



ESAFORM Webinar Series 2026

Metal Forming Across Scales

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<https://www.ibf.rwth-aachen.de>

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Registration link, to receive the information for the connection:

<https://events.teams.microsoft.com/event/d117cd90-0ece-405e-b3e4-b00e116ad515@c1025aae-98b9-4021-b4b6-c201214b884e>

Abstract

For advanced metallic materials and demanding applications, forming increasingly serves as an enabler for engineering the material state itself, determining not only geometry but also global and local formability, springback behavior, damage tolerance, and service properties. This webinar explores how process conditions, microstructure evolution, and local mechanical fields interact across length scales, and how these interactions can be exploited for property-oriented materials and process design. Starting from anisotropic plasticity and fracture at the continuum level, the discussion moves to the crystal scale to uncover the micromechanical origins of macroscopic forming behavior, and then to machine learning strategies that make these multiscale insights actionable. Selected examples are drawn from advanced high-strength alloys, advanced forming processes, and additive manufacturing, illustrating how experiments, multiscale modeling, and data-driven approaches can be integrated to build mechanistically grounded process-structure-property (PSP) relationships. The talk proposes that the future of metal forming lies in closed-loop forming and materials engineering: an integrated framework connecting processing, material architecture, and properties, opening new pathways toward more sustainable manufacturing.

Biography

Junhe Lian is Full Professor and Head of the Chair of Forming Technologies & Institute of Metal Forming at RWTH Aachen University, Germany. He received his Dr.-Ing. (PhD) from the Steel Institute at RWTH Aachen University. Following his doctorate, he held postdoctoral and group leader positions at RWTH Aachen, served as Assistant and then Associate Professor (tenured) at Aalto University in Finland, and held multiple visiting and research affiliate positions at MIT, USA. He has been awarded an ERC Starting Grant (2023), the Future Makers Award (2023), the Scientific Prize of ESAFORM (2020), the ESIS/Elsevier Young Researcher Best Paper Award (2018), and various other best paper awards. His research focuses on advancing material forming technologies by integrating experimental characterization, physics-based modeling, and data-driven engineering. He serves as Associate Editor of the International Journal of Material Forming and Board Member of ESAFORM.

