

SUSPENSION PLASMA SPRAY TBC APPLIED ON GAS TURBINE COMPONENTS

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The great industrial interest in improving the performances of thermal barrier coatings (TBC) results in new investigations and insights on Suspension Plasma Spray (SPS) technology.

The main feature of SPS is that powder feedstock is suspended within a solvent such as water or ethanol. The solvent acts as a carrier medium, enabling fine powder to be transported and injected into the plasma stream for processing. The fine scale of the powder particles used in SPS allows for a great range of coating microstructures to be produced.

The aim of the present work was to test and compare different type of microstructures applied by SPS using an ethanol-based suspension. In particular, this investigation focused on micro-porous and columnar TBCs. Spraying parameters have been developed to increase the standoff distance and the process stability, which are the main limits of SPS so far.

SPS TBCs were characterized by means of microstructural investigation, x-ray diffraction, bond strength and thermal cycling test.

This investigation shows a full comparison of new SPS TBCs with the well known porous TBCs and vertically segmented TBCs in terms of coating performances and industrial feasibility. Moreover, the best performing coating was applied on a real gas-turbine blade, scaling-up the parameters from the laboratory to the industrial-scale.

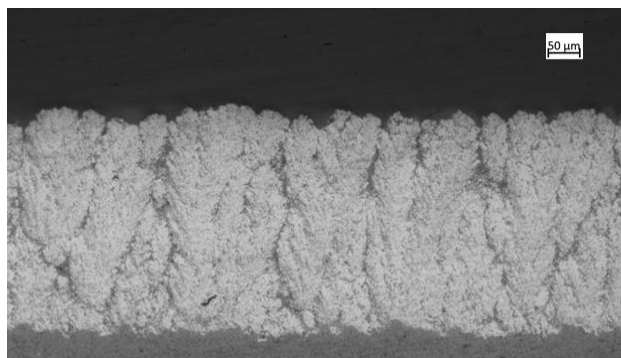


Figure 1 – Feathery Columnar 8YSZ SPS TBC