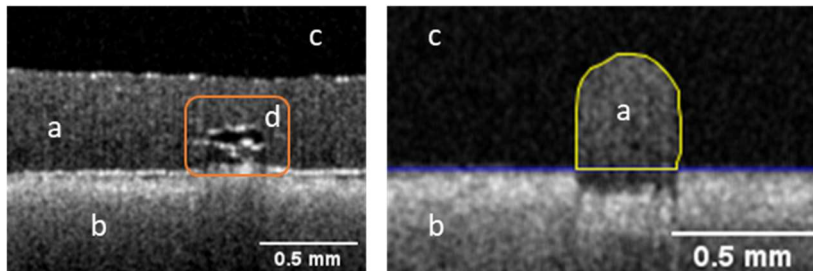




## Task for student research project or diploma thesis

# Development of tomographic process monitoring for additive manufacturing processes

The proliferation of additive manufacturing in industrial production is hindered by deficits in production quality, characterized by dimensional accuracy flaws and defects in internal material areas. Process monitoring techniques are intended to identify process conditions and, in the long term, enable adaptive process control in the sense of agile process optimization. The work addresses the development of tomographic in-line process monitoring for the additive manufacturing process Fused Deposition Modeling (FDM). For this purpose, optical coherence tomography (OCT) data collected during the FDM process is to be analyzed using computer vision methods based on artificial intelligence (AI).



Tomogram of a printed strand with (a) material strand, (b) print bed, (c) air and (d) pore inclusion left: as a longitudinal section and right: as a cross-section [Porstmann, 2020]

### Requested skills and capabilities of the student

- Programming (preferably Python)
- Basics in Artificial Intelligence, in particular the application of artificial neural networks (ANN)
- Fundamentals of production engineering, especially additive manufacturing (fused deposition modeling)
- Basic knowledge in mechanical engineering, mechatronics or comparable engineering sciences

### Main tasks

- Selection of suitable algorithms (ANN) for automated object detection or classification based on OCT images
- Development of a concept for the automation of object recognition / classification for the purpose of process monitoring
- Implementation and application of the developed pipeline for demonstration purposes

### Ansprechpartner

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