

# Fertigungstechnisches Kolloquium

**ETH** Zurich

**inspire**



## Programm für Donnerstag, 24. Oktober (Veranstaltung in Englisch) „Optimization and Control for Advanced Manufacturing Automation“

**14:15 – 14:30 Welcome note by Dr. Efe Balta, inspire AG**

**14:30 – 15:10 Bridging Cobotics Research and Smart Manufacturing Technologies**

*Dr. Hakan Girgin, Swiss cobotics competence center S3C*

In the rapidly evolving landscape of smart manufacturing, the integration of advanced cobotics research is essential for driving innovation and efficiency. So far, research has focused on cobots due to their affordability, compact size, and suitability for laboratory settings, leading to significant progress in areas such as safety, human-robot collaboration, robot movement intelligence, AI and cobot peripheral technologies. However, there remains a gap in understanding the short, mid, and long-term applications and requirements of these advancements in smart manufacturing. This talk will explore the latest works in cobotics research and the gap between these innovations and their practical implementation in the industry. We will highlight real-world applications and case studies conducted by Swiss Cobotics Competence Center (S3C) in Biel demonstrating the benefits of cobotics for the upcoming transition from Industry 4.0 to Industry 5.0.

**15:10 – 15:50 Advancing Additive Manufacturing: Pioneering Controlled Extrusion Processes for Liquid Crystal Polymers (LCPs)**

*Dr. Silvan Gantenbein, NEMATX AG*

This talk presents the latest advancements in extrusion-based additive manufacturing, focusing on controlled extrusion processes for Liquid Crystal Polymers (LCPs) developed collaboratively by NEMATX AG and Inspire AG. We explore the critical role of molecular orientation in LCPs, addressing how anisotropic properties can be optimized for superior material performance. The discussion covers innovative stress-aligned printing strategies, the importance of force-controlled extrusion, and how NEMATX's "Nematic 3D Printing" technology is revolutionizing high-performance polymer 3D printing. This technology provides unmatched precision and material properties, enabling competitive and sustainable production for demanding industries from deep sea to outer space.

**15:50 – 16:20 Break**

**16:20 – 17:00 Bayesian optimization strategies for manufacturing efficiency**

*Prof. Alisa Rupenyan, ZHAW School of Engineering*

Modern industrial systems must quickly adapt to both internal and external variations and disturbances to ensure efficient production of small batches, optimize energy usage, and minimize waste. Manufacturing processes often face limited data collection capabilities, significant variability, and complex noise patterns that are not easily predictable. This presentation will explore strategies for enhancing manufacturing system efficiency in the face of these challenges, with experimental implementations.

**17:00 – 17:40 Closed-loop Feedback Control of the Laser Powder Bed Fusion Process**

*Baris Kavas, ETH Zürich, Advanced Manufacturing Lab*

Laser powder bed fusion (LPBF) as one of the most popular among the additive manufacturing processes has revolutionized design and manufacturing in industries such as aerospace, healthcare, transportation, and energy. However, the LPBF has not reached its maximum potential due to robustness and stability issues arising from the highly complex nature of the process. Closed-loop control has recently emerged as a research area to enhance the maturity of the LPBF process, providing an efficient and perturbation-resistant method to improve overall part quality. In this study, layer-to-layer and in-layer scales of closed-loop control applications are explored and a novel control architecture for thermal stabilization are proposed that leverages the heating and cooling cycles within a layer. The method and the findings lay a groundwork for a robust process with either stable or on demand microstructure with better thermal distortion characteristics.

**17:40 End of the Event**



**ETH Zentrum**

**LEE E308**

Leonhardstrasse 21

8092 Zürich

und online



**Donnerstag  
24. Oktober**



**Start 14:15  
Ende 17:40**

Gesamtprogramm



Zoom Link: <https://ethz.zoom.us/j/61443056724>