



## ESAFORM Webinar Series 2023

### About the virtual design of materials

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**Date/time:** 14th July 2023 / 15:00 CET

Registration link, in advance for this meeting:

[https://videoconf-colibri.zoom.us/meeting/register/tJYkcOyvqTgoEtyIN\\_LCC7-Htbb6AxIEb\\_Hy](https://videoconf-colibri.zoom.us/meeting/register/tJYkcOyvqTgoEtyIN_LCC7-Htbb6AxIEb_Hy)

#### **Abstract**

The dream is to define a target material property and numerically determine the associated composition, its manufacturing method, and its post processing steps. Numerical scientists life is however not easy: many data are required to feed a model, laws at different scales must be developed, and their interaction has to be organized. Thanks to the results of complementary projects, this webinar provides a journey about the prediction of the behavior of AlSi10Mg generated by Laser Powder Bed Fusion and post processed by Friction Stir Processing. The following topics will be covered:

- Finite Element modelling of the process predicting thermal field;
- Phase Field modelling, explaining the microstructure evolution;
- Analytical formulae providing yield stress based on microstructure features;
- Representative Volume Element interest and links to Artificial Intelligence.

The presentation will introduce model advantages and limitations, their identification and validation.

#### **Biography**

Prof. AM Habraken received engineering degree in construction in 1984 and pursued Doctor in Applied Science in 1989 from the University of Liege. She performed a second thesis in 2001 to access her current position of Research Director of F.R.S-FNRS (Walloon Fundamental Research Fund).

Leader of MSM (Materials and Solid Mechanics) team in Dept of Architecture, Geology, Environment and Constructions (ArGEnCo), she focuses on materials (Steel, Ti, Al...), their characterization, forming processes, and behavior modelling. With her team, she develops and identifies constitutive thermo-mechanical-metallurgical laws relying on phenomenological or multi-scale approaches and crystal plasticity models. Fatigue, creep, corrosion and additive manufacturing are the current research topics. Since 1984, MSM has developed its own non linear finite element code **Lagamine** and recently a Phase Field model and Deep Learning has been interacting with FE and experimental results. AM Habraken is involved in ESAFORM since its creation, she took different roles such as president, work group leadership, and benchmark coordinator.

