Real-time Feature Inspection for Additive Manufacturing Systems

Tech ID: 30517 / UC Case 2019-410-0

BACKGROUND

Additive Manufacturing (AM) is the process of making 3D objects from a computer model data by joining materials layer by layer under computer control using a 3D printer. Poplar systems, even for home use, can be purchased that use various polymer plastics. In more robust application areas, metal alloys are required and their manufacturing is much more costly and time intensive. Metal parts created by additive manufacturing are often difficult to dimensionally characterize due to the complex surface structures created by welding phenomena present in state-of the art printing machines. The most holistic techniques involve measuring the surface of each sintered layer of powder, however, this is complicated to perform in a non-contact, non-destructive, and in-situ manner. Techniques such as Spectral Domain Optical Coherence Tomography can be used to perform this task, but are limited to large pointwise measurement, limiting the speed and resolution of measuring the surface topography of each layer. Due to the cost associated with additive manufacturing with alloys, reliable inspection methodologies are necessary to ensure that the part being fabricated is free of defects and meets all user specifications.

TECHNOLOGY DESCRIPTION

Researchers at UC San Diego developed a method of layer-by-layer instantaneous area interrogation using a structured light system. The low-cost design allows measurement of high resolution out-of-plane measurements on each build layer, and the quantification of small pores of sizes 0.050 mm and smaller. The measurement system proposed is purposefully selected to be small enough to allow for in-situ implementation inside a variety of different AM machines. Measurement results of the system have been shown on test specimens dimensionally verified with profilometer measurements, presenting the validity of the system.

APPLICATIONS

The disclosed technology can enhance the quality assurance and efficiency of any lab or commercial scale additive manufacturing platform.

ADVANTAGES

The disclosed system is low-cost and small in form factor with the ability to be integrated into existing AM products.

STATE OF DEVELOPMENT

A working prototype has been developed and is available for demonstration.

INTELLECTUAL PROPERTY INFO

The idea is patent pending and available for licensing.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Published Application	62/934,885	11/13/2019	2019-410

Additional Patent Pending

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OTHER INFORMATION

KEYWORDS

Deep Neural Networks, DNN, Machine Learning, AI, Small world networks

CATEGORIZED AS

- Materials & Chemicals
  - Other

RELATED CASES

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