Grant agreement nº: 825103
Call identifier: H2020-ICT-2018-2020

Customized photonic devices for defectless laser-based manufacturing

CUSTODIAN

Dataset WP2_01_Simulations

Supplementary Information

Work Package 2

Beam characteristics, simulation and modeling

Document type	:	Other
Version	:	V1
Date of issue	:	31/08/2021
Dissemination level	:	OPEN
Lead beneficiary	:	TUWIEN

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement nº 825103. CUSTODIAN project is an initiative of the Photonics Public Private Partnership.

Executive Summary

Abstract	Within this document, a table containing supplementary information related to the contents of dataset WP2_01_Simulations is provided.
Keywords	Multi-physical simulation, laser beam welding, powder bed fusion, additive manufacturing, beam shape optimization

Revision history

Version	Author(s)	Changes	Date
V1	Constantin Zenz	-	31/08/2021

File Name	Type	Description
PBF_CM247LC_multitrack.mp4	video	video of simulation showing 6 tracks of PBF-LB/M of CM247LC on a 100µm powder bed; bidirectional scanning path; substrate coloured light grey, powder coloured dark grey, meltpool coloured by temperature
PBF_CM247LC_validation.png	image	image showing comparison of cross-sectional weld bead obtained experimentally and in simulation for a single track of CM247LC scanned on 100µm powder bed
PBF_IN713LC_validation.png	image	image showing comparison of cross-sectional weld bead obtained experimentally and in simulation for a single track of IN713LC scanned on 50µm powder bed
PBF_IN713LC_balling.mp4	video	video of simulation of PBF-LB/M of IN713LC where insufficient heat input (452W) leads to surface energy-driven defect called balling; accompanying image of experimental result on the right
PBF_IN713LC_Q5plus.png	image	image of simulation and experimental result of PBF-LB/M of IN713LC with sufficient heat input to prevent balling (520W)
LBW_G9.png	image	comparative image of cross and longitudinal section of simulation and experiment of LBW; primary beam only; conditions G9 (details given in image)
LBW_G11.png	image	comparative image of cross and longitudinal section of simulation and experiment of LBW; primary beam only; conditions G11 (details given in image)
LBW_G9_opt.png	image	comparative image of cross and longitudinal section of simulation and experiment of LBW; primary and secondary beam; conditions G9 (details given in image)
LBW_G11_opt.png	image	comparative image of cross and longitudinal section of simulation and experiment of LBW; primary and secondary beam; conditions G11 (details given in image)
LBW_G7.mp4	video	comparative video: high speed camera recording (top) and simulation result (bottom) of LBW; conditions G7: P = 4kW, gap width = 0.3mm, welding velocity = 100mm/s; primary beam only
LBW_G7_GrainGrowth.mp4	video	video showing coupled simulation of melting, solidification, and crystallographic grain growth; conditions G7; primary beam only

Table 1: Supplementary information on the contents of dataset WP2_01_Simulations