

Accepted Manuscript

Title: Influence of SLM process parameters on the surface finish, porosity rate and fatigue behavior of as-built Inconel 625 parts

Authors: Imade Koutiri, Etienne Pessard, Patrice Peyre, Ouafae Amlou, Thibaut De Terris



PII: S0924-0136(17)30634-9
DOI: <https://doi.org/10.1016/j.jmatprotec.2017.12.043>
Reference: PROTEC 15580

To appear in: *Journal of Materials Processing Technology*

Received date: 20-6-2017
Revised date: 1-12-2017
Accepted date: 30-12-2017

Please cite this article as: Koutiri I, Pessard E, Peyre P, Amlou O, De Terris T, Influence of SLM process parameters on the surface finish, porosity rate and fatigue behavior of as-built Inconel 625 parts, *Journal of Materials Processing Technology* (2010), <https://doi.org/10.1016/j.jmatprotec.2017.12.043>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Influence of SLM process parameters on the surface finish, porosity rate and fatigue behavior of as-built Inconel 625 parts

Imade KOUTIRI^{a*}, Etienne PESSARD^b, Patrice PEYRE^a, Ouafae AMLOU^a, Thibaut De TERRIS^a

^a*Arts et Métiers ParisTech, CER Paris - Laboratoire PIMM – UMR 8006 CNRS – ENSAM – CNAM, 151 Bd de l'hôpital, 75013 Paris, FRANCE*

^b*Arts et Métiers ParisTech, CER Angers - Laboratoire LAMPA - 2 Bd du Ronceray, 49035 Angers Cedex 1, FRANCE*

**Corresponding author. Tel : +13344246209/ E-mail adress : imade.koutiri@ensam.eu*

Abstract

This paper is dedicated to understanding fatigue crack initiation for an Inconel 625 manufactured by SLM, using a hatching + contour procedure. In the first part of the paper, an optimum set of parameters was found to deliver the best surface roughness combined with low porosity. This process optimization, mostly focused on adjusting the volume energy density aimed at finding a compromise between an optimum densification state and a minimum number of contaminating spatters. Secondly, a fatigue test campaign has been conducted on as-built SLM samples or polished samples. The analysis of failure surfaces allowed identifying different heterogeneities at the origin of the fatigue damage for each configuration. The embedded particles on the surface of as-build specimens have been shown to play an important role in fatigue and need to be optimized or taken into account in the fatigue strength design of SLM components.

Keywords: SLM, particle, fatigue, Inconel 625, porosity, surface finish

Introduction

Additive Layer Manufacturing (ALM) currently impacts several industrial sectors, ranging from medical to aerospace and energy. Since 2003, there has been a 42% increase of parts

Download English Version:

<https://daneshyari.com/en/article/7176468>

Download Persian Version:

<https://daneshyari.com/article/7176468>

[Daneshyari.com](https://daneshyari.com)