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PARAMETRIC OPTIMIZATION OF FUSED DEPOSITION MODELING AND VAPOUR SMOOTHING PROCESSES FOR SURFACE FINISHING OF BIOMEDICAL IMPLANT REPLICAS

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ABSTRACT

This study focuses on formulation of robust design for vapour smoothing, an advanced surface finishing technique for finishing ABS replicas where hot vapours tend to level the uneven surface asperities. The process parameters of combined Fused Deposition Modeling (FDM) and Vapour smoothing (VS) process are optimized for sustainability of ABS replicas for biomedical applications. Six input parameters have been investigated, two of FDM and four of VS processes while surface roughness and hardness of ABS part is taken as response. The vapour smoothing process ensue ultra smooth finish with negligible deterioration of upper surface deducing maximum contribution of smoothing time (51.07%) and number of cycles (40.08%) on surface roughness. Hardness of replica has been slightly increased by maximum impact of orientation angle (34.69%) and postcooling time (44.46%) of ABS replicas which endorsed the use of FDM replicas for investment casting of biomedical implants.

Keywords: Vapour smoothing, fused deposition modeling, shore d hardness, ABS replicas