ANALYSIS OF THE METALLURGICAL BONDING BETWEEN INCONEL 625 AND MCrAlY COATINGS DEPOSITED USING HVOF AND CO2 LASER

(1)University Center of FEI, Av. Humberto Alencar Castelo Branco, 3972 - Assunção, São Bernardo do Campo - SP, Brazil, 09850-901. 2 Institute for Advanced Studies – IEAv- DCTA, Trevo Coronel Aviador José Alberto Albano do Amarante, n1 – Putim, São José dos Campos – SP, Brazil, 12228-001

Resumo:
Gas-turbine engines rely on high-temperature Thermal-Barrier Coatings applied to blades’ surfaces for improved efficiencies and power. Ceramic coatings are employed to avoid metallic substrate oxidation, thus increasing turbine work temperature and performance. A Bond Coat base of particulate material (Ni-Al powders) is necessary to assure a good adhesion (strength) and gradual decrease in thermal expansion coefficient between substrate and coating. In this work, a MCrAlY bond coat was deposited on Inconel 625 substrate employing High-Velocity Oxygen-Fuel (HVOF) thermal spraying. In the sequence, samples were irradiated by a CO2 laser beam of 125 W and diameter 0.2 mm to enhance adherence and metallurgical bonding. Microstructural features were examined by optical and scanning electron microscopy, X-ray diffraction and microhardness. Results indicate that the CO2 laser parameters are of paramount relevance to reach adequate metallurgical bonding between the bond coat and substrate.