Additive Manufacturing (L-PBF) machines evaluation

Rene Vijgen, Senior Technical Manager,
ETN Global

A synopsis of the project findings ETN office

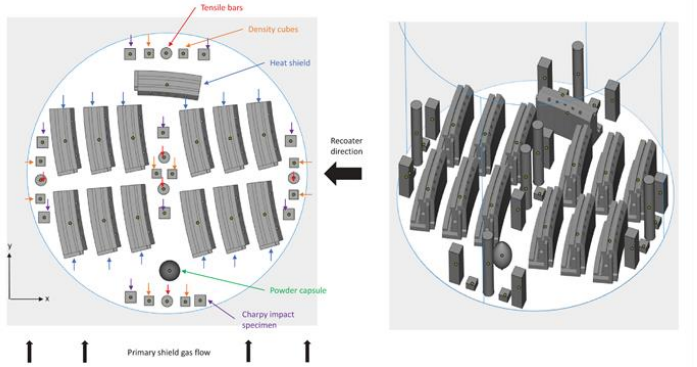
AGM 210324 Leiden

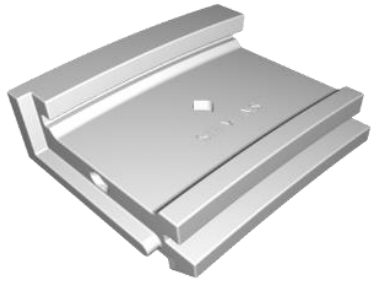
(*) L-PBF = Laser Powder Bed Fusion

ETN's L-PBF Machine Evaluation Initiative

Objectives

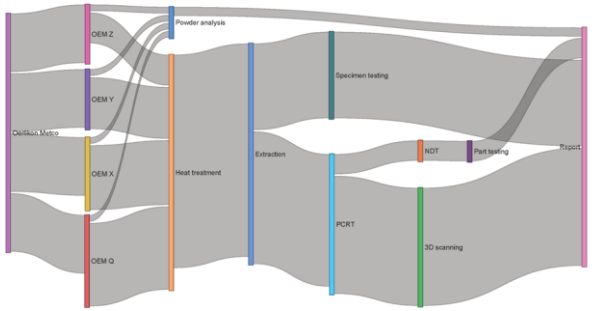
Demonstrate performance & productivity of L-PBF machines from 5 participating suppliers



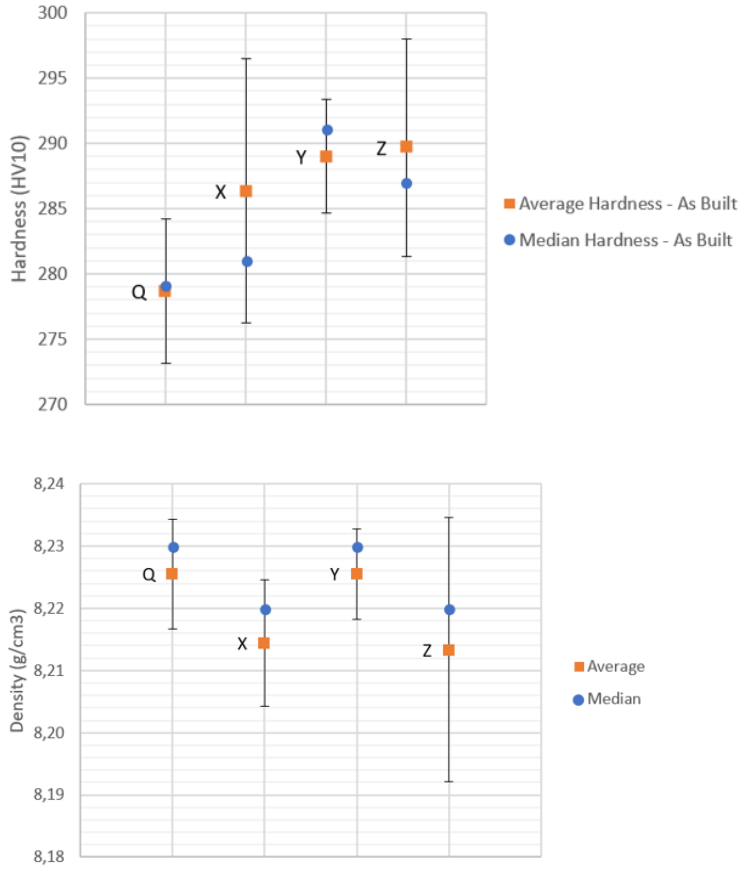


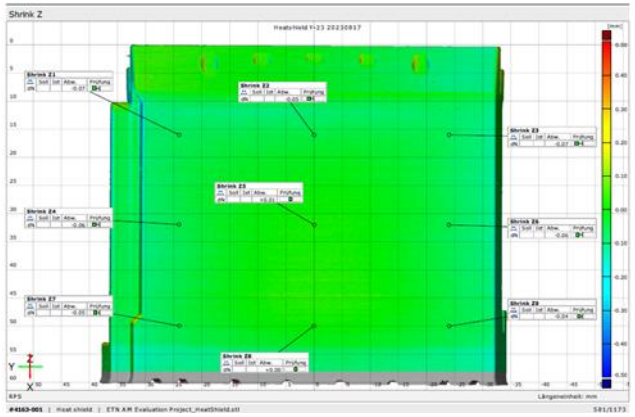
Project scope

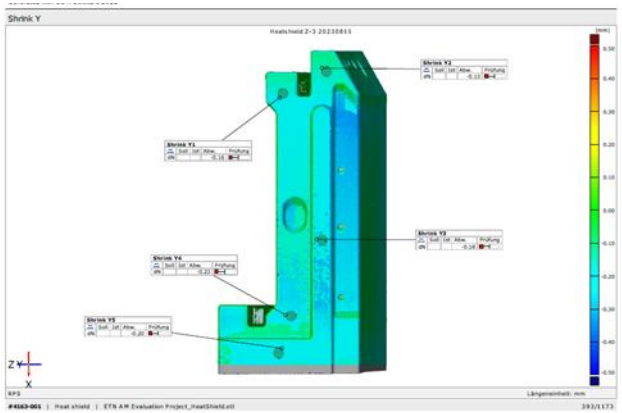
- Material: Nickel Alloy 718 (ASTM F3055 - 14a)
- Post processing by central organisation
- Deliverables:
  - ✓ Component
  - ✓ criticality application
  - ✓ test specimen
  - ✓ cubes
  - ✓ powder capsule
  - ✓ report



Selective results



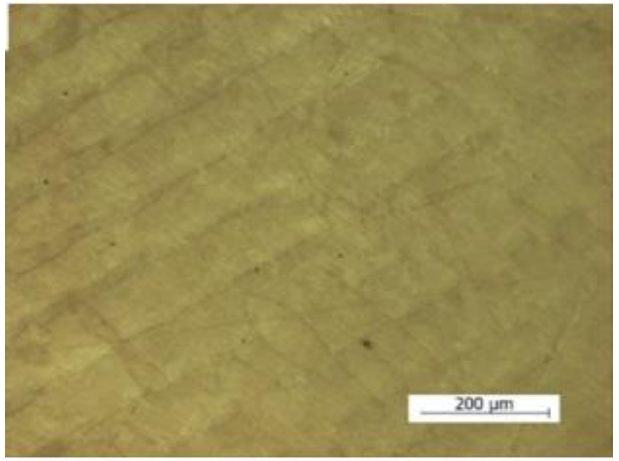


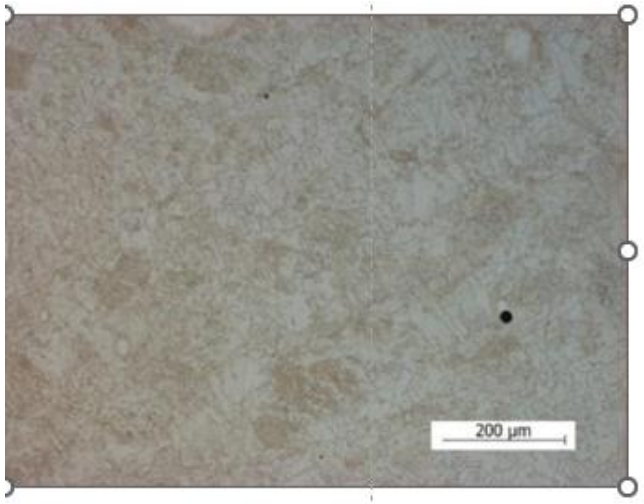


Mechanical properties

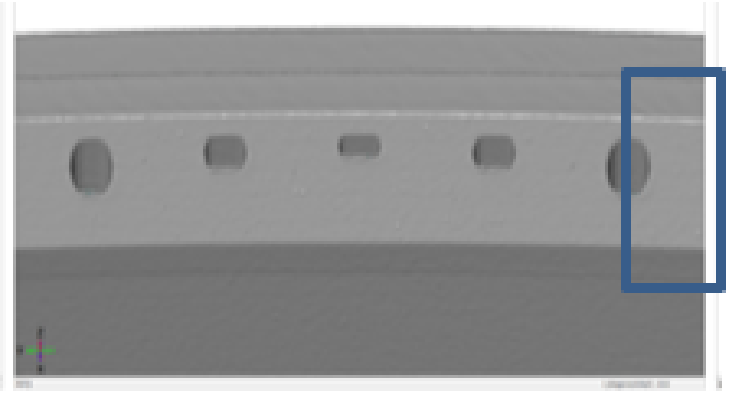
Dimensions

Selective results



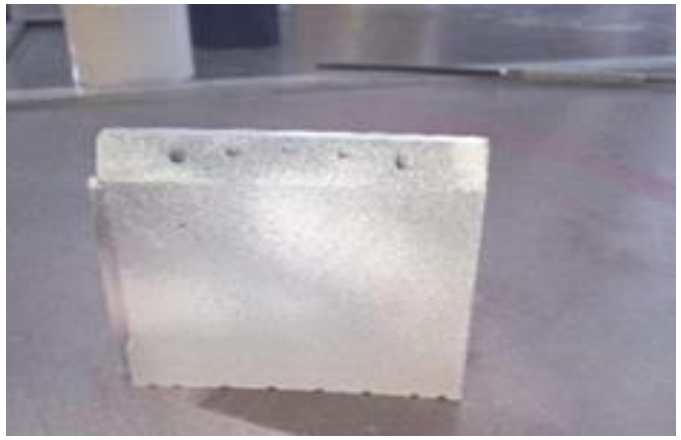


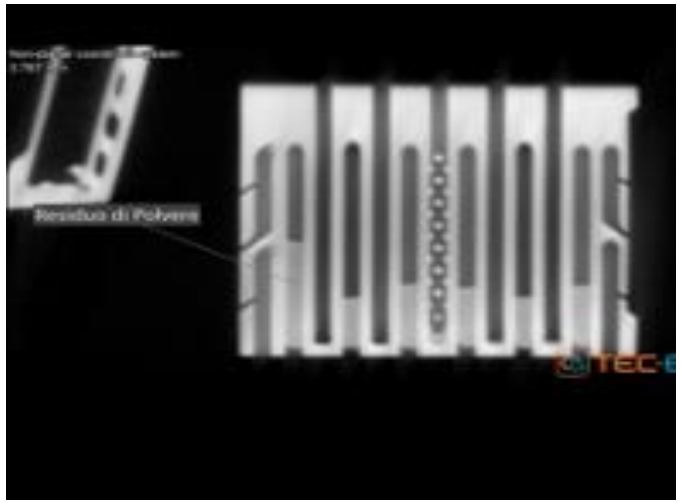
Microstructure



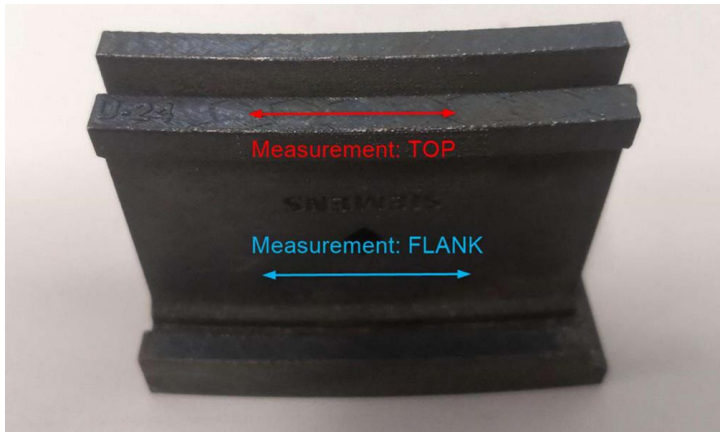
Defects

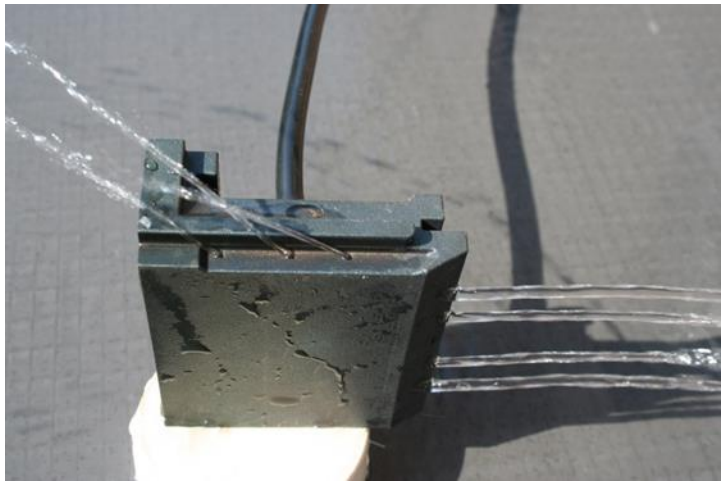
Selective results





NDT inspections





Roughness and water flow

Based on the findings in this work the following may be concluded:

- The material properties of alloy 718 (UNS N07718), printed by different equipment makers (OEMs) were consistent over the tested equipment brands, using the standard parameter sets from the equipment makers.
- Aspects like ease of use, openness, and productivity highly depend on the larger setup of support systems, and the availability of support from the OEMs. All machines in this work appeared easy to use with possible integration opportunities for improving the overall production process.
- When the build job was designed for maximum practical capacity of the machine, including test specimens and a safe distance between parts, the print time per part was similar even though there were slight variations in machine size, layer height, part spacing, number of lasers, and process pauses. The productivity will therefore mainly depend on the support systems that improve the active time of the machines and general availability of AM machines and of post-processing activities.

ETN AM MACHINE OEM EVALUATION

Report ETN

Energy & Turbomachinery Network a.i.s.b.l

A lot of details and deviations have been experienced during the project execution and testing. This know how is fully described in a confidential report, available for the funding companies.