

## In-Situ Defect Detection of Additive Manufactured Parts

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**Abstract :** Fused Deposition Modelling (FDM), a widely used Additive Manufacturing (AM) process, often faces challenges in the quality of the part, such as the formation of defects. The most common defects in FDM are stringing, dimensional inaccuracy, layer shifting, warping, and poor bridging. This work presents the summary of research work carried out in the field of AM, optimization of 3D printing process parameters, and techniques used for identifying defects. Also, an attempt is made to integrate machine vision with a deep learning model to continuously monitor the printing process. The system captures and analyzes layer-by-layer data of the printed part, detecting defects such as stringing, warping, and dimensional inaccuracy. FDM is extensively utilized across various sectors, including aerospace, automotive, healthcare, and consumer goods. In industries such as aerospace, where high precision and reliability are paramount, even minor defects can lead to component failures that compromise safety and performance. This highlights the critical need for real-time identification of defects produced during the printing process.

**Keywords :** FDM, defect detection, machine vision, CNN

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