

INVESTIGATING THE MECHANICAL PROPERTIES OF FEED STOCK FILAMENT PREPARED FROM HAp AND NYLON-6 MATRIX FOR FUSED DEPOSITION MODELLING

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Mode of Study : P. Time

ABSTRACT

Natural bone is made up from inorganic/organic composite mainly nanostructure hydroxyapatite ($\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$) and collagen fibers. Hydroxyapatite (HAp) forms the major inorganic portion of bone and teeth tissue and it is a key requirement for developing bone grafts. Fused deposition modeling (FDM) is most economical, commercially used additive manufacturing technology. In past 20 years, many researchers have developed the in house wires to be used as feed stock filament of FDM. But hitherto no work has been reported on the Nylon-6 reinforced HAp powder filament wire for bio medical applications. In this research work, the main focus is to develop has been made to develop the filament for FDM of biocompatible material and investigations have been made for mechanical properties of feed stock filament. Pin on disk test was conduct various parameters like HAp percentage, applied normal load and sliding velocity in an unlubricated conditions. The present research work is based on the various variables (HAP percentage, Applied Load & Rotational speed). Investigations were performed to check the influence of different process parameters on mechanical properties (like wear rate, weight loss, Shore D hardness, frictional force, tensile strength, and porosity). The procedures parameters are were streamlined by utilizing DOE taking into account Taguchi L9 orthogonal array.