3D PRINTING OF INCONEL 718 BY MEAM (METAL EXTRUSION ADDITIVE MANUFACTURING)

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☐ Oral presentation ☐ Poster presentation

ABSTRACT

In this study the production of 3D-printed pieces made from Inconel 718 using Metal Extrusion Additive Manufacturing of highly-filled polymers has been investigated. The printer used was a Prusa I3 MK3 printer modified with a gravity fed-pellets screw extruder. The feedstock was pellets composed of metal powder and polymeric binders.

Different types of geometries and sizes were printed during the study with the aim to determine both the limits of the technique and the final mechanical properties of the pieces after the whole process (Fig 1). After printing, debinding, and sintering some of the samples were cut and observed by SEM to determine the presence of remaining porosity inside the pieces. The samples for tensile tests were subjected to a final precipitation heat-treatment to check the mechanical properties.

As a general conclusion of the study, better results were obtained in small pieces with a small thickness. As thickness increases porosity and the amount of large defects created during the printing or debinding steps rises. On the other hand, pieces with regular geometries show less warping. This warping comes from the large shrinkage experimented by the samples during sintering. The hardness and yield strength of the tensile samples are within the expected range for this material, but ductility is easily affected by the presence of defects.

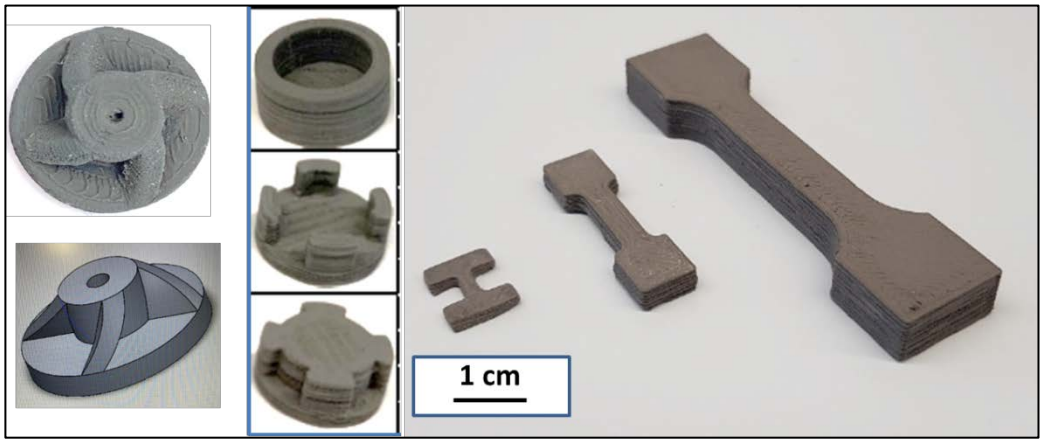

Fig. 1. Different geometries and sizes used in the study