

Manufacturing

3D Printer Test Station

In situ testing of material deposition and layer adhesion in a 3D printer

NASA Langley Research Center has developed a test station capable of in-situ testing of material deposition and layer adhesion in an extrusion additive manufacturing process. The technology addresses the problem of monitoring part quality during the 3D printing process. It includes methods that can be readily integrated into an extrusion apparatus to provide in-situ feedback for closed-loop processing in that apparatus. The novelty is that testing happens in situ as the component is being built. Testing during the building process allows users to adjust the print parameters to control the quality of the fabricated part.

BENEFITS

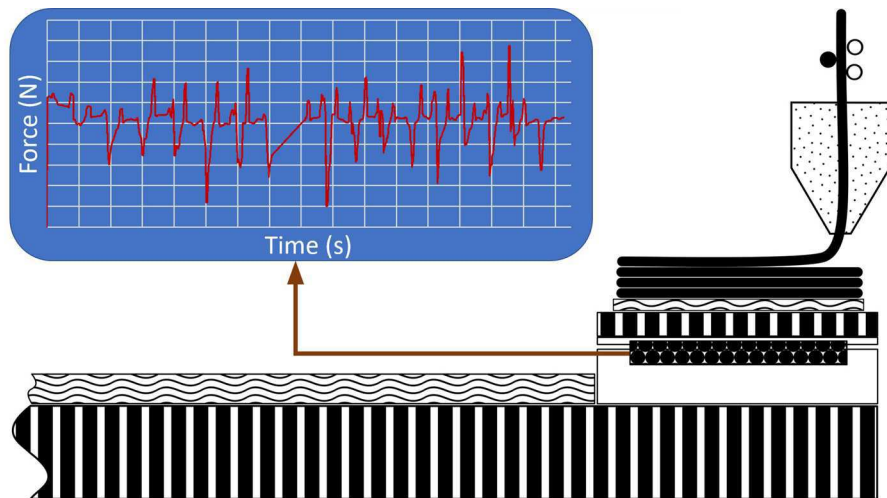
- Enables monitoring of material deposition and adhesion in a 3D printer as parts are being fabricated
Improves part quality and manufacturing reliability
- Improves part quality and manufacturing reliability
- Allows adjustments to be made during the printing process as part of a closed loop control system

technology solution



THE TECHNOLOGY

The test station consists of an extrusion head and a print bed equipped with one or more load cells for measuring the forces exerted as material is deposited. The force data is combined with information on the motion of the print head and bed to determine the actual rate of material deposition and adhesion between layers of material.



Prototype of adhesion test station to prevent part defect shown. Image credit: NASA

APPLICATIONS

The technology has several potential applications:

- 3D printing applications
- Rapid prototyping
- Manufacturing quality assurance

PUBLICATIONS

Patent Pending

National Aeronautics and Space Administration

The Technology Gateway

Langley Research Center

Mail Stop 151
Hampton, VA 23681
757-864-1178
LARC-DL-technologygateway@mail.nasa.gov

<http://technology.nasa.gov/>

www.nasa.gov

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