazil

Smart Service Engineering: Promising Approaches for a Digitalized Economy
Jan Kuntz, Roman Senderek, Volker Stich, Jana Frank
FIR an der RWTH Aachen, Germany

Applicability of Agile Methods for Dynamic Requirements in Smart PSS Development
Stefan Alexander Wiesner1, Jannicke Baalsrud Hauge1,2, Paul Sonntag2, Klaus-Dieter Thoben1,3
1: BIBA - Bremer Institut für Produktion und Logistik GmbH, Germany; 2: KTH – Royal Institute of Technology, Sweden; 3: University of Bremen, Germany

Production Planning and Control (2)
Location: 615B
Chair: Johan Oppen

Postponement Revisited – A Typology for Displacement
Fredrik Tiedemann, Joakim Wikner
Jönköping University, School of Engineering, Sweden

Efficient Heuristic Solution Methodologies for Scheduling Batch Processor with Incompatible Job-Families, Non-Identical Job-Sized and Non-Identical Job-Dimensions
Muthu Mathirajan1, M Ramaasubramanian2
1: Indian Institute of Science, Bangalore, India; 2: Loyola Institute of Business Administration, Chennai, India

Increasing the Regulability of Production Planning and Control Systems
Günther Schuh, Philipp Wetzschewald
Institute for Industrial Management (FIR) at RWTH Aachen University, Germany

Optimizing Workflow in Cell-based Slaughtering and Cutting of Pigs
Johan Oppen
Møreforsking Molde, Norway
Research Workshop
616A
Chair: Hans-Hermann Wiendahl

Operations Management in Engineer-to-Order Manufacturing
616A
Chair: Erlend Alfnes

Aspects for Better Understanding of Engineering Changes in Shipbuilding Projects: In-depth Case Study
Natalia Iakymenko, Marco Semini, Jan Ola Strandhagen
Norwegian University of Science and Technology, Norway

IPD Methodology in Shipbuilding
Hajnalka Vaagen, Lucky M. Masi
Norwegian University of Science and Technology, Department of Ocean Operations and Civil Engineering, Ålesund, Norway

Exploring Logistics Strategy in Construction
Martin Rudberg¹, Duncan Maxwell²
1: Linköping University, Sweden; 2: Monash University, Australia

Practical Guidelines for Production Planning and Control in HVLV production
Erik Gran¹, Erlend Alfnes²
1: SINTEF, Norway; 2: Norwegian university of science and technology

APS Feasibility in One-Of-a-Kind ERP Environments
Erlend Alfnes¹, Hans-Henrik Hvolby²
1: Norwegian University of Science and Technology, Trondheim; 2: Aalborg University, Denmark

Production Management in Food Supply Chains
602
Chair: Irenilza de Alencar Nääs

Horizontal Integration in Fresh Food Supply Chain
Flemming Max Møller Christensen¹, Soujanya Mantravadi², Iskra Dukovska-Popovska³,
Hans-Henrik Hvolby¹, Kenn Steger-Jensen¹, Charles Møller²
1: Centre for Logistics (CELOG), Materials & Production, Aalborg University, Denmark; 2: Centre for Industrial Production (CIP), Materials & Production, Aalborg University, Denmark

Reverse Logistics and Waste in the Textile and Clothing Production Chain in Brazil
Solimar Garcia¹, Irenilza de Alencar Nääs², Pedro Luiz de Oliveira Costa Neto³,
João Gilberto Mendes dos Reis³
Paulista University, Brazil
CO2 Gas Emissions of Soybean Production and Transportation in the Different Macro-regions of Mato Grosso State-Brazil
Marley Nunes Vituri Toloi¹², Rodrigo Carlo Toloi¹², Helton Raimundo Oliveira Silva¹, João Gilberto Mendes dos Reis¹, Silvia Helena Bonilla¹
1: Paulista University, São Paulo, Brazil; 2: Federal Institute of Mato Grosso Campus Rondonópolis, Mato Grosso, Brazil

Asymmetrical Evaluation of Forecasting Models through Fresh Food Product Characteristics
Flemming Max Møller Christensen, Iskra Dukovska-Popovska, Casper Solheim Bojer, Kenn Steger-Jensen
Aalborg University, Denmark

Brazilian Coffee Export Network: An Analysis Using SNA
Paula Ferreira da Cruz Correia¹, João Gilberto Mendes dos Reis¹, Aginaldo Eduardo de Souza², Ataide Pereira Cardoso Junior³
1: Paulista University - UNIP, PPGEP, São Paulo, Brazil; 2: Paulista University - UNIP, PPGEP, São Paulo, Brazil, UFGD, PPGA, Dourados, Brazil; 3: Paulista University - UNIP, PPGEP, São Paulo, Brazil, UNIBR, São Vicente, Brazil

The Operator 4.0 and the Internet of Things, Services and People (2) An SM and CPPS SIG Workshop Session
616B
Chair: David Romero

Task-Technology Fit in Manufacturing: Examining Human-Machine Symbiosis through a Configurational Approach
Patrick Mikalef, Hans Torvatn, Emrah Arica
SINTEF, Norway

Augmented Reality for Humans-Robots Interaction in Dynamic Slotting “Chaotic Storage” Smart Warehouses
Peter Papcun¹, Jan Cabadaj¹, Erik Kajati¹, David Romero², Lenka Landryova³, Jan Vascak¹, Iveta Zolotova¹
1: Technical University of Kosice, Faculty of Electrical Engineering and Informatics, Slovak Republic; 2: Tecnológico de Monterrey, Mexico; 3: VSB – Technical University of Ostrava Ostrava, Czech Republic

Analyzing Human Robot Collaboration with the Help of 3D Cameras
Robert Gloeckner¹, Lars Fischer², Arne Dethlefs², Hermann Lödding¹
1: Hamburg University of Technology, Germany; 2: Garz & Fricke GmbH

Strategies for Implementing Collaborative Robot Applications for the Operator 4.0
Ása Fast-Berglund¹, David Romero²
1: Chalmers University of Technology, Sweden; 2: Tecnológico de Monterrey, Mexico

Situation Awareness for Effective Production Control
Andreas D. Landmark, Emrah Arica, Birgit Klose, Pål Furu Kamsvåg, Eva Amdahl Seim, Manuel Oliveira
SINTEF, Norway
**Sustainability and Production Management**

1:45 p.m. – 3:15 p.m.

615B
Chair: Bjorn Jager

**Configuring the Future Norwegian Macroalgae Industry Using Life Cycle Analysis**

Jon Halfdanarson¹, Matthias Koesling², Nina Pereira Kvadsheim¹, Jan Emblemsvåg¹, Celine Rebours²
1: Møreforsking Molde AS, Norway; 2: NIBIO; 3: Møreforsking Ålesund AS, Norway

**Business Model Innovation for Eco-Efficiency: An Empirical Study**

YAN Li¹, Steve Evans²
1: University of Greenwich, United Kingdom; 2: University of Cambridge, United Kingdom

**Atmospheric Water Generation (AWG): Performance Model and Economic Analysis**

Faraz Moghimi¹, Hamed Ghodduzii², Bahram Asiabanpour¹, Mahdi Behroozikhah³
1: Texas State University; 2: Stevens Institute of Technology; 3: University of California, San Diego

**Life Cycle Assessment for Ordinary and Frost-resistant Concrete**

Ramin Sabbagh, Paria Esmatloo
The University of Texas at Austin, United States of America

**Operationalizing Industry 4.0: Understanding Barriers of Industry 4.0 and Circular Economy**

Lise Lillebrygdfjeld Halse, Bjørn Jæger
Molde University College, Norway

Variety and Complexity Management in the Era of Industry 4.0

1:45 p.m. – 3:15 p.m.

615A
Chair: Khaled Medini

**Bringing Advanced Analytics to Manufacturing: A Systematic Mapping**

Hergen Wolf¹,², Rafael Lorenz², Mathias Kraus³, Stefan Feuerriegel¹, Torbjörn H. Netland¹
1: ETH Zurich, Switzerland; 2: TU Dresden, Germany

**Impact of Modeling Production Knowledge for a Data Based Prediction of Transition Times**

Günter Schuh, Jan-Philipp Prote, Philipp Hünnekes, Frederick Sauermann, Lukas Stratmann
Laboratory for Machine Tools and Production Engineering (WZL) of RWTH Aachen University, Germany

**5G-Ready in the Industrial IoT-Environment - Requirements and Needs for IoT Applications From an Industrial Perspective**

Kay Burow¹, Marco Franke¹, Klaus-Dieter Thoben²
1: BIBA - Bremer Institut für Produktion und Logistik GmbH, Germany; 2: University of Bremen, Institute for Integrated Product Development, Germany

**Computer-aided Selection of Participatory Design Methods**
3:45 p.m. – 5:15 p.m.

Michael Bojko, Ralph Riedel, Mandy Tawalbeh
Chemnitz University of Technology, Germany

Customization and Variants in Terms of Form, Place and Time
Joakim Wikner, Fredrik Tiedemann
Jönköping University, School of Engineering, Sweden

3:45 p.m. – 5:15 p.m.

Operations Management in Engineer-to-Order Manufacturing
616A
Chair: Erlend Alfnes

Digitalized Manufacturing Logistics in Engineer-to-Order Operations
Jo Wessel Strandhagen, Sven-Vegard Buer, Marco Semini, Erlend Alfnes
Norwegian University of Science and Technology, Trondheim, Norway

Architecture for a Digital Spare-Parts Library: Effective Use of Additive Layer Manufacturing in Petroleum Industry
R.M. Chandima Ratnayake¹, Arvind Keprate², Roman Wdowik³
1: Department of Mechanical and Structural Engineering and Materials Science, University of Stavanger, N4036, Stavanger, Norway.; 2: DNVGL, Høvik, 1363, Norway.; 3: Rzeszów University of Technology, The Faculty of Mechanical Engineering and Aeronautics, 35-959 Rzeszów, Poland

Purchasing Strategies, Tactics, and Activities in Engineer-to-Order Manufacturing
Mikhail Shlopak, Espen Rød, Gabriele Hofinger Jünge
Møreforsking Molde AS, Norway

Examining Circular Economy Business Models for Engineer-To-Order Products
Nina Pereira Kvadsheim¹, Deodat Mwesiumo¹, Jan Emblemsvåg²
1: Møreforsking Molde AS, Norway; 2: Molde University College

Changing Markets: Implications for the Planning Process in ETO Companies
Kristina Kjersem¹, Marte F. Giskeødegård²
1: Møreforsking Molde AS, Norway; 2: NTNU Ålesund

3:45 p.m. – 5:15 p.m.

Participatory Methods for Supporting Career Choices in Industrial Engineering and Management and Education
615B
Chair: Nick B. Szirbik

Teaching of Engineers Focused on Innovative Entrepreneurship
Production Management in Food Supply Chains

Chair: Joao Gilberto Mendes Dos Reis

Collaborative Production Chain: A Case-Study of Two Agri-Food Companies in Brazil
Yuri Claudio C. de Lima, Silvia Piva R. de Morais, Luis A. Mendes de M. Araujo, Daiane da S. A. Castelo Branco, Irenilza de Alencar Naãs
1: FACID/WYDEN, Teresina, Piaui, Brazil; 2: Paulista University-Graduate Program in Production Engineering, Brazil

Broiler meat production in Piauí State: A Case Study
Eldelita A. Franco, Lilane Brandão, José A. Luz, Kelly Gonçalves, Irenilza Naãs
Paulista University, Brazil

Global Warming Impact in a Food Distribution System: A Case-study in an Elementary School in Piauí
Genyvana Criscya Garcia Carvalho, Ivonalda Brito de Almeida Morais, Manoel Eulálio Neto, Raimundo Nonato Moura Rodrigues, Francisco Canindé Dias Alves, Irenilza de Alencar Naãs, Oduvaldo Vendrametto
UNIP- Paulista University, Brazil

Sustainability of Meat Chain: The Carbon Footprint of Brazilian Consumers
Raquel Silva, João Gilberto Reis, Thayla Curi, Nilsa Lima, Solimar Garcia, Irenilza Naãs
1: University Paulista, Brazil; 2: Anhanguera Educacional College, Brazil; 3: University of Campinas, Brazil

Scenarios for the Development and Use of Data Products within the Value Chain of the Industrial Food Production
Volker Stich, Lennard Holst, Philipp Jussen, Dennis Schiemann
1: FIR an der RWTH Aachen, Germany; 2: Lindt & Sprüngli Germany GmbH

The New Frontiers of Service Engineering: Designing and Delivering Smart Services in The Digital Age
Chair: Paolo Gaiardelli

The Impact of Digital Technologies on Services Characteristics: Towards Digital Servitization
David Romero, Paolo Gaiardelli, Giuditta Pezzotta, Cavalieri Sergio
1: Tecnológico de Monterrey; 2: University of Bergamo, Italy

Digital Servitization:
3:45 p.m. – 5:15 p.m.

The Next "Big Thing" in Manufacturing Industries
Ugljesa Marjanovic, Slavko Rakic, Bojan Lalic
University of Novi Sad, Serbia

Organization of Sales for Smart Product Service Systems
Benedikt Moser, Achim Kampker, Philipp Jussen, Jana Frank
Institute for Industrial Management at RWTH Aachen University, Germany

Capability-based Implementation of Digital Service Innovation in SMEs
David Görzig1,2, Susann Kärcher1, Thomas Bauernhansl1,2
1: IFF University of Stuttgart, Germany; 2: Fraunhofer IPA

A Dual Perspective Workflow to Improve Data Collection for Maintenance Delivery: An Industrial Case Study
Roberto Sala, Fabiana Pirola, Emanuele Dovere, Sergio Cavalieri
University of Bergamo, Italy

Variety and Complexity Management in the Era of Industry 4.0 (2)
615A
Chair: Ann-Louise Andersen

A Framework for Identification of Complexity Drivers in Manufacturing Companies
Rasmus Andersen, Thomas Ditlev Brunoe, Kjeld Nielsen
Aalborg University, Denmark

A DSM Clustering Method for Product and Service Modularization
Omar Ezzat1, Khaled Medini1, Maria Stoettrup Schioeening Larsen2, Xavier Boucher3, Thomas D Brunoe4, Kjeld Nielsen4, Xavier Delorme1
1: Mines Saint-Etienne, Univ Clermont Auvergne, CNRS, UMR 6158 LIMOS, Institut Henri Fayol, 42023 Saint- Etienne, France; 2: Department of Materials and Production, Aalborg University, Aalborg, Denmark

Identification of Platform Candidates through Production System Classification Coding
Daniel G.H. Sorensen1, Hoda A ElMaraghy2, Thomas Ditlev Brunoe1, Kjeld Nielsen1
1: Aalborg University, Denmark; 2: University of Windsor, Canada
Intelligent Diagnostics and Maintenance Solutions for Smart Manufacturing, an SM and CPPS SIG Workshop session

615B
Chair: Farhad Ameri

A Thesaurus-guided Method for Smart Manufacturing Diagnostics
Farhad Ameri, Reid Yoder
Texas State University, United States of America

A Study on the Diagnostics Method for Plant Equipment Failure
Minyoung Seo¹, HongBae Jun²
¹: Puzzle systems co., Data Business Unit, Korea, Republic of (South Korea); ²: Hongik University, Korea, Republic of South Korea

Modeling the Maintenance Time Considering the Experience of the Technicians
Hyunjong Shin, Kai-Wen Tien, Vittaldas Prabhu
The Pennsylvania State University, United States of America

Detailed Performance Diagnosis Based on Production Timestamps: A Case Study
Johannes Cornelis de Man, Felix Mannhardt
SINTEF Digital, Norway

Product and Asset Life Cycle Management in Smart Factories of Industry 4.0 (¹)

602
Chair: Irene Roda

Risk Sources Affecting the Asset Management Decision-making Process in Manufacturing: A Systematic Review of the Literature
Adalberto Polenghi, Irene Roda, Marco Macchi, Paolo Trucco
Politecnico di Milano, Italy

A Method for Converting Current Data to RDF in the Era of Industry 4.0
Marlene Hildebrand, Ioannis Tourkogiorgis, Foivos Psarommatis, Damiano Arena, Dimitris Kiritsis
École polytechnique fédérale de Lausanne, Switzerland

Ontology-based Resource Allocation for Internet of Things
Zeinab Nezami¹,², Kamran Zamanifar¹, Damiano Arena¹, Dimitris Kiritsis²
¹: University of Isfahan, Iran, Islamic Republic of; ²: École Politechnique Fédérale de Lausanne (EPFL), Switzerland

Semantic Model-Driven PLM Data Interoperability: An Application for Aircraft Ground Functional Testing with Eco-design Criteria
Damiano Arena¹, Manuel Oliva¹, Ignacio Eguía¹, Carmelo Del Valle¹, Dimitris Kiritsis²
¹: École Politechnique Fédérale de Lausanne, Switzerland; ²: AIRBUS, Spain; ³: University of Seville, Spain
8:30 a.m.– 9:45 a.m.

**Variety and Complexity Management in the Era of Industry 4.0** (3)

615A
Chair: Stefan Alexander Wiesner

**Reconfigurable Manufacturing: A Classification of Elements Enabling Convertibility and Scalability**
Alessia Napoleone¹, Ann-Louise Andersen², Alessandro Pozzetti¹, Marco Macchi³
1: Department of Management, Economics and Industrial Engineering, Politecnico di Milano, Milano, Italy; 2: Department of Materials and Production, Aalborg University, Aalborg, Denmark

**Complexity Management in Production Systems: Approach for Supporting Problem Solving Through Holistic Structural Consideration**
Samuel Horler, Ralph Riedel, Egon Müller
Chemnitz University of Technology, Germany

**Reconfigurable Manufacturing: A Case-Study of Reconfigurability Potentials in the Manufacturing of Capital Goods**
Bjørn Christensen¹, Ann-Louise Andersen¹, Khaled Medini², Thomas Dittey Brunoe¹
1: Aalborg University, Denmark; 2: Mines Saint-Etienne University, France

8:30 a.m.– 9:45 a.m.

**Smart Factory and IOT**

616B
Chair: Thorsten Wuest

**Virtualisation of Sea Trials for Smart Prototype Testing**
Moritz von Stietencron¹, Shantanoo Desai¹,², Klaus-Dieter Thoben¹,²
1: BIBA - Bremer Institut für Produktion und Logistik GmbH at the University of Bremen, Hochschulring 20, 28359 Bremen, Germany; 2: University of Bremen, Faculty of Production Engineering, Badgasteiner Straße 1, 28359 Bremen, Germany

**IoH Technologies into Indoor Manufacturing Sites**
Takeshi Kurata¹, Takashi Maehata¹, Hidehiko Hashimoto¹, Naohiro Tada¹, Ryosuke Ichikari², Hideki Aso³, Yoshinori Ito³
1: SEI, Japan; 2: AIST, Japan; 3: JPS, Japan

**Study on 3D Visualization of the Production History and Simulation Results for an Automotive Parts Supplier**
Hwang Dahye, Noh Sang Do
Sungkyunkwan University, Korea, Republic of South Korea

**Opportunities of Industry 4.0 in SMES: A Sectorial Analysis**
Javier Luco, Sara Mestre, Ludovic Henry, Simon Tamayo, Frédéric Fontane
Mines ParisTech, France

8:30 a.m.– 9:45 a.m.

**Production Planning and Control** (1)

616A
Chair: Eiji Morinaga
Simulation-Based Optimization of Lot Sizes for Opposing Logistic Objectives
Janine Tatjana Maier, Thomas Voss, Jens Heger, Matthias Schmidt
Leuphana University Lueneburg, Germany

A Proposal of Order Planning Method with Consideration of Multiple Organizations in Manufacturing System
Ken Yamashita¹, Toshiya Kaihara¹, Nobutada Fujii¹, Daisuke Kokuryo¹, Toyohiro Umeda¹, Rihito Izutsu²
1: Kobe University, Japan; 2: Kobe Steel, Ltd., Japan

Decision-making Process for Buffer Dimensioning in Manufacturing
Lisa Hedvall, Joakim Wikner
School of Engineering, Jönköping University, Sweden

Reduction of Computational Load in Robust Facility Layout Planning Considering Temporal Production Efficiency
Eiji Morinaga¹, Komei Iwasaki¹,², Hidefumi Wakamatsu¹, Eiji Arai¹
1: Osaka University, Japan; 2: Currently, NEC Corporation, Japan

Keynote Address 2 and 3

Salon J

Redesigning Manufacturing Machines, Design Tools, and Robotics for Smart Human Augmented Spatial Interfaces
Karthik Ramani
Purdue University

Digitalization and Cybersecurity for Trusted Next Generation Supply Chains
Chip White
Georgia Institute of Technology

Cyber Physical Systems
616B
Chair: Duck Young Kim

Blockchain as an Internet of Services Application for an Advanced Manufacturing Environment
Benedito Cristiano Aparecido Petroni¹, Jacqueline Zonichenn dos Reis¹, Rodrigo Franco Gonçalves¹²
1: Paulista University, Brazil; 2: Politecnico School, University of Sao Paulo, Brazil

Development of a Modeling Architecture Incorporating the Industry 4.0 View for a Company in the Gas Sector
Nikolaos A. Panayiotos, Konstantinos E. Stergiou, Vasileios P. Stavrou
National Technical University of Athens, Greece
Process for Enhancing the Production System Robustness with Sensor Data: A Food Manufacturer Case Study
Sofie Bech, Thomas Ditlev Brunoe, Kjeld Nielsen
Aalborg University, Denmark

In-process Noise Detection Methods for Product Quality Monitoring: Sensor Technologies and Acoustic Signal Analytics
Woonsang Baek, Duck-Young Kim
UNIST, Korea, Republic of South Korea

Product and Asset Life Cycle Management in Smart Factories of Industry 4.0
Chair: Irene Roda

Conceptual Framework for a Data Model to Support Asset Management Decision-making Process
Adalberto Polenghi, Irene Roda, Marco Macchi, Alessandro Pozzetti
Politecnico di Milano, Italy

Identification of the Inspection Specifications for Achieving Zero Defect Manufacturing
Foivos Psarommatis, Dimitris Kiritsis
École polytechnique fédérale de Lausanne, Switzerland

Total Cost Of Ownership Driven Methodology For Predictive Maintenance Implementation In Industrial Plants
Irene Roda¹, Simone Arena², Marco Macchi³, Pier Francesco Orrù³
1: Politecnico di Milano, Italy; 2: University of Cagliari, Italy

Hybrid Approach Using Ontology-supported Case-based Reasoning and Machine Learning for Defect Rate Prediction
Bongjun Ji¹,², Farhad Ameri¹, Junhyuk Choi², Hyunbo Cho²
1: Texas State University, United States of America; 2: Pohang University of Science and Technology, Republic of South Korea

Lean Production
Chair: Christoph Roser

Lean Leadership in Production Ramp-Up
Uwe Dombrowski, Jonas Wullbrandt
Technical University Braunschweig, Germany

Total Quality Management and Quality Circles in the Digital Lean Manufacturing World
David Romero¹, Paolo Gaiardelli², Daryl Powell³, Thorsten Wuest³, Matthias Thürer⁴
1: Tecnológico de Monterrey, Mexico; 2: University of Bergamo, Italy; 3: Norwegian University of Science and Technology, Norway; 4: West Virginia University, USA; 5: Jinan University, China
Using Prescriptive Analytics to Support the Continuous Improvement Process

Günther Schuh¹, Jan-Philipp Prote¹, Thomas Busam², Rafael Lorenz³, Torbjörn H. Netland⁴
1: Laboratory for Machine Tools and Production Engineering (WZL), RWTH Aachen University, 52074 Aachen, Germany; 2: Schuh & Co. GmbH, 52074 Aachen, Germany; 3: Department of Management, Technology, and Economics, ETH Zurich, 8092 Zurich, Switzerland

No Lean Without Learning: Rethinking Lean Production as a Learning System

Daryl John Powell¹, Eivind Reke²
1: Norwegian University of Science and Technology, Norway; 2: Los Norge, Norway

The Effect of Team Size on the Performance of Continuous Improvement Teams: Is Seven Really the Magic Number?

Daryl John Powell¹, Rafael Lorenz²
1: Norwegian University of Science and Technology, Norway; 2: ETH Zurich, Switzerland

Sustainability and Reconfigurability of Manufacturing Systems (¹)

Chair: Xavier Boucher

Towards Reconfigurable Digitalized and Servitized Manufacturing Systems: Conceptual Framework

Xavier Boucher¹, Audrey Cerqueus¹, Xavier Delorme¹, Clemens Gonnermann², Magdalena Paul²,
Gunther Reinhart², Julia Schulz², Fabian Sippl²
1: Mines Saint-Etienne, Université Clermont Auvergne, LIMOS; 2: Institute for Machine Tools and Industrial Management (iw), Technical University of Munich

Decision Support System for Joint Product Design and Reconfiguration of Production Systems

Seyyed Ehsan Hashemi Petroodi¹, Clemens Gonnermann², Magdalena Paul², Simon Thevenin¹,
Alexandre Dolgui¹, Gunther Reinhart²
1: IMT-Atlantique, Nantes, France; 2: Technical University Munich, Germany

Classification of Optical Technologies for the Mapping of Production Environments

Marius Greger¹, Daniel Palm¹, Louis Louw², Konrad von Leipzig²
1: Reutlingen University, Germany; 2: University of Stellenbosch, South Africa

A Competence-Based Description of Employees in Reconfigurable Manufacturing Systems

Svenja Korder, Barbara Tropschuh, Gunther Reinhart
Technical University of Munich, Germany
Supply Chain Planning and Optimization (1)
615B
Chair: Jan Frick

Price Decision Making in a Centralized/decentralized Solid Waste Disposal Supply Chain with One Contractor and Two Disposal Facilities
Iman Ghalekhondabi, Reza Maihami
Our lady of the lake university, United States of America

Understanding the Impact of User Behaviours and Scheduling Parameters on the Effectiveness of a Terminal Appointment System Using Discrete Event Simulation
Mihai Neagoe¹, Hans-Henrik Hvolby²,³, Mohammad Sadegh Taskhiri⁴, Paul Turner⁴
¹: ARC Centre for Forest Value, Discipline of ICT, College of Sciences and Engineering, University of Tasmania, Hobart, Australia; ²: Centre for Logistics, Department of Materials & Production, Aalborg University, Aalborg, Denmark; ³: Department of Mechanical and industrial Engineering, Norwegian University of Science and Technology, Trondheim, Norway

Full-Scale Discrete Event Simulation of an Automated Modular Conveyor System for Warehouse Logistics
Alireza Ashrafi¹, Ole-Gunnar Pettersen¹, Kristian N Kunte², Jacob Franke³, Erlend Alines³, Knut F. Henriksen¹
¹: Norwegian University of Science and Technology, Norway; ²: Swisslog, Norway; ³: ASKO, Norway

Handling Uncertainties in Production Network Design
Günther Schuh, Jan-Philipp Prote, Andreas Gützlaff, Sebastian Henk
Laboratory for Machine Tools and Production Engineering (WZL) of RWTH Aachen University

Collaborative Technology (2)
616B
Chair: Marcia Terra da Silva

Managing Knowledge in Manufacturing Industry -University Innovation Projects
Irina-Emily Hansen¹, Ola Jon Mork¹, Torgeir Welo²
¹: Department of Ocean Operations and Civil Engineering, Norwegian University of Science and Technology; ²: Department of Mechanical and Industrial Engineering, Norwegian University of Science and Technology

Technology Companies in Judicial Reorganization
Ricardo Zandonadi Schmidt, Márcia Terra
Paulista University, Brazil

Multiscale Modeling for Social Systems: Bridging Scales via Decision Making
Nursultan Nikhanbayev, Toshiya Kaihara, Fujii Nobutada, Daisuke Kokuryo
Kobe university, Japan
e-Health: A Framework Proposal for Interoperability and Health Data Sharing A Brazilian Case
Neusa Maria Andrade$^{1,2}$, Pedro Luiz de Oliveira Costa Neto$^1$, Jair Gustavo de Mello Torres$^1$
Irapuan Glória Júnior$^1$, Cláudio Guimarães Scheidt$^2$, Welleson Gazel$^{1,2}$
1: UNIP, Brazil; 2: SPDM, Associação Paulista para o Desenvolvimento da Medicina

Lean Production $^{(2)}$
616A
Chair: Christoph Roser

Practical Boundary Case Approach for Kanban Calculation on the Shop Floor Subject to Variation
Christoph Roser$^1$, Daniel Nold$^2$
1: Karlsruhe University of Applied Science, Germany; 2: Dr. Ing. h.c. F. Porsche AG

Sketching the Landscape for Lean Digital Transformation
Alireza Ashrafian$^1$, Daryl J. Powell$^4$, Jonas A. Ingvaldsen$^1$, Heidi C. Dreyer$^5$, Halvor Holtskog$^1$
Peter Schütz$^1$, Elsebeth Holmen$^1$, Ann-Charlott Pedersen$^1$, Eirin Lodgaard$^1$
1: Norwegian University of Science and Technology, Norway; 2: SINTEF Raufoss Manufacturing, Norway

Options for Maintaining Weakened FIFO in Parallel Queues
Kalkanci Kaan, Christoph Roser
Karlsruhe University of Applied Science, Germany

Cyber-Physical Waste Identification and Elimination Strategies in the Digital Lean Manufacturing World
David Romero$^1$, Paolo Gaiardelli$^2$, Matthias Thürer$^3$, Daryl Powell$^4$, Thorsten Wuest$^5$
1: Tecnológico de Monterrey, Mexico; 2: University of Bergamo, Italy; 3: Jinan University, China; 4: Norwegian University of Science and Technology, Norway; 5: West Virginia University, USA

Lean and Digitalization: Contradictions or Complements?
Rafael Lorenz$^1$, Paul Buess$^1$, Julian Macuvele$^1$, Thomas Friedli$^1$, Torbjörn H. Netland$^1$
1: ETH Zurich, 8006 Zurich, Switzerland; 2: University of St. Gallen, 9000 St. Gallen, Switzerland

Data-driven Production Management
602
Chair: Jonas Wullbrandt

From a Theory of Production to Data-based Business Models
Günther Schuh$^1$, Malte Brettel$^1$, Jan-Philipp Prot$^1$, Andreas Gütlaff$^1$, Frederick Sauermann$^1$
Katharina Thomas$^1$, Mario Piel$^1$
1: Laboratory for Machine Tools and Production Engineering (WZL) of RWTH Aachen University, Germany; 2: Innovation and Entrepreneurship Group (WIN) – TIME Research Area, RWTH Aachen University, Germany

Real-time Data Sharing in Production Logistics: Exploring Use Cases by an Industrial Study
Masoud Zafarzadeh$^1$, Jannicke Baalsrud Hauge$^1$, Magnus Wiktorsson$^1$, Ida Hedman$^2$, Jasmin Bahtijarevic$^2$
1: KTH Royal Institute of Technology, Sweden; 2: AstraZeneca, Sweden
2:30 p.m. – 3:45 p.m.

Open Access Digital Tools’ Application Potential in Technological Process Planning: SMMEs Perspective
Roman Wdowik, R.M. Chandima Ratnayake
1: Rzeszów University of Technology; The Faculty of Mechanical Engineering and Aeronautics, 35-959 Rzeszów, Poland; 2: Department of Mechanical and Structural Engineering and Materials Science, University of Stavanger, Norway

Bidirectional Data Management Between Factory Planning and Production
Uwe Dombrowski, Jonas Wullbrandt, Alexander Karl
Technische Universität Braunschweig, Germany

2:30 p.m. – 3:45 p.m.

Sustainability and Reconfigurability of Manufacturing Systems
Chair: Khaled Medini

Simulation of Reconfigurable Assembly Cells with Unity3D
Magdalena Paul, Daria Leiber, Julian Pleli, Gunther Reinhart
Institute for Machine Tools and Industrial Management, Technical University of Munich, Germany

Modular Robot Software Framework for the Intelligent and Flexible Composition of its Skills
Lisa Heuss, Andreas Blank, Sebastian Dengler, Georg Lukas Zikeli, Gunther Reinhart, Jörg Franke
1: Institute for Machine Tools and Industrial Management (iwb), Technical University Munich, Germany; 2: Institute for Factory Automation and Production Systems (FAPS), Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

Simple Assembly Line Balancing Problem with Power Peak Minimization
Paolo Gianessi, Xavier Delorme, Oussama Masmoudi
1: Mines Saint-Étienne, Saint-Étienne, France; 2: University of Technology of Troyes, Troyes, France

A DRC Scheduling for Social Sustainability: Trade-off between Tardiness and Workload Balance
Muhammad Akbar, Takashi Irohara
1: Department of Information and Communication Sciences, Sophia University, Japan; 2: Department of Industrial Engineering, Bandung Institute of Technology, Indonesia

2:30 p.m. – 3:45 p.m.

Supply Chain Planning and Optimization
Chair: R.M. Chandima Ratnayake

Supply Chain Scenarios for Logistics Service Providers in the Context of Additive Spare Parts Manufacturing
Daniel Pause, Svenja Marek
FIR at Aachen University, Germany
Collaborative Exchange of Cargo Truck Loads: Approaches to Reducing Empty Trucks in Logistics Chains
Hans-Henrik Hvolsby¹, Kenn Støger-Jensen¹, Mihai Neagoe², Sven Vestergaard¹, Paul Turner²
1: Aalborg University, Denmark; 2: University of Tasmania, Hobart

An Integrated Approach for Supply Chain Tactical Planning and Cash Flow Valuation
Asma Rakiz¹,², Kawtar Retmi¹, Sabah Belili¹,³
1: Emines-Mohammed VI Polytechnic University; 2: PARIS II Panthéon-Assas University; 3: Limos Clermont Auvergne University

Supply Chain Optimization in the Tire Industry: State-of-the-art
R.M. Chandima Ratnayake², Kartika Nur Alfina¹
1: University of Indonesia, Depok, Indonesia; 2: Department of Mechanical and Structural Engineering and Materials Science, University of Stavanger, Stavanger, Norway

Plenary Session 1: Emerging Challenges and Research Opportunities in Smart Services
SALON J
Chair: Vittaladas Prabhu
Knowledge Management in Design and Manufacturing

Chair: Melissa Demartini

Modeling Manual Assembly System to Derive Best Practice from Actual Data
Susann Kärcher¹, David Görzig², Thomas Bauerhansl¹²
¹: Fraunhofer IPA, Nobelstrasse 12, 70569 Stuttgart, Germany; ²: IFF University of Stuttgart, Nobelstrasse 12, 70569 Stuttgart, Germany

Application of a Controlled Assembly Vocabulary: Modeling a Home Appliance Transfer Line
E. Chase Wentzky, Chelsea Spence, Apurva Patel, Nicole Zero, Adarsh Jeyes, Alexis Fiore, Joshua D. Summers, Mary E. Kurz, Kevin Taaffe
Clemson University, United States of America

What the Product Developer Really Needs to Know - Capturing the Major Design Elements
Bjørnar Henriksen, Andreas Landmark, Carl Christian Røstad
SINTEF, Norway

Closed-Loop Manufacturing for Aerospace Industry: PLM and MOM Solutions Support the Wing Box Assembly Process
Islam Abusohyon¹, Melissa Demartini¹, Federico Galluccio², Raffaello Lepratti³, Paolo Mattis², Flavio Tonelli¹
¹: University of Genoa, via Opera Pia 15, 16145, Genoa, Italy; ²: Siemens Italy S.p.A., Via Enrico Melen 83, 16152, Genoa, ITALY; ³: Siemens AG., Gleiwitzerstr. 555, 90475 Nuremberg, GERMANY

Industry 4.0 Implementations

Chair: Vidosav Majstorovic

Implementation of Industry 4.0 in Germany, Brazil and Portugal: Barriers and Benefits
Walter C. Satyro¹, Mauro de Mesquita Spinola¹, Jose Benedicto Sacomano¹, Márcia Terra da Silva², Rodrigo Franco Gonçalves²⁵, Marcelo Pessoa¹, Jose Celso Contador¹, Jose Luiz Contador¹, Luciano Schiavo¹
¹: Politecnich School of USP – Universidade de Sao Paulo, Brazil; ²: UNIP – Universidade Paulista, Postgraduate Program in Production Engineering; ³: UNIP – Universidade Paulista, Postgraduate Program in Administration; ⁴: FACCAMP - Faculdade Campo Limpo Paulista, Postgraduate Program in Administration

Planning Guideline and Maturity Model for Intralogistics 4.0 in SME
Knut Krowas², Ralph Riedel¹
¹: Chemnitz University of Technology, Germany; ²: TUCed Affiliated Institute for Transfer and Continuing Education
Self-Assessment of Industry 4.0 Technologies in Intralogistics for SME’s
Martina Schiffer, Hans-Hermann Wiendahl, Benedikt Saretz
Fraunhofer Institute for Manufacturing Engineering and Automation IPA, Germany

Industry 4.0 Visions and Reality-Status in Norway
Hans Torvatn, Pål Kamsvåg, Birgit Kleve
SINTEF Digital

The Impact of Energy Management Systems on Industry 4.0 Concepts: Evidence from Serbian Manufacturing Companies
Milovan Medojevic¹, Nenad Medic¹, Ugljesa Marjanovic¹, Bojan Lalic¹, Vidosav Majstorovic²
¹: University of Novi Sad, Serbia; ²: University of Belgrade, Serbia

Collaborative Technology ¹
615B
Chair: Volker Stich

Approach for Detecting and Anticipating Collaboration Opportunities
Ibrahim Koura¹, Frederick Benaben¹, Juanqiong Gou²
¹: IMT Mines Albi, France; ²: Beijing Jiaotong University, China

Systematic Integration of Stakeholders in Factory Planning, Construction and Factory Operations to Increase Acceptance and Prevent Disruptions
Uwe Dombrowski, Alexander Karl, Colette Vogeler, Nils Bandelow
Technische Universität Braunschweig, Germany

Design and Simulation of an Integrated Model for Organisational Sustainability Applying the Viable System Model and System Dynamics
Sergio Gallego García, Manuel García García
UNED National Distance Education University, Spain

Service Engineering Models: History and Present-Day Requirements
Jan Kuntz, Roman Senderek, Volker Stich, Jana Frank
FIR an der RWTH Aachen, Germany

Supply Chain Planning and Optimization ³
615A
Chair: JOAO GILBERTO MENDES DOS REIS

UAV Set Covering Problem for Emergency Network
Young Soo Park¹, Ilkyeong Moon¹²
¹: Department of Industrial Engineering, Seoul National University, Korea, Republic of (South Korea); ²: Institute for Industrial Systems Innovation, Seoul National University, Korea, Republic of (South Korea)
A Stochastic Optimization Model for Commodity Rebalancing under Traffic Congestion in Disaster Response
Xuehong Gao
Pusan National University, Busan, Republic of (South Korea)

Optimal Supplier Selection in a Supply Chain with Predetermined Loading/unloading Time Windows and Logistics Truck Share
Alireza Fallahtafti1, Iman Ghalekhkondabi2, Gary R. Weckman1
1: OHIO UNIVERSITY, United States of America; 2: School of Business and Leadership, Our Lady of the Lake University, San Antonio

Passenger Transport Disutilities in The US: An Analysis Since the 90’s
Helcio Raymundo, João Gilberto Mendes dos Reis
Universidade Paulista, Brazil

Port Efficiency to Commodities Transportation: An Analysis in Port of Santos, Brazil
Renato Marcio dos Santos, João Gilberto Mendes dos Reis, Júlio Cesar Raymundo, Emerson Rodolfo Abraham, Ataíde Pereira Cardoso Júnior, Aguinaldo Eduardo de Souza
Paulista University - UNIP, Brazil

Plenary Session 1: Towards Smart Production Management Systems: Things, Services and People
SALON J
Chair: David Romero, Boonserm (Serm) Kulvatunyou

Collaborative Product Development
Location: 616B
Chair: Boonserm (Serm) Kulvatunyou

Knowledge Management Environment for Collaborative Design in Product Development
Shuai Zhang
University of Greenwich, United Kingdom

A Multi-criteria Approach to Collaborative Product-Service Systems Design
Martha Orellano1, Khaled Medini2, Christine Lambev-Checchin2, Maria-Franca Noresse4, Gilles Neubert6
1: Mines Saint-Etienne, Univ Lyon, Univ Jean Moulin, Univ Lumire, Univ Jean Monnet, ENTPE, INSA Lyon, ENS Lyon, CNRS, UMR 5600 EVS, Institut Henri Fayol, F-42023, Saint-Etienne, France; 2: Mines Saint-Etienne, Univ Clermont Auvergne, CNRS, UMR 6158 LIMOS, Institut Henri Fayol, F 42023, Saint-Etienne, France; 3: Univ Clermont Auvergne, EA3849 CleRIMa, F-63008, Clermont-Ferrand, France; 4: Politecnico di Torino, DIGEP, Torino, Italy; 5: emlyon business school, CNRS, UMR 5600 EVS, F-42009, Saint-Etienne, France
Design-for-Cost – An Approach for Distributed Manufacturing Cost Estimation

Minchul Lee, Boonsen Kulvatunyou
National Institutes of Standard and Technology, United States of America

1:15 p.m. – 2:45 p.m.

Machine Learning in Production Management

615A
Chair: Kenn Steger-Jensen

1:15 p.m. – 2:45 p.m.

Enabling Energy Efficiency in Manufacturing Environments through Deep Learning Approaches: Lessons Learned

M.T. Alvela Nieto, E. G. Nabati, D. Bode, M. A. Redecker, A. Decker, K.-D. Thoben
University of Bremen (Germany), Department of Production Engineering, BIK- Institute for Integrated Product Development

A Data Mining Approach to Support Capacity Planning for the Regeneration of Complex Capital Goods

Melissa Seitz, Maren Sobotta, Peter Nyhuis
Leibniz University Hannover, Germany

Developing Smart Supply Chain Management Systems Using Google Trend’s Search Data: A Case Study

Ramin Sabbagh, Dragan Djurdjanovic
The University of Texas at Austin, United States of America

Retail Promotion Forecasting: A Comparison of Modern Approaches

Casper Solheim Bojer, Iskra Dukovska Popovska, Flemming Max Møller Christensen, Kenn Steger-Jensen
1: Aalborg University, Denmark; 2: University College of Southeast Norway, Norway

ICT for Collaborative Manufacturing

616A
Chair: Daryl John Powell

1:15 p.m. – 2:45 p.m.

Identifying the Role of Manufacturing Execution Systems in the IS Landscape: A Convergence of Multiple Types of Application Functionalities

Sabine Waschull, J.C. Wortmann, J.A.C. Bokhorst
University of Groningen, Netherlands

A Generic Approach to Model and Analyze Industrial Search Processes

Philipp Steenwerth, Hermann Lödding
Hamburg University of Technology, Germany

A Methodology to Assess the Skills for an Industry 4.0 factory

Federica Acerbi, Silvia Assiani, Marco Taisch
Politecnico di Milano, Italy
1:15 p.m. – 2:45 p.m.  
**MES Implementation: Critical Success Factors and Organizational Readiness Model**  
Daniela Invernizzi¹, Paolo Gaiardelli¹, Emrah Arica², Daryl Powell³  
¹: University of Bergamo, Italy; ²: Sintef Digital, Norway; ³: Norwegian University of Science and Technology, Norway

1:15 p.m. – 2:45 p.m.  
**Workflow and Inventory Planning**  
615B  
Chair: Hans-Henrik Hvolby

**Possibilities and Benefits of Using Material Flow Information to Improve the Internal Hospital Supply Chain**  
Giuseppe Ismael Fragapane, Aili Biriita Bertnum, Jan Ola Strandhagen  
Norwegian University of Science and Technology, Norway

**Combining the Inventory Control Policy with Pricing and Advertisement Decisions for a Non-instantaneous Deteriorating Product**  
Reza Maihami, Iman Ghalekhhondabi  
Our lady of the Lake University, United States of America

**Inventory Control at the Point-Of-Use in Hospitals**  
Giuseppe Fragapane, Aili Biriita Bertnum, Hans-Henrik Hvolby, Jan Ola Strandhagen  
Norwegian University of Science and Technology, Norway

**Assessing Fit of Capacity Planning Methods for Delivery Date Setting: An ETO Case Study**  
Swapnil Bhalla¹, Erlend Alfnes¹, Hans-Henrik Hvolby²  
¹: Department of Mechanical and Industrial Engineering, Norwegian University of Science and Technology, Trondheim, Norway; ²: Department of Materials and Production, Centre for Logistics, Aalborg University, Aalborg, Denmark

**Scheduling Auction: A New Manufacturing Business Model for Balancing Customization and Quick Delivery**  
Shota Suginouchi, Hajime Mizuyama  
Aoyama Gakuin University, Japan

3:15 p.m. – 4:45 p.m.  
**Closing Ceremony**  
SALON J
Conference Chairs

Farhad Ameri  
*Conference Chair* — Texas State University, U.S.A.

Dimitris Kiritsis  
*Conference Co-Chair* — École polytechnique fédérale de Lausanne, Switzerland

Kathryn Stecke  
*Program Chair* — University of Texas at Dallas, U.S.A

Gregor Von Cieminski  
*Program Co-Chair* — ZF Friedrichshafen AG, Germany

Event Planning Team

Monica Jeffs  
Office of Distance and Extended Learning, Texas State University, U.S.A.

Joshua Book  
Office of Distance and Extended Learning, Texas State University, U.S.A.

David Cummings  
Office of Distance and Extended Learning, Texas State University, U.S.A.

George Charles  
Office of Distance and Extended Learning, Texas State University, U.S.A.

Program Committee

Albert Jones  
National Institute of Standards and Technology (NIST), U.S.A.

Boonserm Kulvatunyou  
National Institute of Standards and Technology (NIST), U.S.A.

Vital Prabhu  
The Pennsylvania State University, U.S.A.

Kathryn Stecke  
Committee Chair — University of Texas at Dallas, U.S.A.

Thorsten Wuest  
West Virginia University, U.S.A.

Gregor Von Cieminski  
*Program Co-Chair* — ZF Friedrichshafen AG, Germany
Scientific Committee

Erry Yulian Triblas Adesta  
International Islamic University Malaysia  
Malaysia

Erlend Alfnes  
Norwegian University of Science and Technology  
Norway

Thecle Alix  
IUT Bordeaux Montesquieu  
France

Susanne Altendorfer-Kaiser  
Montanuniversitaet Leoben  
Austria

Farhad Ameri  
Texas State University  
USA

Bjørn Andersen  
Norwegian University of Science and Technology  
Norway

Eiji Arai  
Osaka University  
Japan

Frédérique Biennier  
INSA Lyon  
France

Umit S Bititci  
Heriot Watt University  
UK

Adriana Giret Boggino  
Universidad Politècnica de Valencia  
Spain

Magali Bosch-Mauchand  
Université de Technologie de Compiègne  
France

Abdelaziz Bouras  
Qatar University  
Qatar

Jim Browne  
University College Dublin  
Ireland

Luis Camarinha-Matos  
Universidade Nova de Lisboa  
Portugal

Sergio Cavalieri  
University of Bergamo  
Italy

Stephen Childe  
Plymouth University  
UK

Hyunbo Cho  
Pohang University of Science & Technology  
Korea

Gregor von Cieminski  
ZF Friedrichshafen AG  
Hungary

Catherine Da Cunha  
Ecole Centrale de Nantes  
France

Frédéric Demoly  
Université de Technologie de Belfort-Montbéliard  
France

Shengchun Deng  
Harbin Institute of Technology  
China

Melanie Despeisse  
Chalmers University of Technology  
Sweden

Alexandre Dolgui  
IMT Atlantique Nantes  
France

Slavko Dolinšek  
University of Ljubljana  
Slovenia

Sang Do Noh  
Sungkyunkwan University  
Korea

Heidi Carin Dreyer  
Norwegian University of Science and Technology  
Norway

Eero Eloranta  
Helsinki University of Technology  
Finland

Soumaya El Kadiri  
Texelia AG  
Switzerland
Christos Emmanouilidis  
Cranfield University  
UK  
Åsa Fasth-Berglund  
Chalmers University  
Sweden  
Jan Frick  
University of Stavanger  
Norway  
Paolo Gaiardelli  
University of Bergamo  
Italy  
Bernard Grabot  
INP-ENIT  
France  
Samuel Gomes  
Belfort-Montbéliard University of Technology  
France  
Gerhard Gudergan  
FIR Research Institute for Operations Mngt.  
Germany  
Thomas R. Gulledge Jr  
George Mason University  
USA  
Hironori Hibino  
Tokyo University of Science  
Japan  
Hans-Henrik Hvolby  
Aalborg University  
Denmark  
Dmitry Ivanov  
Berlin School of Economics and Law  
Germany  
Harinder Jagdev  
National University of Ireland at Galway  
Ireland  
John Johansen  
Aalborg University  
Denmark  
Toshiya Kaihara  
Kobe University  
Japan  
Dimitris Kiritsis  
Ecole Polytechnique Fédérale de Lausanne  
Switzerland  
Tomasz Koch  
Wroclaw Universit of Science and Technology  
Poland  
Pisut Koomsap  
Asian Institute of Technology  
Thailand  
Gül Kremer  
Iowa State University  
USA  
Boonserm Kulvatunyou  
National Institute of Standards and Technology  
USA  
Thomas R. Kurfess  
Georgia Institute of Technology  
USA  
Andrew Kusiak  
University of Iowa  
USA  
Lenka Landryova  
Technical University of Ostrava  
Czech Republic  
Jan-Peter Lechner  
First Global Liaison  
Germany  
Ming K. Lim  
Chongqing University  
China  
Hermann Lödding  
Hamburg University of Technology  
Germany  
Marco Macchi  
Politecnico di Milano  
Italy  
Vidosav D. Majstorovich  
University of Belgrade  
Serbia  
Adolfo Crespo Marquez  
University of Seville  
Spain  
Gökan May  
Ecole Polytechnique Fédérale de Lausanne  
Switzerland  
Jörn Mehnen  
Strathclyde University Glasgow  
UK
Hajime Mizuyama  
Aoyama Gakuin University  
Japan

Ilkyeong Moon  
Seoul National University  
Korea

Dimitris Mourtzis  
University of Patras  
Greece

Irenilza de Alencar Naas  
UNIP Paulista University  
Brazil

Masaru Nakano  
Keio University  
Japan

Torbjörn Netland  
ETH Zürich  
Switzerland

Gilles Neubert  
EMLYON Business School Saint-Etienne  
France

Manuel Fradinho Duarte de Oliveira  
SINTEF  
Norway

Jinwoo Park  
Seoul National University  
Korea

François Pérès  
Université de Toulouse  
France

Fredrik Persson  
Linköping Institute of Technology  
Sweden

Selwyn Piramuthu  
University of Florida  
USA

Alberto Portioli-Staudacher  
Politecnico di Milano  
Italy

Vittaldas V. Prabhu  
Pennsylvania State University  
USA

Ricardo José Rabelo  
Federal University of Santa Catarina  
Brazil

Mario Rapaccini  
Florence University  
Italy

Joao Gilberto Mendes dos Reis  
UNIP Paulista University  
Brazil

Ralph Riedel  
TU Chemnitz  
Germany

Asbjörn Rolstadás  
Norwegian University of Science and Technology  
Norway

David Romero  
Tecnologico de Monterrey University  
Mexico

Christoph Roser  
Karlsruhe University of Applied Sciences  
Germany

Martin Rudberg  
Linköping University  
Sweden

Thomas E. Ruppli  
University of Basel  
Switzerland

Krzysztof Santarek  
Warsaw University of Technology  
Poland

John P. Shewchuk  
Virginia Polytechnic Institute and State University  
USA

Dan L. Shunk  
Arizona State University  
USA

Riitta Smeds  
Aalto University  
Finland

Vijay Srinivasan  
National Institute of Standards and Technology  
USA

Johan Stahre  
Chalmers University  
Sweden

Kathryn E. Stecke  
University of Texas at Dallas  
USA

Kenn Steger-Jensen  
Aalborg University  
Denmark

Volker Stich  
FIR Research Institute for Operations Management  
Germany
Richard Lee Storch  
University of Washington  
USA

Jan Ola Strandhagen  
Norwegian University of Science and Technology  
Norway

Stanislaw Strzelczak  
Warsaw University of Technology  
Poland

Shigeki Umeda  
Musashi University  
Japan

Marco Taisch  
Politecnico di Milano  
Italy

Kari Tanskanen  
Aalto University School of Science  
Finland

Ilias Tatsiopoulos  
National Technical University of Athens  
Greece

Sergio Terzi  
Politecnico di Milano  
Italy

Klaus-Dieter Thoben  
Universität Bremen  
Germany

Jacques H. Trienekens  
Wageningen University  
Netherlands

Mario Tucci  
Università degli Studi di Firenze  
Italy

Gündüz Ulusoy  
Sabanci University  
Turkey

Bruno Vallespir  
University of Bordeaux  
France

Agostino Villa  
Politecnico di Torino  
Italy

Hans-Hermann Wiendahl  
University of Stuttgart  
Germany

Joakim Wikner  
Jönköping University  
Sweden

Hans Wortmann  
Groningen University  
Netherlands

Thorsten Wuest  
West Virginia University  
USA

Iveta Zolotová  
Technical University of Košice  
Slovakia

International Advisory Committee

Dragan Djurdjanovic  
University of Texas at Austin, USA

Gül Kremer  
Iowa State University, USA

Ilkyeong Moon  
Seoul National University, Korea

David Romero  
Tecnologico de Monterrey University, Mexico