

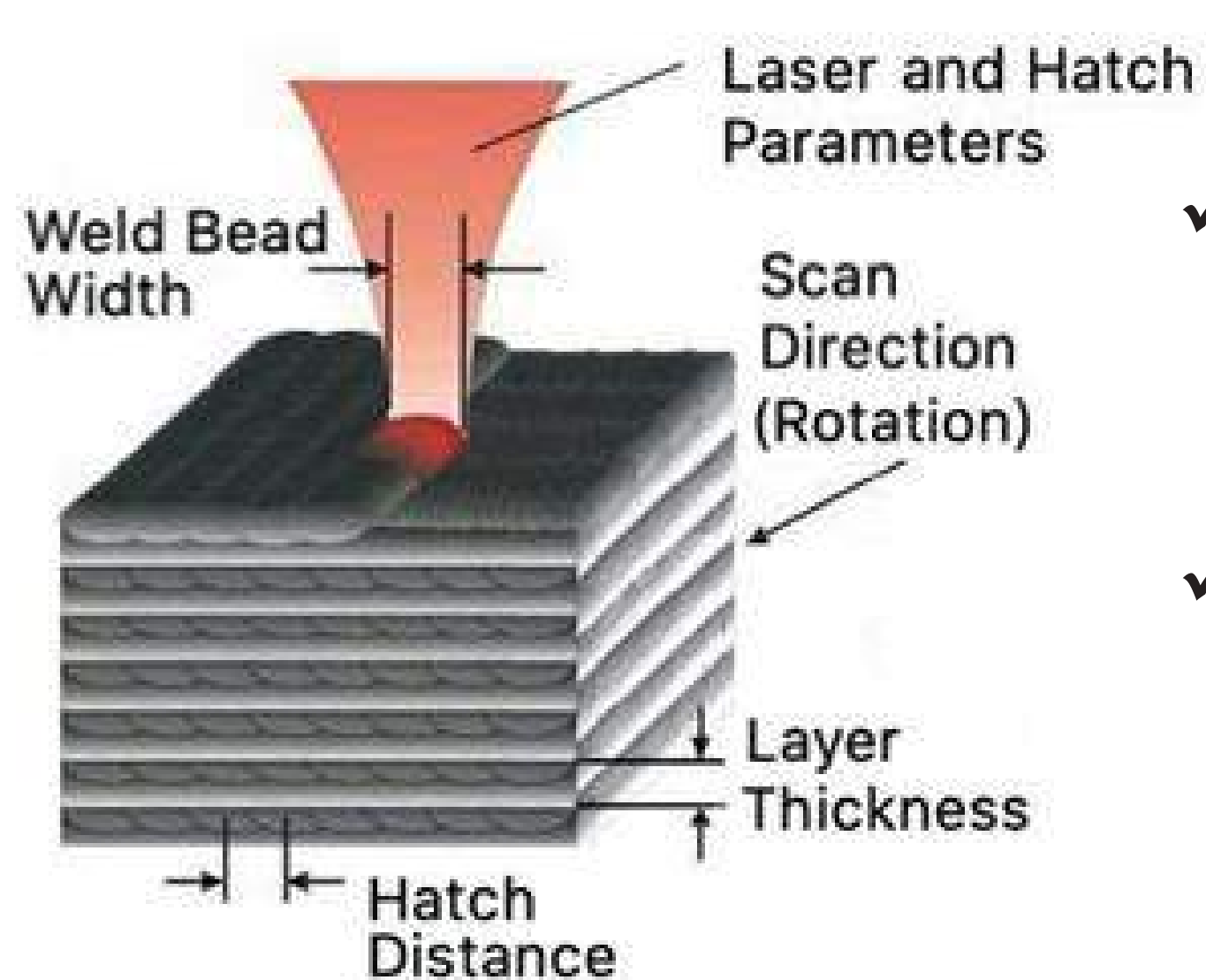
3D micro-lattices produced by L-PBF

Introduction

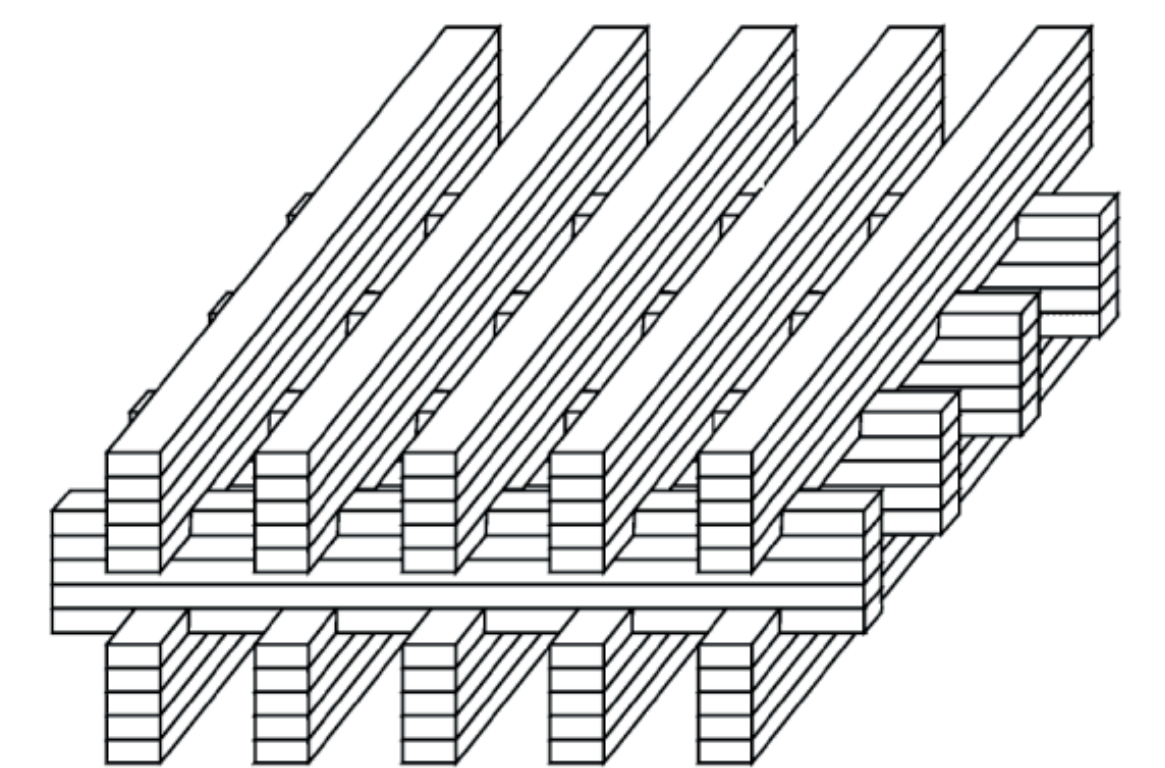
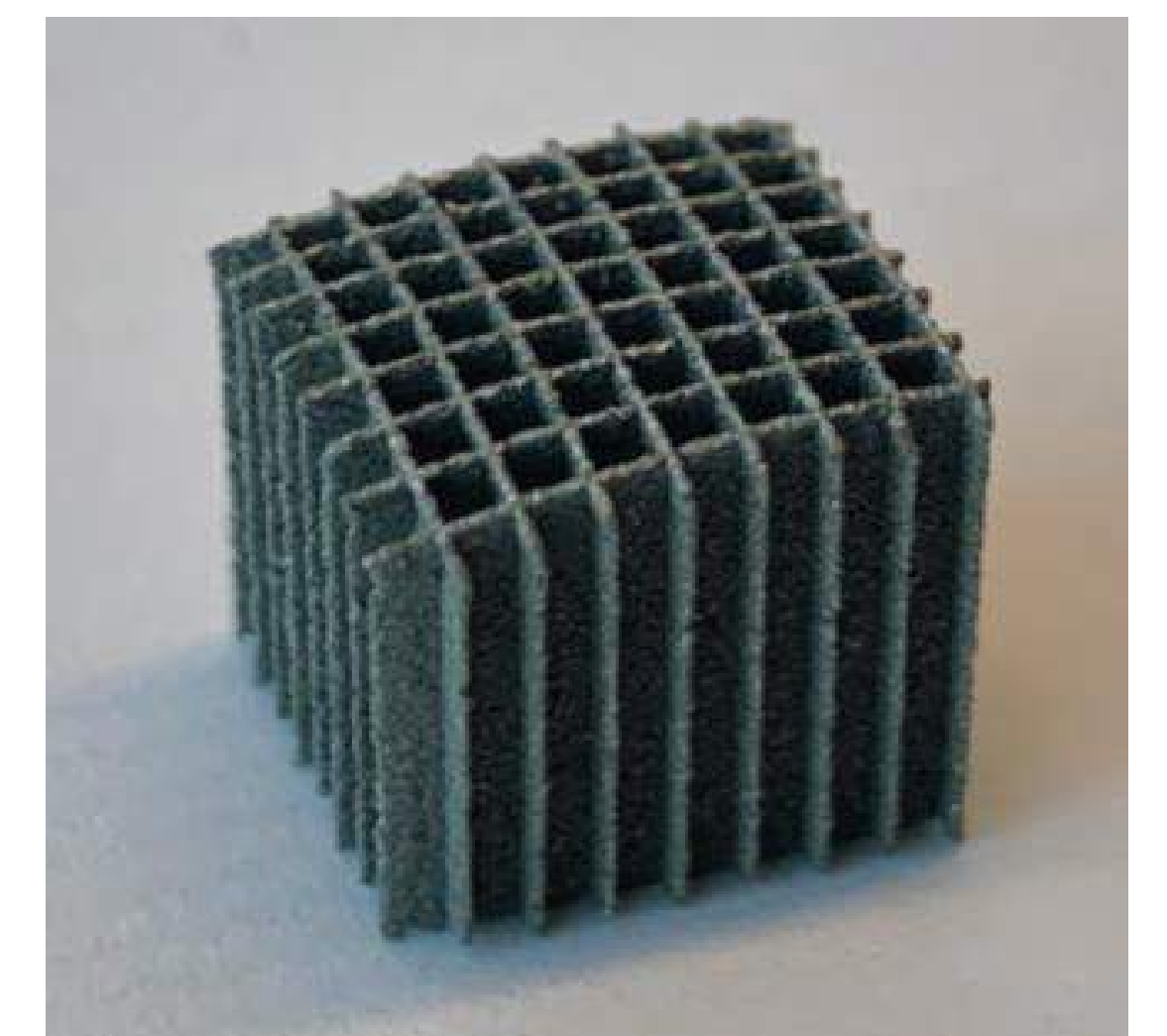
- ✓ 3D lattices represent an attractive option for lightweight design of structures
- ✓ Metal Additive Manufacturing offers full freedom of fabrication for complex shapes, from the macro- to the micro-scale
- ✓ Large and complex shapes require demanding design of the model, which must contain full details of the lattice geometry



Experimental approach

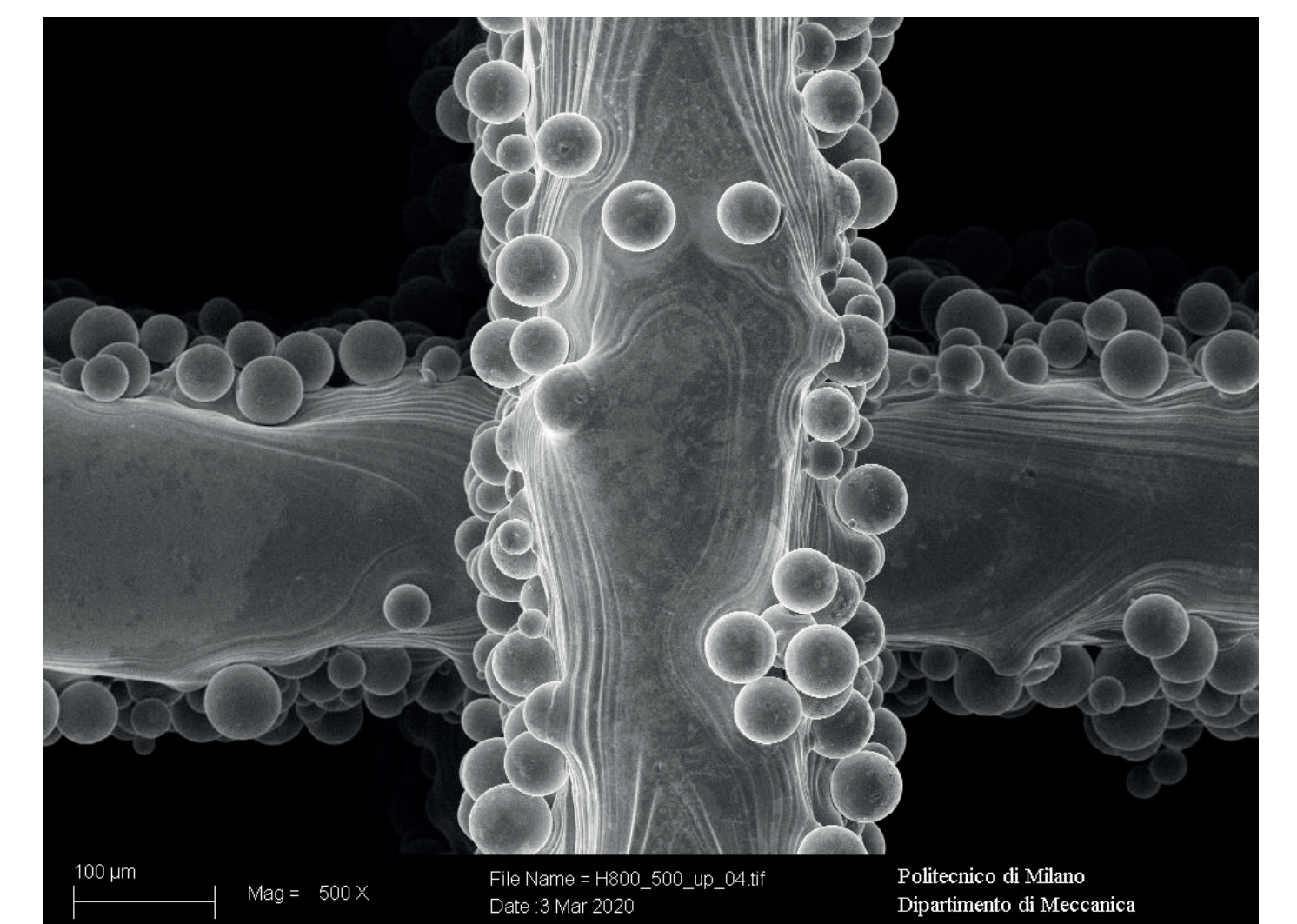
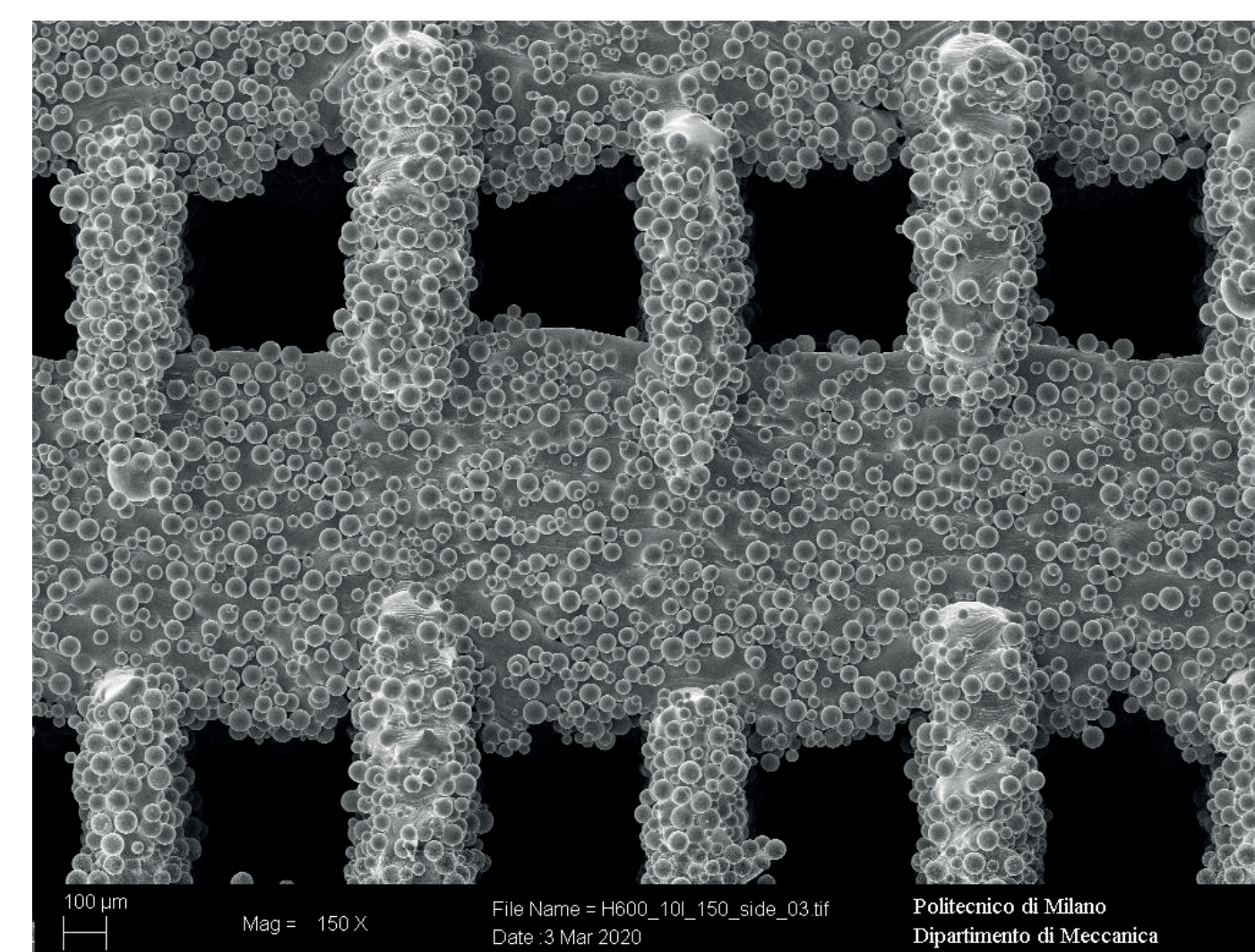
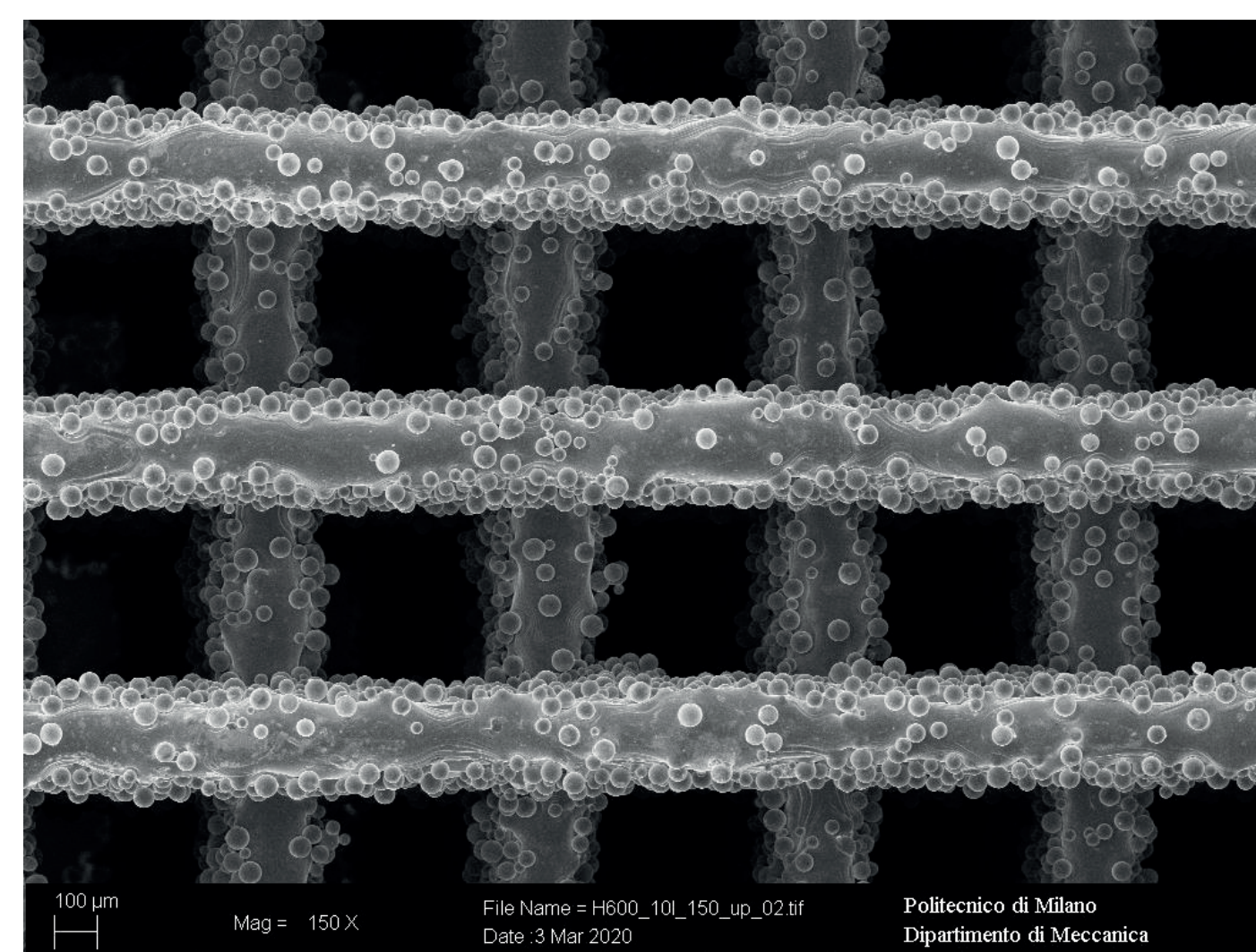
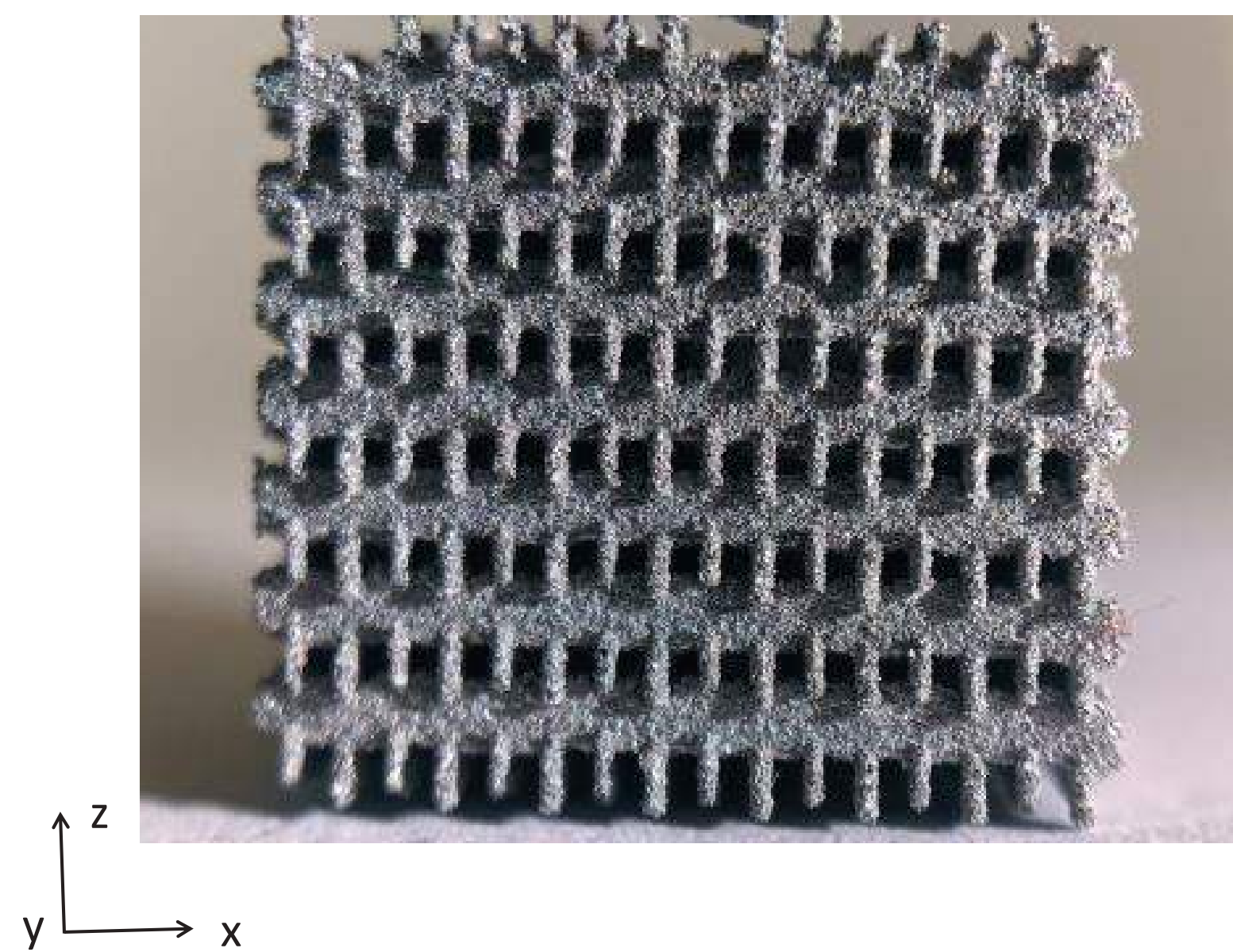


- ✓ An alternative option here investigated is the generation of micro-lattice structures by adjusting the Laser processing parameters upon L_PBF manufacturing of solid shapes
- ✓ Widening of the hatch distance and proper desing of the rotation sequence of batches of layers allows creating different micro-lattice geometries using simplified models



Tests have been carried out using both 316L stainless steel and Ti-6Al-4V alloy

Results & Conclusions



- ✓ Flexibility of the L-PBF system and accurate process parameter setting allowed designing and producing sound 3D lattices showing good geometrical control of the strut even at the microscale (beam size 100um, beam spacing 200 um)
- ✓ Many variables can potentially be tuned to design new micro-lattices, such as: stacking sequence of layer batches, their rotation, struts width and height, degree of overlapping at intersection points, ...
- ✓ Mechanical properties (here shown in compression) are promising as well and show the expected dependance on unit cell geometry)

