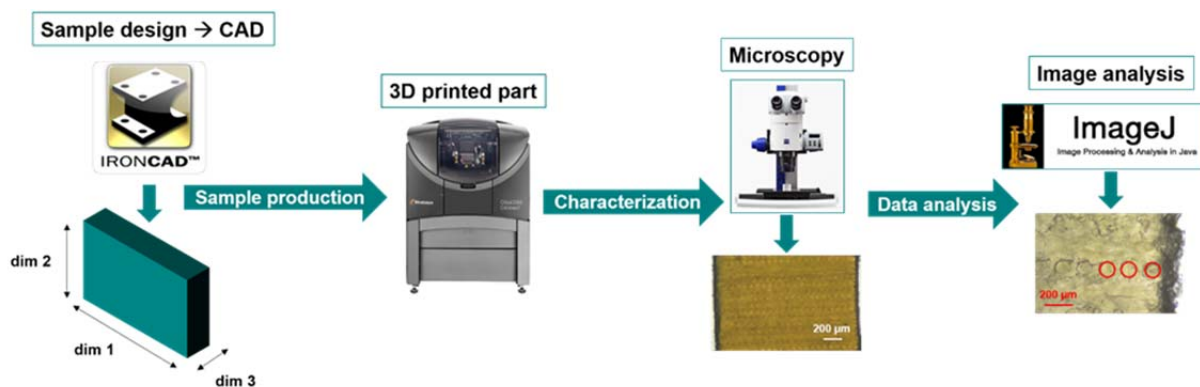


Microstructural characterization of parts fabricated by multimaterial inkjet polymer printing

Additive manufacturing is rapidly emerging as an alternative approach to fabricate objects in many different fields ranging from aeronautics to tissue engineering. Three-dimension (3D) printing is an additive manufacturing technique based on the successive deposition of layers of material to fabricate complex parts starting from a 3D virtual model. Objet 260 Connex (Stratasys, Israel) is a 3D inkjet polymer printer that allows to combine high accuracy (up to 0.1 mm) and high resolution (up to 600 dpi) [1]. The printer also allows the simultaneous depositions of multiple polymers with different properties, ranging from rubber-like to rigid. To tailor the properties of the final printed part, it is fundamental to characterize the influence of the printing process on the resulting microstructure.

The aim of the project is to conduct a systematic characterization of the influence of the printing parameters (e.g., model disposition on the building tray, model size, model material, resolution) on the microstructure of 3D printed samples. In particular, various samples will be designed by CAD modelling (IronCAD, USA) and fabricated by 3D polymer printing (Objet260 Connex2, Stratasys, Israel). Optical characterization will be performed with stereomicroscopy and the obtained pictures will be analyzed with ImageJ (imagej.nih.gov/ij/) to link the process parameters with the sample properties.



MAIN TASKS

- Review the relevant literature on 3D polymer printing;
- Get familiar with CAD software, 3D printer, stereomicroscope and ImageJ;
- Design, print and characterize different structures;
- Link process parameters with sample properties;
- Write a detailed report and prepare a presentation of the work performed;

PRACTICAL INFORMATION

- Project type: 60% experimental; 40% data analysis;
- Project location: Department of Aerospace and Mechanical Engineering; Building B52/3;
- Project supervisor: Prof. Davide Ruffoni, Laura Zorzetto, PhD student;
- Required background: a previous knowledge of image processing (ImageJ/Matlab) and/or CAD systems would be beneficial;

REFERENCES

- [1] <http://www.stratasys.com/3d-printers/design-series/objet260-connex2>