

Project Title: Mechanical and X-ray computed tomography characterization of the metal 3D printed parts

Abstract

X-ray tomography has emerged as a uniquely powerful and non-destructive tool to analyze defects in additive manufacturing. Powder material properties, non-uniform delivery of the powder layer, deformation during manufacturing, and deviations from optimal process parameters caused by changes in the laser beam, the optical components, and the scanning system operation, may result in a lack of fusion pores, metallurgical pores, keyhole pores, etc. These different types of pores have different typical sizes, shapes, and 3D distributions. Such defects affect the mechanical properties of the finished part. The use of X-ray tomography to visualize pores in parts prior to mechanical testing allows us to improve our understanding of the effect of this porosity on the mechanical properties of the part. The aim of this study is to predict the mechanical properties of printed parts with respect to these internal pores occurred due to manufacturing. X-ray tomography will be used to determine the number and size of the pores. The captured images will be post-analyzed in VoxTex and meshed structure will be extracted into Abaqus for further structural analysis. Samples preparation and X-ray tomography will be performed at Additive Manufacturing Technology Application and Research Center (EKTAM), Ankara. Thus, the applicant should regularly work in EKTAM.

Required skills: Mechanical Property Characterization

