

Laser modification of YSZ thermal barrier coating on AISI H13 tool steel substrate

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Abstract. This paper presents laser surface modification of plasma sprayed yttria stabilized zirconia (YSZ) coating for minimum surface roughness and improved hardness properties. Laser surface modification on plasma sprayed YSZ was conducted using 300W JK300HPS Nd: YAG laser at pulse mode. Parameters varied were laser power and pulse frequency at constant residence time. The YSZ coating surface roughness was analysed using two-dimensional Mitutoyo surface roughness tester while hardness properties were measured using micro Vickers indenter. Micrographs of coating cross-sectional area was captured using IM7000 inverted optical microscope. Surface roughness of laser modified YSZ coating layer decreased significantly with increasing laser power. The re-melted YSZ coating surface exhibited higher hardness properties compared to the as-sprayed sample condition. These findings were significant to enhance thermal barrier coating surface integrity for high temperature die applications.