

ADDITIVE MANUFACTURING - FROM FUNDAMENTALS TO APPLICATIONS

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ABSTRACT

Additive manufacturing (AM) continues to increase in popularity and is used in many industrial applications. The purpose of this study is to present our approach to teaching AM at the graduate level in the form of a 14-week course developed in 2015 and taught currently at the Afeka Academic College of Engineering (Tel Aviv, Israel), and review three study cases of student projects designed, printed and presented during the course. The projects were designed in order to solve medical problems and help disabled people. The first project was to develop a bottle opener for people with arthritis; the second was to build a door opener device to assist people with Parkinson's disease; and the third was to develop a personal connector bracket device for the Dobbs clubfoot bar, to help infants and kids with a clubfoot birth defect. All projects were designed with a CAD program and the prototype was printed with ABS material. The learning procedure included two iteration process steps that were performed in order to optimize the structural design, including considerations of mechanical properties and a 3D printing building strategy. Based on the students' presentations and their personal opinions, the projects served as useful learning experience in their engineering education. Our experience from teaching the course (starting in 2015), and the impressive outcomes achieved by the student projects demonstrate the innovative potential of AM. It is worth mentioning that AM education, while rooted in mechanical engineering, is truly multidisciplinary, and education programs must embrace this context.

KEYWORDS: additive manufacturing, 3D printing, FDM, ABS, devices for disabled people, engineering education

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