Smart Manufacturing I (software-centric)

Why is everyone talking about scheduling their fabs?

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Abstract
The Industry 4.0/Smart Manufacturing revolution is underway and already driving changes throughout the Semi industry and world. The establishment of a comprehensive Digital Twin of a factory is key to delivering any I4.0/Smart solution. It is significantly more difficult to create a Digital Twin in Semi than any other industry for several reasons which will be reviewed. Fabs are willing to invest in creating a Digital Twin because it enables new capabilities, many of which were not comprehended even a few years ago.

Among the new I4.0/Smart solutions, full Fab/Factory Scheduling is the leading application as it typically provides the fastest and greatest ROI. We will review the data and factory requirements, deliverables and expected benefits from such a system including case studies. We will conclude with an overview of future Scheduler enhancements including the integration with tool centric solutions like APC,FDC, eOCAP, etc..

Biography
John R Behnke
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Mr. Behnke has 35 years of semiconductor industry experience including: logic and memory manufacturing, technology/product development and fab operational excellence. As the GM of Final Phase Systems an INFICON Product Line, John leads a team that develop and deploy SMART software solutions that enable fabs to improve their manufacturing efficiency. FPS's suite of software solutions are built upon a common Datawarehouse which enables advanced Fab Scheduling and optimized WIP movement as well as other related capabilities. He is also a Co-Chair of the Semi North America Smart Manufacturing Special Interest Group.
Prior to FPS John served as the CEO and President of Novati Technologies, the SVP and GM of the Semiconductor Group of Intermolecular, the CVP for Front End Manufacturing, Process R&D and Technology Transfers at Spansion and the Director of AMD's Fab 25's Engineering and Operations groups where he was a founding member of AMD's Automated Precision Manufacturing (APM) initiative which led the Semiconductor industry's development and use of APC and other advanced factory systems. He also led the successful conversion of Fab 25 from Logic to Flash memory which was enabled through the virtual automation of the fab.
Mr. Behnke earned a B.S. degree in Mechanical Engineering with an Industrial Engineering Minor from Marquette University. Mr. Behnke holds five U.S. patents.

Democratizing AI to accelerate the journey towards smart manufacturing

I. Kobusch
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Abstract
Semiconductor manufacturing has been at the forefront of implementing aspects of smart manufacturing since the early 2000s. Automated material handling and analytics have enabled 300mm fab to reach the highest level of automation among almost all manufacturing industries. Artificial Intelligence (A.I.) holds the promise of driving the next level of smart manufacturing. This talk will cover how to accelerate the application of AI and advanced analytics in semiconductor manufacturing by combining semiconductor domain specific templates and solution patterns utilizing advanced AI & Machine Learning algorithms via hybrid multi cloud delivery model.

Biography
Ingo Kobusch is member of IBM's Global Electronics Center of Competence. He has over 20 years of experience in semiconductor manufacturing and electronics manufacturing and operations. He combines deep industry knowledge with first-hand experience in designing and implementing manufacturing control and optimization systems and processes. Recently, his work has focused on digital transformation, advanced analytics & AI, Industry 4.0 and cognitive manufacturing.

Practical Machine Learning for Tools

D. Suerich
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Abstract
Semiconductor equipment makers (OEMs) are under pressure to produce tools that offer the maximum possible substrate throughput while maintaining high process quality levels. Although actual processing time is often constrained by physical limits based on the underlying requirements of the process itself, overall throughput in a tool is also subject to non-productive time delays such as transfer time, equipment speed limitations, and vacuum pump down. Therefore, minimizing non-productive tool time is a key element in maximizing overall throughput.
This case study investigates efforts made to use machine learning to improve throughput in a complex cluster tool. Traditional methods to find planner optimizations were successful, but required extensive amounts of non-recurring engineering expense. This led to an exploration of how modern machine learning algorithms could be used to streamline the planner optimization process and find solutions beyond what a human engineer could discover.

Biography
Doug Suerich is Product Evangelist at The PEER Group Inc., the semiconductor industry's leading supplier of factory automation software for smart manufacturing and Industry 4.0. Doug focuses on big data and remote connectivity solutions that help manufacturers collaborate securely on tools and data in production environments. A passionate advocate for smart manufacturing, Doug serves as an active member of the SEMI® Smart Manufacturing Advisory Council and SEMI SMART Manufacturing Technology Community, Americas Chapter.
Doug has over 20 years of experience leading software teams for a variety of industries including semiconductor, manufacturing, and transportation. Most recently, he was involved in architecting PEER Group's remote connectivity solution, Remicus™, and he was a champion in promoting the use of cloud computing and latest-generation web technologies.
Prior to joining PEER Group, Doug was a software development manager, automation engineer, information systems specialist, and consultant. He has extensive experience designing and integrating robust automation software solutions. Doug holds a Bachelor of Applied Science with Honours in System Design Engineering from the University of Waterloo.

Cyber-Physical Human-in-the-Loop Systems for manufacturing: exploring the border between learning and control

G. Russo
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Abstract
Complex manufacturing systems can be modeled as Cyber-Physical Systems (CPSs). Essentially, a CPS is a system controlled via a closed-loop computer-based algorithm and tightly integrated with the communication infrastructure and the behavior of its users. In a manufacturing scenario, it is of particular interest to study CPSs that have humans in their loop. In this context, the talk we will present some recent results related to the design of the control system for such Cyber-Physical, human-in-the-loop, systems. In particular, we will start with introducing our main set-up and context for the research. Then, we will present a set of new results for controlling systems directly from data. From the conceptual viewpoint, the results will allow to learn a control policy from demonstrations and the idea deploy our algorithms in a manufacturing environment, where the plant is not programmed to execute a task but it rather learns how to execute it from *success stories*

Biography
Giovanni Russo is a Lecturer in Cyber-Physical Systems at University College Dublin (UCD). Dr. Russo received his Ph.D. degree from the University of Naples Federico II in 2010. The focus of the work was on the stability of nonlinear dynamical systems with applications to networked control and systems biology. In 2010, Dr. Russo joined Ansaldo STS as a System Engineer and, from 2012 to 2015, he was the Lead System Engineer and Integrator of the Honolulu Rail Transit Project (HRTP) – the first mass transit driverless railway system of the United States. From 2015 to 2018, after having completed the HRTP system-level design, Dr. Russo has been with IBM Research Ireland as a Research Staff Member in Optimization, Control and Decision Science. In September 2018, Dr. Russo joined UCD and current research interests include Cyber-Physical Systems, nonlinear dynamics, stochastic systems and networked control systems. Dr. Russo is currently a member of the Board of Editors of IEEE Transactions on Circuits and Systems I: regular papers and of the IEEE Transactions on Control of Network Systems. Dr. Russo is also a funded investigator of the Science Foundation Ireland Research Centres I-Form (Advanced Manufacturing Irish Research Centre) and LERO (Irish Software Research Centre).