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IBR manufacturing by hybrid combination of laser metal deposition and machining processes

The use of additive manufacturing (AM) technologies in aeronautic industries is on increase. An example of this is the fact that most companies in the sector have started to combine additive with machining operations. The laser metal deposition (LMD) process is one of the most used AM methods together with the selective laser melting (SLM) process, but only the first one is currently capable of producing big parts. The LMD technology can work with a wide range of metals; some of them are common within the aeronautic industry, such as Titanium, Inconel 718 and Hastelloy X, among others. This technology implies big challenges due to its complexity; in order to attain good results a high number of process parameters must be controlled, like laser power, gas and powder flux, filling strategies, feed rate, to name just a few. The present research work aims to study the manufacturing and repair of turbine components, such as blisk, by LMD. To that end, a blisk is manufactured by additively building up blades on a core disk substrate. In addition, a monitoring of the temperature of the process and the height of the clad is also realized. Therefore, this work demonstrates the feasibility of manufacturing and repairing high added value parts by 5 axis LMD.

Recent Publications

1. Arrizubieta J I, Martinez S, Lamikiz A, Ukar E, Arntz K and Klocke F (2017) Instantaneous powder flux regulation system for laser metal deposition. Journal of Manufacturing Processes 29:242-251.
2. Arrizubieta J I, Lamikiz A, Klocke F, Martinez S, Arntz K and Ukar E (2017) Evaluation of the relevance of melt pool dynamics in laser material deposition process modeling, International Journal of Heat and Mass Transfer 115:80-91.
3. Calleja A, Tabernero I, Ealo J A, Campa, F J, Lamikiz A and López de Lacalle L N (2014) Feed rate calculation algorithm for the homogeneous material 5 deposition of blisk blades by 5-axis laser cladding. Int. J. Adv. Manufacturing Technology, 74, Issue 9–12, pp 1219–1228
4. Calleja A, Tabernero I, FernándezV A, Celaya A, Lamikiz A and López de Lacalle L N (2014) Improvement of

Strategies and Parameters for Multi-Axis Laser Cladding Operations, Optics and Lasers in Engineering, 56:113-120.

5. Artetxe E, González H, Calleja A, Polvorosa R, Lamikiz A and López de Lacalle L N (2016) Optimized methodology for aircraft engine IBRs five-axis machining. Int. J. Mechatronics and Manufacturing Systems 9(4):385.

Biography

Haizea González is a Mechanical and Manufacturing Engineer and PhD student at the Basque Country University since 2015. She has experience in industrial companies, such as Novalti S A (aerospace manufacturing company). She also has I+D+i experience working as Mechanical Engineering Department Collaborator since 2013. She is specialised in hybrid manufacturing combining laser metal deposition and machining processes. He has a book chapter, 3 indexed articles, and 6 papers in industrial manufacturing magazines, 7 national and international conferences.

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