INSTITUTE FOR **PLASTICS** PROCESSING

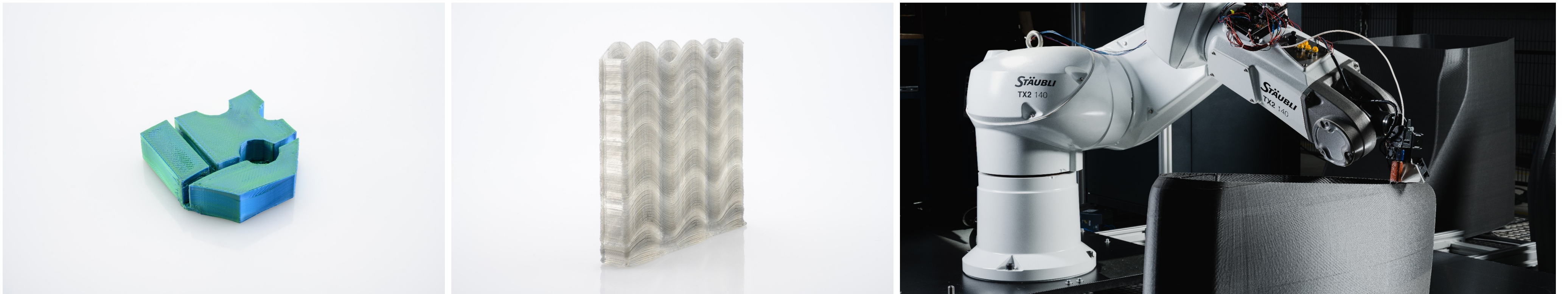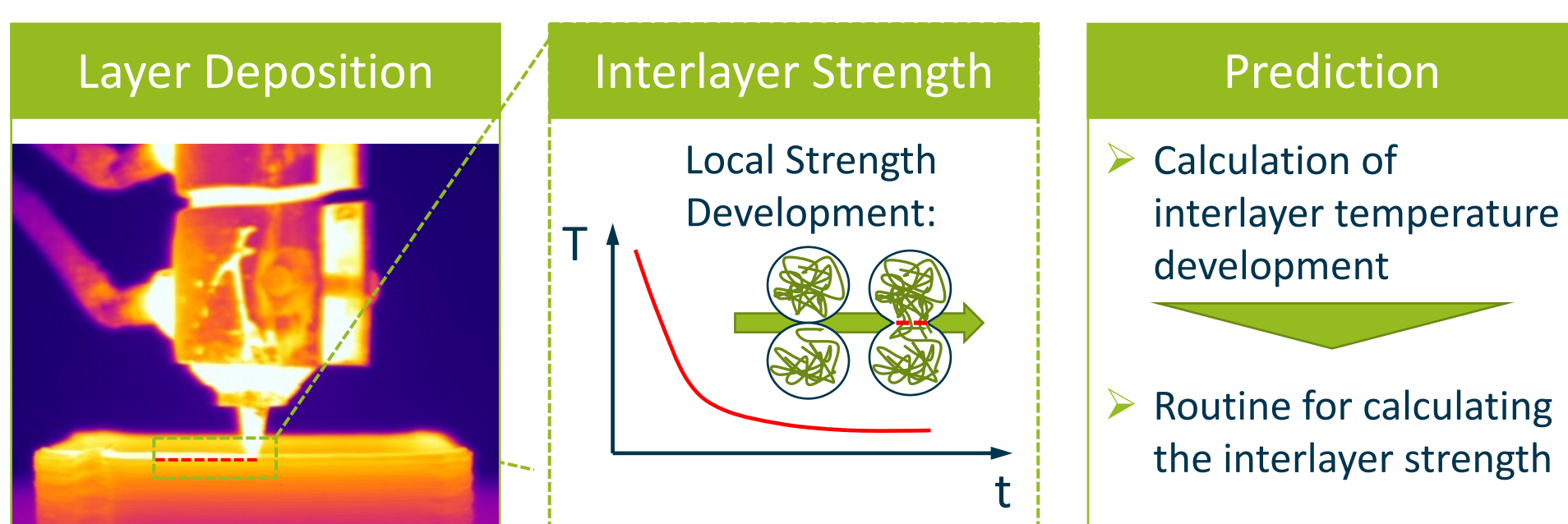in Industry and Craft at RWTH Aachen University

Key research area: Additive Manufacturing

## Research on Additive Manufacturing at IKV

IKV has been carrying out research on the scaling of Additive Manufacturing for several years now and can draw on its comprehensive knowledge regarding the interdependencies of material parameters, production parameters as well as component design and the characteristics of the product and process. One of the major tools is the physically motivated modelling of the cooling and solidification behaviour of the thermoplastic material in Additive Manufacturing processes. The research is aimed at putting the user in a position to exploit the full potential of AM, to select materials that are suitable for the application and to design and streamline his process.

Prediction of interlayer-strength

Layer Deposition | Interlayer Strength | Prediction

Local Strength Development:

Prediction
➤ Calculation of interlayer temperature development
➤ Routine for calculating the interlayer strength

- Currently there is no practical method for predicting the local interlayer strength of AM-components.
- The projects aim is the prediction of the local interlayer strength on the basis of the machine code including pathing and parameters.
- Modelling of the temperature development of the interlayer and interlayer-strength development.

## Cluster of Excellence: Internet of Production
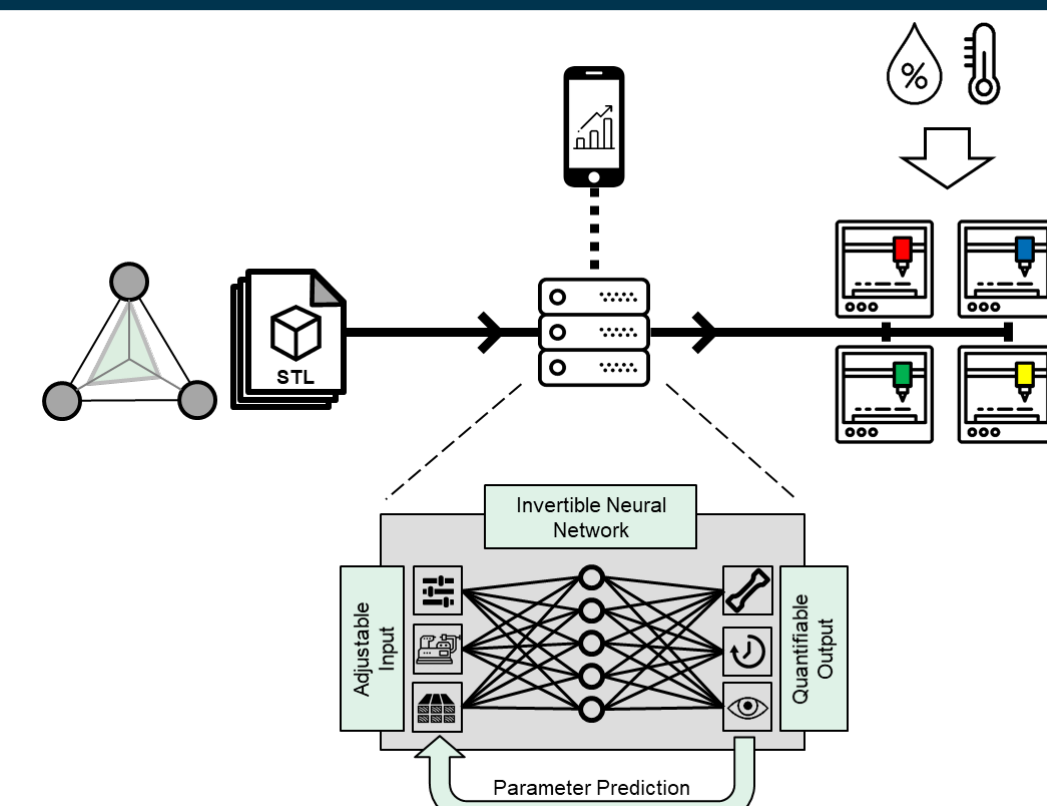
- The allocation and parameterisation of production orders for a heterogeneous machine park is challenging and time-consuming.
- Efficient production through autonomous, optimal allocation of orders and a objective determination of process parameters.
- Networking of the machines using an autonomous plant control system and parameter prediction with the help of invertible NN.

Investigations into the properties of AM-prototypes
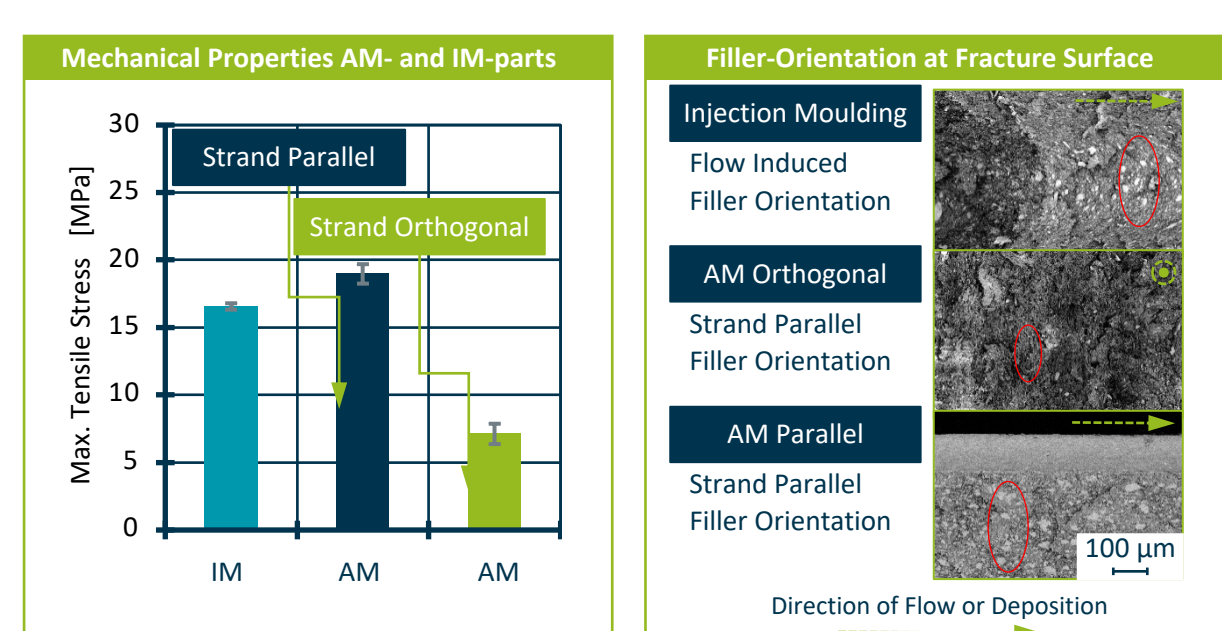
- The use of AM-prototypes is limited by the differences in mechanical properties and their limited comparability.
- Examining test specimens and demonstrator components, differences in properties are systematically determined.
- Evaluation of the suitability of additively manufactured prototypes for pre-series testing.

Non-planar path planning
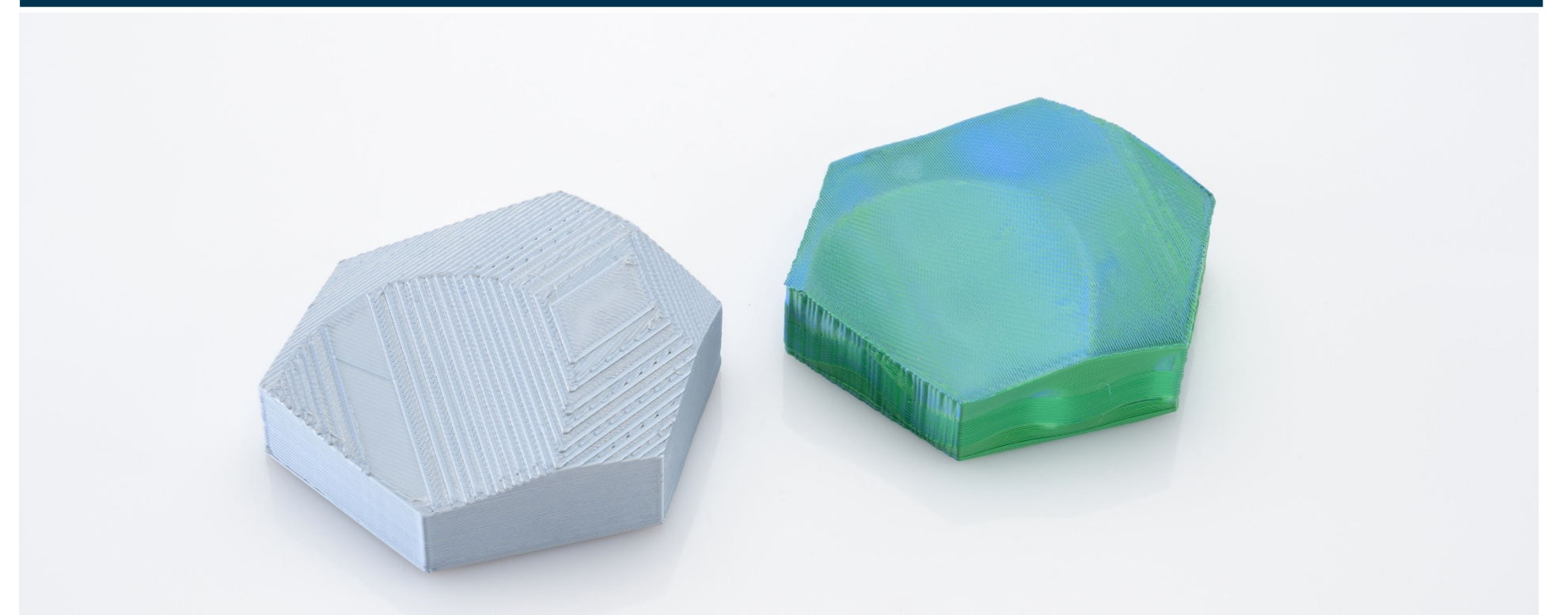
- Current AM processes are limited by how the machine paths are calculated (multiple two-dimensional, planar layers).
- Using all available machine axes combined with a variable layer height creates AM parts with precise, smooth surfaces and load-case optimised mechanical properties.