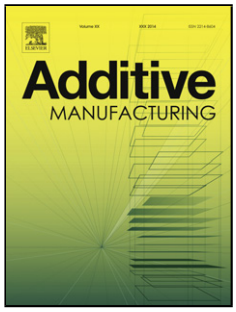

Title: A Targeted Material Selection Process for Polymers in Laser Sintering

Author: G.M. Vasquez C.E. Majewski B. Haworth N. Hopkinson

PII: S2214-8604(14)00013-X
DOI: http://dx.doi.org/doi:10.1016/j.addma.2014.09.003
Reference: ADDMA 12

To appear in:

Received date: 11-6-2014
Accepted date: 18-9-2014

Please cite this article as: Vasquez GM, Majewski CE, Haworth B, Hopkinson N, A Targeted Material Selection Process for Polymers in Laser Sintering, *Addit Manuf* (2014), http://dx.doi.org/10.1016/j.addma.2014.09.003

A Targeted Material Selection Process for Polymers in Laser Sintering

G.M. Vasquez, C.E. Majewski[+]**, B. Haworth*, N. Hopkinson***

Abstract

Laser sintering (LS) of polymer materials is a process that has been developed over the last two decades and has been applied in industries ranging from aerospace to sporting goods. However, one of the current major limitations of the process is the restricted range of usable materials. Various material characteristics have been proposed as being important to optimise the laser sintering process, key aspects of which have been combined in this work to develop an understanding of the most crucial requirements for LS process design and materials selection. Using the favourable characteristics of polyamide-12 (the most often used material for laser sintering) as a benchmark, a previously un-sintered thermoplastic elastomer material was identified as being suitable for the LS process, through a combination of information from Differential Scanning Calorimetry (DSC), Hot Stage Microscopy (HSM) and knowledge of viscosity data. Subsequent laser sintering builds confirmed the viability of this new material, and tensile test results were favourable when compared with materials that are currently commercially available, thereby demonstrating the efficacy of the chosen selection process.

Keywords: Laser sintering, materials selection, elastomer, Additive Manufacturing

* Department of Materials, Loughborough University, Loughborough, Leicestershire LE11 3TU, UK

** Department of Mechanical Engineering, University of Sheffield, Sir Frederick Mappin Building, Mappin Street, Sheffield, S1 3JD, UK,

+ Corresponding author – Tel +44 (0) 114 2227791, Fax +44 (0)114 2227890, Email c.majewski@sheffield.ac.uk