A comprehensive review on fused deposition modelling of polylactic acid

L. Sandanamsamy1 · W. S. W. Harun1 · I. Ishak2 · F. R. M. Romlay3 · K. Kadirgama3 · D. Ramasamy1 · S. R. A. Idris3 · F. Tsumori4

1 Department of Mechanical Engineering, College of Engineering, Universiti Malaysia Pahang, Gambang, 26300 Kuantan, Pahang, Malaysia

2 Faculty of Manufacturing and Mechatronic Engineering Technology, Universiti Malaysia Pahang, 26600 Pekan, Malaysia

3 Faculty of Mechanical and Automotive Engineering Technology, Universiti Malaysia Pahang, 26600 Pekan, Pahang, Malaysia

4 Department of Aeronautics and Astronautics, Faculty of Engineering, Kyushu University, 744 Motooka Nishi-Ku, Fukuoka 819-0395, Japan

* W. S. W. Harun: sharuzi@ump.edu.my

ABSTRACT

Fused Deposition Modelling (FDM) is one of the additive manufacturing (AM) techniques that have emerged as the most feasible and prevalent approach for generating functional parts due to its ability to produce neat and intricate parts. FDM mainly utilises one of the widely used polymers, polylactic acid, also known as polylactide (PLA). It is an aliphatic polyester material and biocompatible thermoplastic, with the best design prospects due to its eco-friendly properties; when PL degrades, it breaks down into water and carbon dioxide, neither of which are hazardous to the environment. However, PLA has its limitations of poor mechanical properties. Therefore, a filler reinforcement may enhance the characteristics of PLA and produce higher-quality FDM-printed parts. The processing parameters also play a significant role in the final result of the printed parts. This review aims to study and discover the properties of PLA and the optimum processing parameters. This review covers PLA in FDM, encompassing its mechanical properties, processing parameters, characterisation, and applications. A comprehensive description of FDM processing parameters is outlined as it plays a vital role in determining the quality of a printed product. In addition, PLA polymer is highly desirable for various field industrial applications such as in a medical, automobile, and electronic, given its excellent thermoplastic and biodegradability properties.

Keywords: FDM, PLA, 3D printing, Mechanical properties, Processing parameters, Applications

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