

54th CIRP Conference on Manufacturing Systems

In-Situ defect detection and monitoring for laser powder bed fusion using a multi-sensor build platform

Clemens Maucher^{a,*}, Kim Torben Werkle^a, Hans-Christian Möhring^a

^a*Institute for Machine Tools – University of Stuttgart, Holzgartenstr. 17, 70174 Stuttgart, Germany*

* Corresponding author. Tel.: +49 711 685-84560; *E-mail address*: clemens.maucher@ifw.uni-stuttgart.de

Abstract

In additive manufacturing (AM), the laser powder bed fusion (LPBF) process allows to manufacture complex components. Due to the high energy input and the resulting residual stresses, the structural integrity of the built component is at risk. However, these areas lie within the powder bed and are difficult to monitor. In this paper a new method was developed to monitor the process by measuring the heat flow inside of the build plate to detect possible process interruptions. This is achieved by a multi-sensor build platform which measures the temperature below the build plate. Furthermore, the method offers insights about the discrete temperature history based on the heat balance.

© 2021 The Authors. Published by Elsevier B.V.

This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

Peer-review under responsibility of the scientific committee of the 54th CIRP Conference on Manufacturing System

Keywords: Laser Powder Bed Fusion (LPBF); process monitoring; defect detection; process simulation
