

Method to Maximize Interlayer Bonding in Additive Manufacturing

Print-speed control method maximizes interlayer bonding strength in additive manufacturing.

Researchers at Purdue University have developed a method to optimize printing speed for maximum part strength in additive manufacturing. Interlayer bonding is critical for preventing delamination of layers during printing or when subjected to mechanical loads. However, current methods use either a constant print speed or constant time between layers to compute print speeds, which neglect variations in time-temperature history and increase the potential for failure by delamination.

This method helps 3D printing equipment manufacturers and slicing software developers reduce the number of costly and time-consuming print failures commonly experienced with current empirical methods. This innovation decreases the variability in interlayer bonding and the potential for failure by delamination. Furthermore, this method mitigates the need for trial-and-error prints and enhances confidence in producing a successful print the first time. The innovation can be implemented at different stages in the additive manufacturing workflow, such as during the slicing process, as the machine controller, or as a stand-alone pre-processor.

Technology Validation:

By targeting a specific temperature, the layer time was found to be controlled independent of the layer profile lengths. In separate experiments, targeting substrate temperatures of 180 C and 200 C respectively, the researchers achieved consistent bonding strength.

Advantages:

- Reduces the need for manual monitoring and adjustment of process conditions
- Mitigates need for trial-and-error prints

Technology ID

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Category

Semiconductors/IC Design & EDA
Tools
Materials Science &
Nanotechnology/Composites &
Hybrid Materials
Chemicals & Advanced
Materials/Materials Processing &
Manufacturing Technologies

Further information

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-Minimizes costly and time-consuming printing errors

Applications:

-3D printing companies

-Slicing companies

-Additive manufacturing technology users

TRL: 3

Intellectual Property:

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