



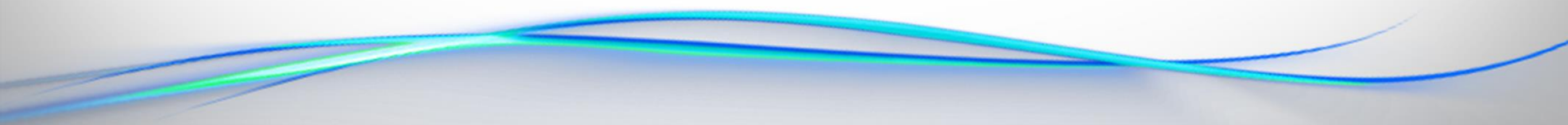
**ACONITY 3D**

ELABORATING YOUR ADDITIVE PRODUCTION



# Progress & Current Challenges in Laser Beam Melting (LBM)

EPIC Online Technology Meeting on 3D Printing

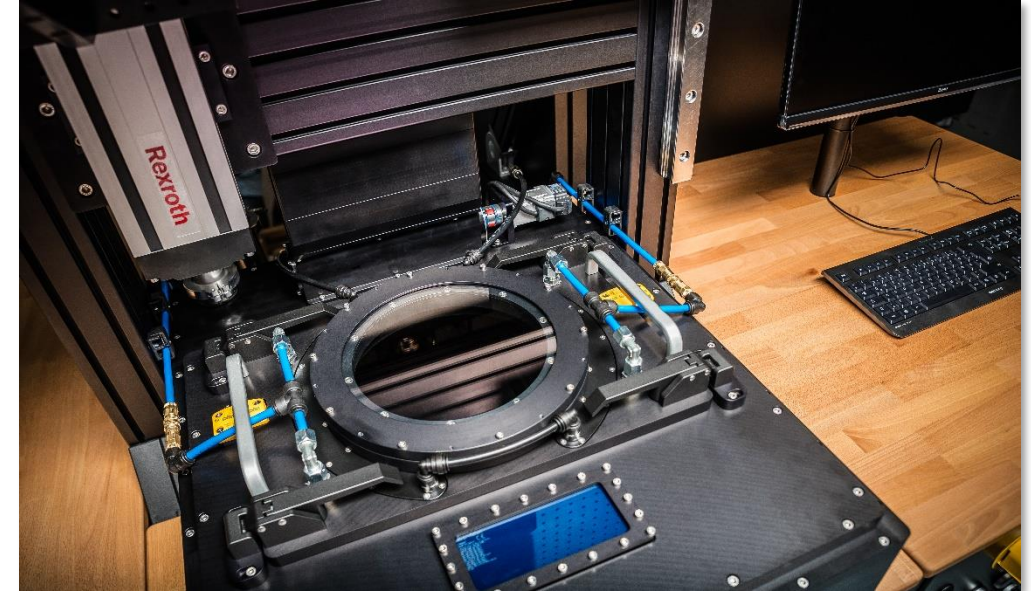




# Company Profile

## What we do...

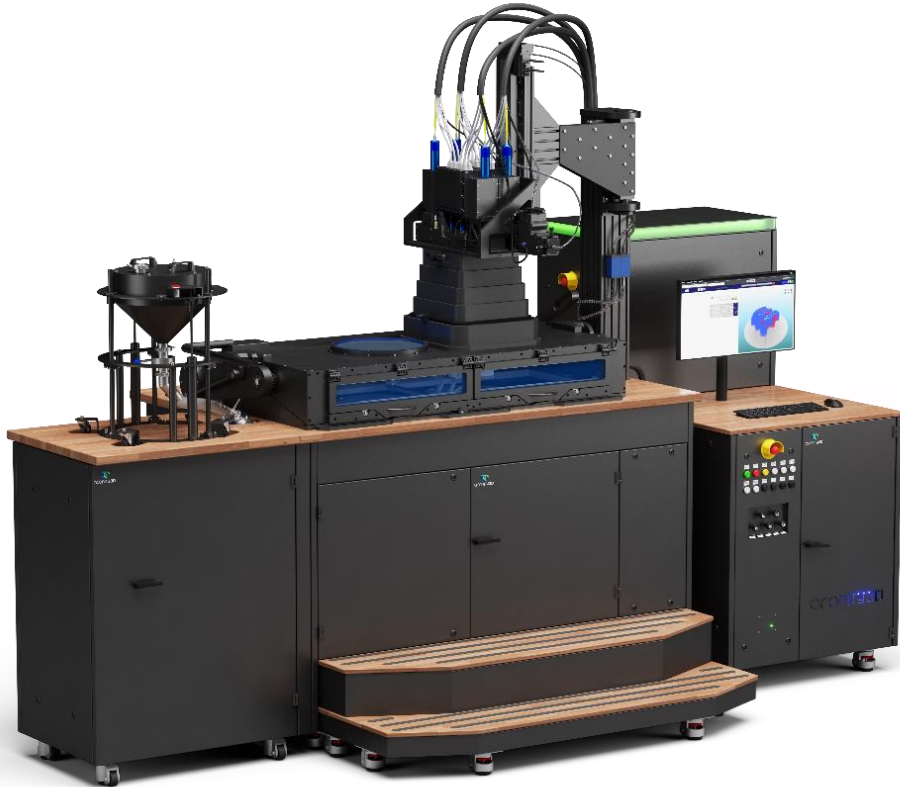
- Consulting
- Job Shop
- Material Distribution
- Testing Facilities
- Equipment



➡ One – Stop Shopping for Laser-Based 3D Printing (LBM) of Metals



# Aconity**SYSTEMS**



Aconity**ONE** - multi-laser production system



Aconity**MIDI** – flexible platform for advanced R&D



Aconity**MIDI+** – Multi-Material



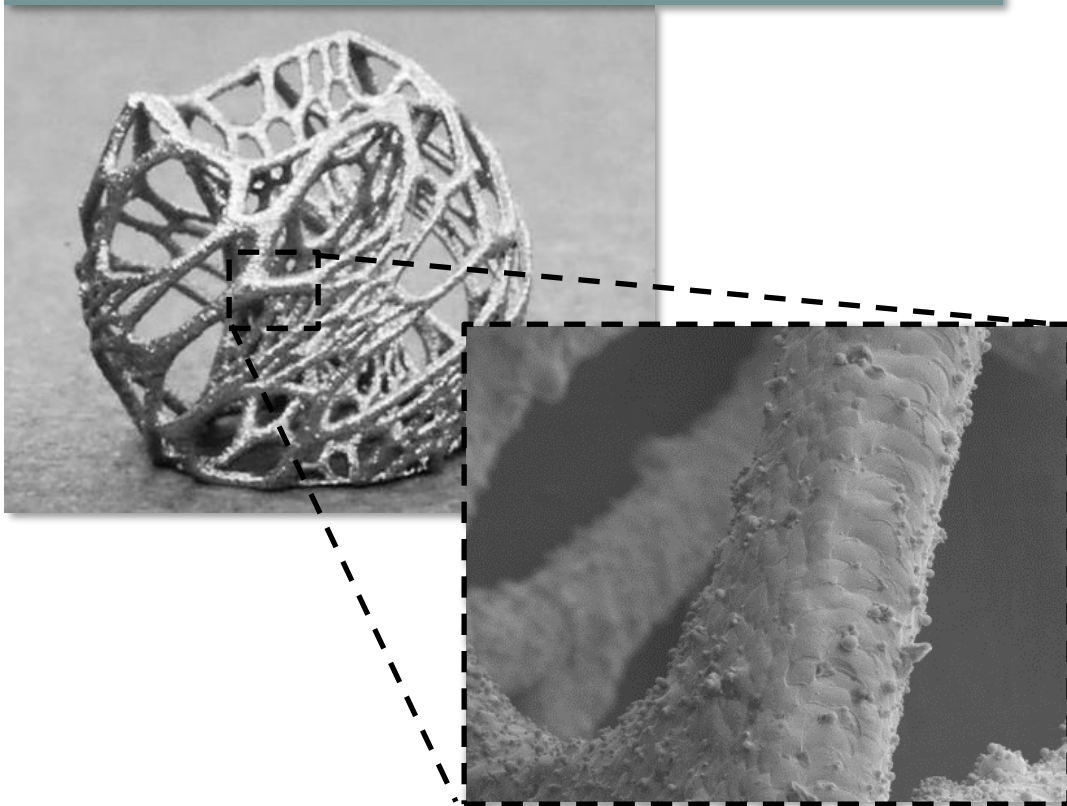
Aconity**MINI** – entry level



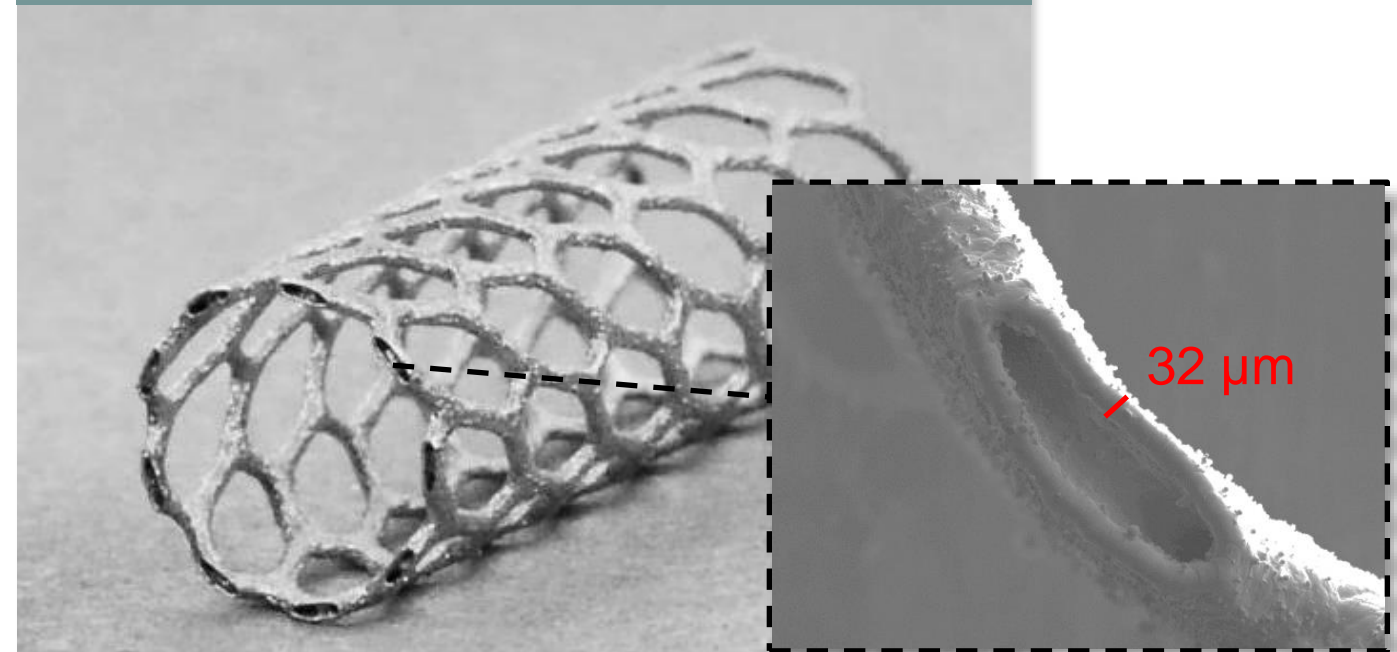
# Micro SLM

## Demonstrating Objects

Complex scaffold (Nickel Titanium)



Stent (Nickel Titanium)



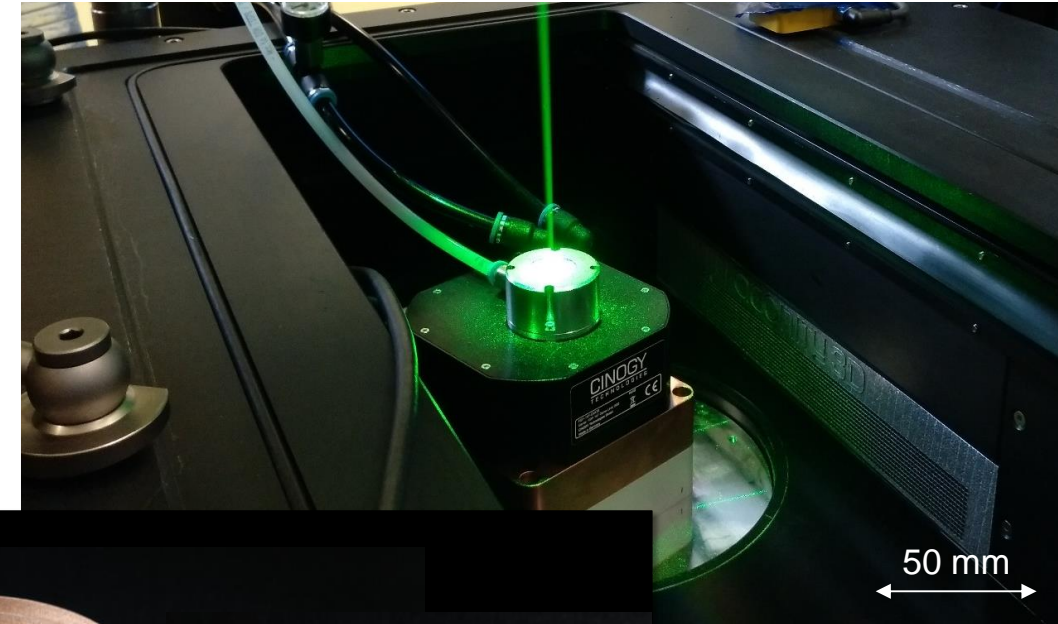
Work performed by:



# Pure Copper (Cu-ETP)

## Challenges

- Oxygen Pickup ✓
  - Low oxygen content during processing
- Absorptivity ✓
  - Increased absorptivity of green laser light



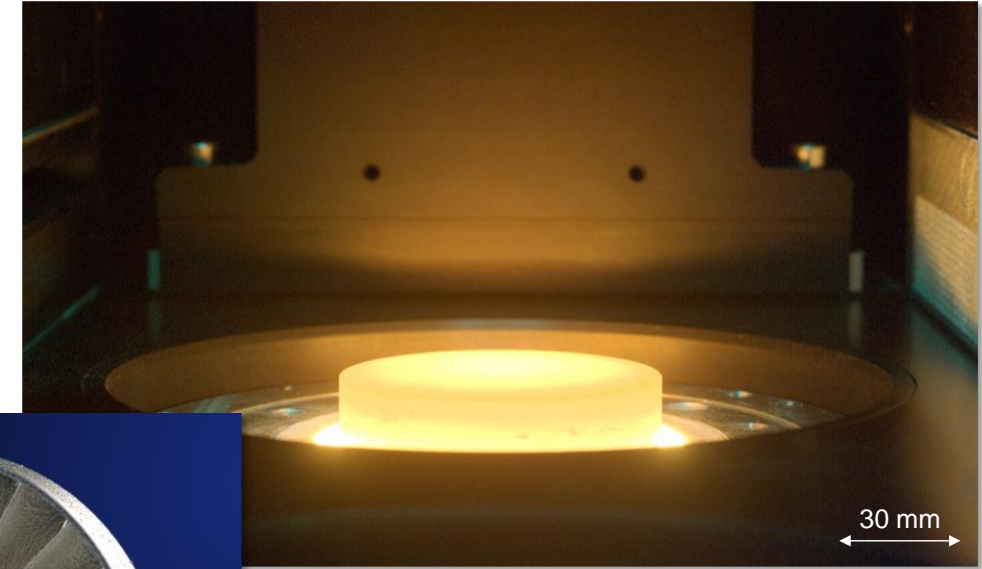
➡ Adapted Machine for Processing of pure Copper



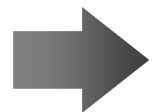
# High Temperature Preheating

## Challenges

- Oxygen Pickup
  - Low oxygen content during processing
- Crack Formation
  - High-temperature preheating necessary



TiAl part printed via LBM



Adapted Machine for Processing of Extended Material Classes

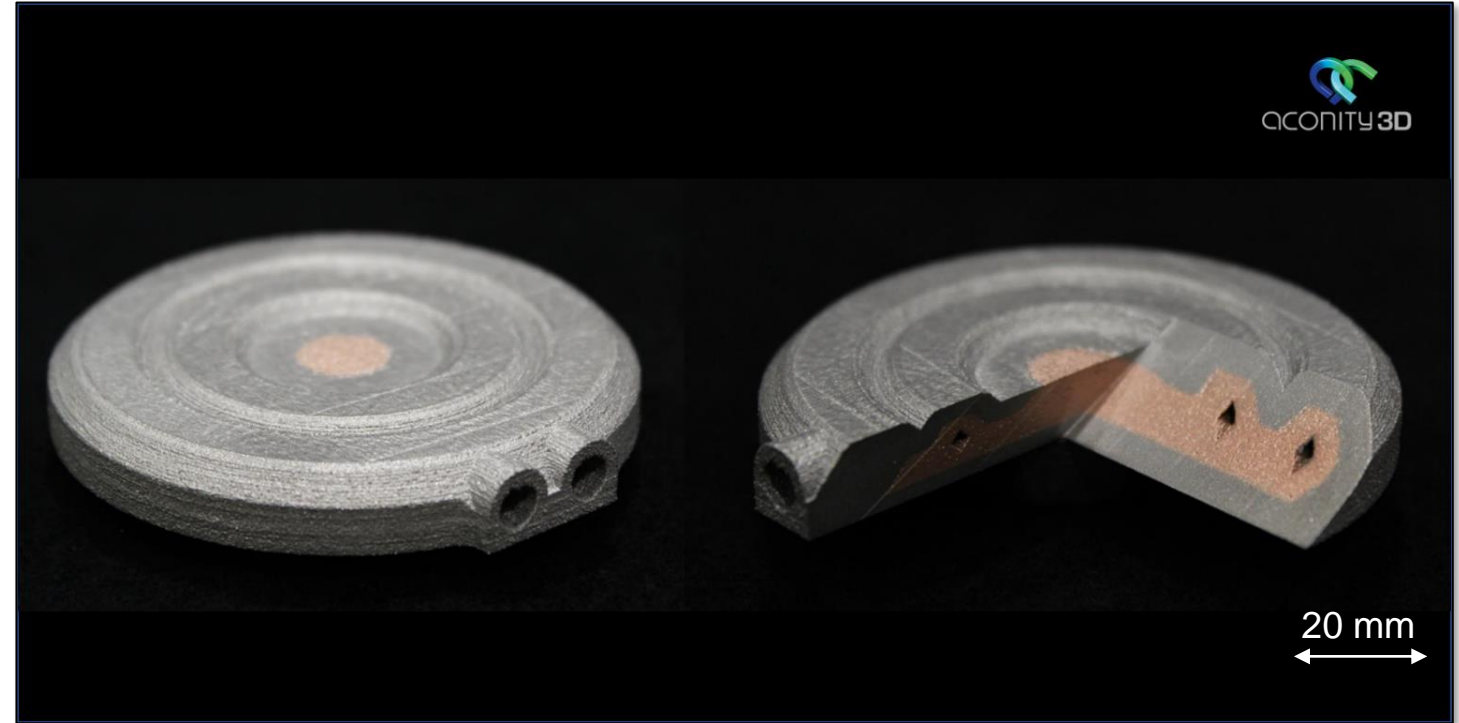


# Multi-Material LBM

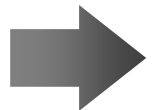
## Challenges

- Powder Depositions ✓
  - No Multi-Material powder deposition were systems available
- Parameter Sync ✓
  - Parameters are synced according to deposited material

Steel / Copper Multi-Material LBM process



In collaboration with:  aerosint



Adapted Machine for Multi-Material Processing



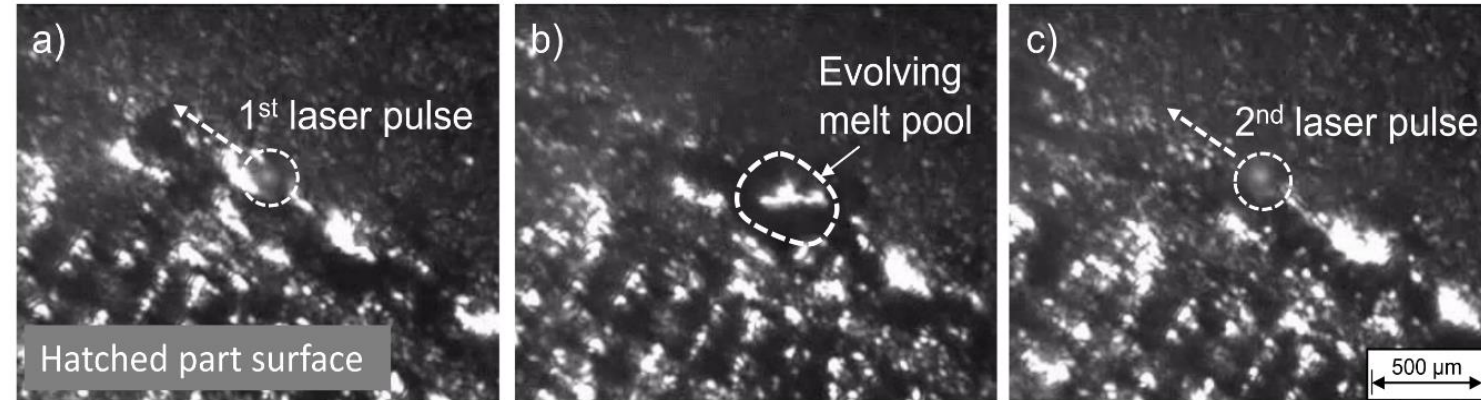
# Process Monitoring

## High-Speed Camera

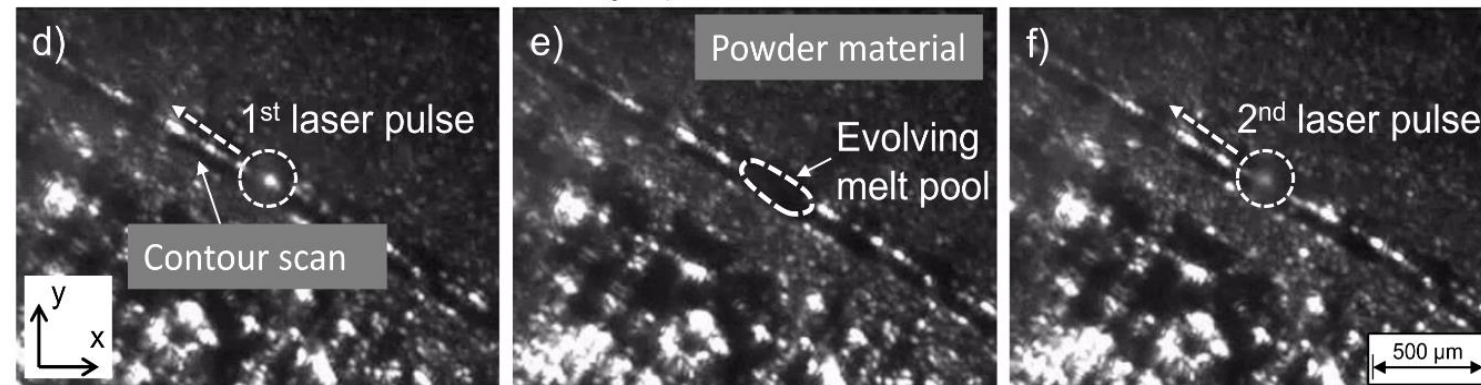
- Coaxial High Speed Camera
  - Frame rate: max. 5.000 Hz
  - Exposure time: min. 1  $\mu$ s
- Illumination
  - Second laser source

### In-process High-speed Imaging

Laser modulation:  $f = 200$  Hz; Modulation length:  $p = 5$  ms



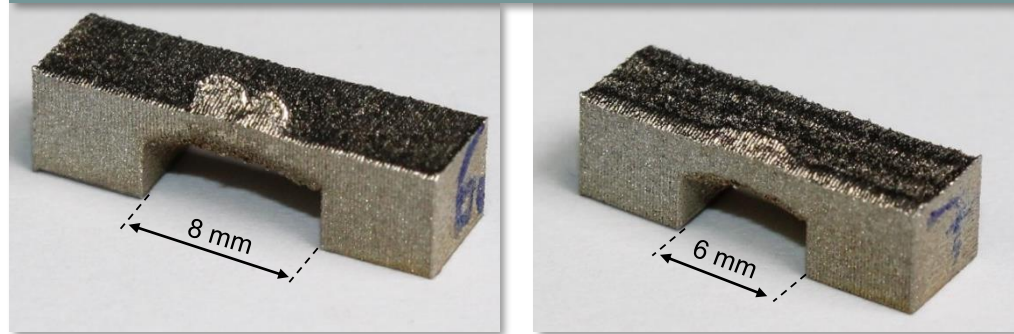
Laser modulation:  $f = 500$  Hz; Modulation length:  $p = 0,5$  ms



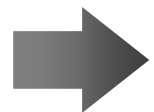
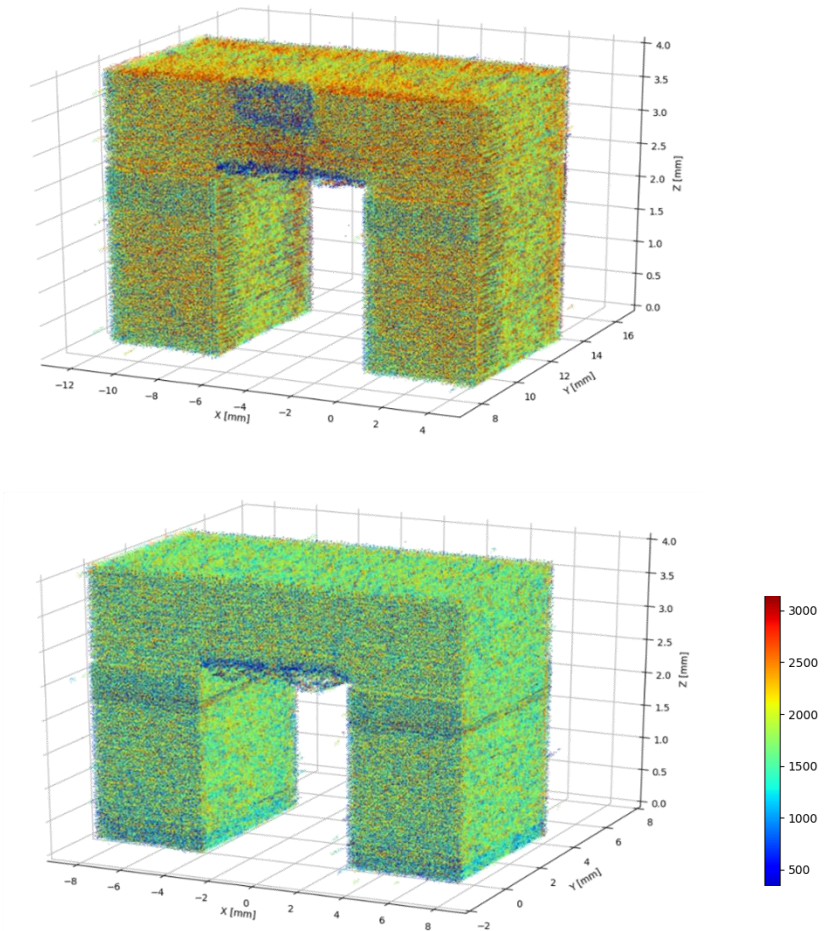
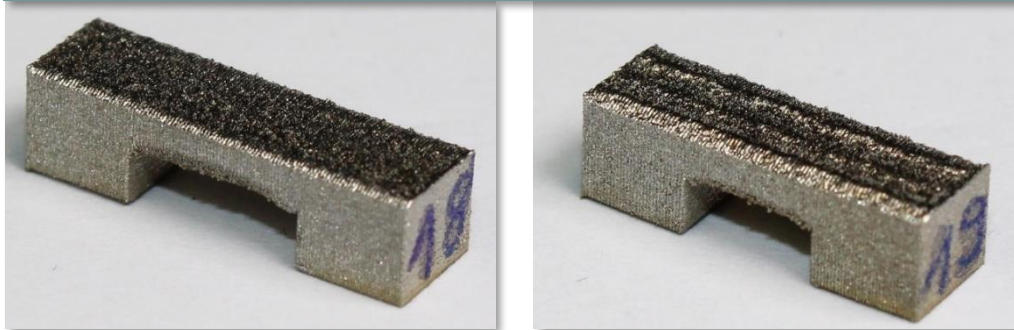
➡ In Depth Understanding of Process Mechanisms

# Process Control In-Layer

Non-controlled



Controlled



Increased quality (roughness, distortion) for critical geometries





# Thank you for your Attention

**Also thanks to our partners!**

For further information contact us:

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