



## ESAFORM Webinar Series 2024

### Computational microstructure design: harnessing the synergy of experimental and numerical investigations

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**Date/time:** 25th March 2024 / 15:00 CET

Registration link, in advance for this meeting:

<https://videoconf-colibri.zoom.us/meeting/register/tJwqf-uopz0vGdB9ExwBwbhjvCcmEakI147>

#### Abstract

The topic presents a concept of full-field microstructure-based models that can be considered as digital shadows of the metallic material's microstructure during numerical simulations of forming operations. Recent progress in the area of full-field modelling is directly driven by the development of modern metallic materials, often of a multiphase nature. Such microstructure types lead to local heterogeneities influencing material behaviour and, eventually, macroscopic properties of the formed product. The concept of the digital material shadow, stages of the model development, and examples of practical applications to the simulation of microstructure evolution during forming and heat treatment operations are discussed. The selected results demonstrate the capabilities and also limitations of such microstructure-based models in the computational material design.

#### Biography

Lukasz Madej is a full professor and the head of the Industrial Digitalization and Multiscale Modelling Division at the Faculty of Metal Engineering and Industrial Computer Science at AGH University of Krakow. His research focuses on the development of modern numerical solutions for the industry and, in particular, full-field multiscale modelling models for materials science. He is a member of various scientific organisations, e.g., the Polish Association of Computational Mechanics or several Committees of the Polish Academy of Sciences. In 2022, he was elected as a Fellow of the CIRP - The International Academy for Production Engineering. Since 2020, he has also been a member of the Board of Directors of ESAFORM.

He is editor-in-chief of Computer Methods in Materials Science journal and a member of editorial boards in various academic journals, e.g., Steel Research International, International Journal of Material Forming, Journal of Materials Processing Technology or Production Engineering. He is the author and co-author of more than 250 published works, including five books.

Besides scientific activities, he is also active in the Polish Forging Association, where he holds the position of vice-president, in the EUROFORGE as an Executive Board member and in the AMDS ArcelorMittal Poland as a metal forming expert. More information can be found at the following website [home.agh.edu.pl/~lmadej](http://home.agh.edu.pl/~lmadej)

