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LASER CLADDING: FROM EXPERIMENTAL RESEARCH TO INDUSTRIAL APPLICATIONS

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Abstract: Nowadays the laser cladding technique is one of the best method for reconditioning of damaged components made from high alloyed materials. This paper addresses to the reconditioning of titanium jet engine blades [1]. The figure 1 shows a jet engine blade with pronounced wear on the top surface.

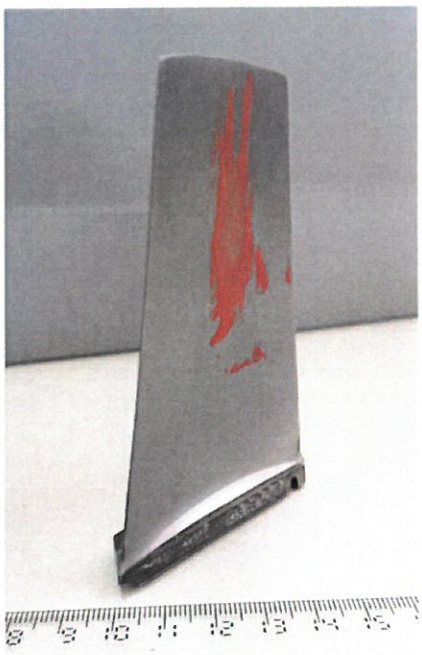

Fig. 1 Jet Engine blade

It is critical to obtain a perfect bonding between the cladded layer and the substrate in order to prevent any lose of material during the engine exploitation which could lead to critical failure. The main advantages of the laser cladding process are good metallurgical bonding and a lower heat input during the reconditioning process compared with other conventional remanufacturing processes.

The laser cladding reconditioning was carried out using an TRUMPH pulsed laser and a coaxial cladding head manipulated by an 9-axis robotic cell. Pure titanium powder was supplied into the coaxial cladding module for reconstruction of the damaged blade.

Several preliminary tests were made in order to determine the optimal process parameters for cladding on the blades active parts. The reconditioning process was carried out using a spot diameter of 2 mm and 1500 W laser power at a frequency of 90 Hz. Argon was supplied as shielding gas. The engine blades were cross-sectioned and analyzed by optical and electronic microscopy and EDS elemental mapping.

Selective references:

1. S. Kaierle, L. Overmeyer, I. Alfred, B. Rottwinkel, J. Hermsdorf, V. Weslinga, N. Weidlichc, *Single-crystal turbine blade tip repair by laser cladding and remelting*, CIRP Journal of Manufacturing Science and Technology 19, 2017, p. 196-199.

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