

Comparative Analysis of Fused Deposition Modeling and Binding-Jet 3D Printing Technologies

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Abstract : Purpose: Large numbers of 3D printing technologies are now available for sophisticated applications in different fields. Additive manufacturing has established its dominance in design, development, and customisation of the product. In the era of developing technologies, there is a need to identify the appropriate technology for different application. In order to fulfil this need, two widely used printing technologies such as Fused Deposition Modeling (FDM), and Binding-Jet 3D Printing are compared for effective utilisation in the current scenario for different applications. Methodology: Systematic literature review conducted for both technologies with applications and associated factors enabling for the same. Appropriate MCDM tool is used to compare critical factors for both the technologies. Findings: Both technologies have their potential and capabilities to provide better direction to the industry. Additionally, this paper is helpful to develop a decision support system for the proper selection of technologies according to their continuum of applications and associated research and development capability. The vital issue is raw materials, and research-based material development is key to the sustainability of the developed technologies. FDM is a low-cost technology which provides high strength product as compared to binding jet technology. Researcher and companies can take benefits of this study to achieve the required applications in lesser resources. Limitations: Study has undertaken the comparison with the opinion of experts, which may not always be free from bias, and some own limitations of each technology. Originality: Comparison between these technologies will help to identify best-suited technology as per the customer requirements. It also provides development in this different field as per their extensive capability where these technologies can be successfully adopted. Conclusion: FDM and binding jet technology play an active role in industrial development. These help to assist the customisation and production of personalised parts cost-effectively. So, there is a need to understand how these technologies can provide these developments rapidly. These technologies help in easy changes or in making revised versions of the product, which is not easily possible in the conventional manufacturing system. High machine cost, the requirement of skilled human resources, low surface finish, and mechanical strength of product and material changing option is the main limitation of this technology. However, these limitations vary from technology to technology. In the future, these technologies are to be commercially viable for efficient usage in direct manufacturing of varied parts.

Keywords : 3D printing, comparison, fused deposition modeling, FDM, binding jet technology

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