Publ. Obs. Astron. Belgrade No. 53 (1996), 121

DEPOSITION OF THE PLASMA SPRAYED THERMAL BARRIER COATINGS

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Abstract. The influence of the sprayed powder quality and oxygen content in the LPPS-coatings on their structure, rate of oxidation and thermal cycling lifetime of the top ceramic layers are under considerstion of the paper presented.

Thermal barrier coatings applied in high temperature applications are generally manufactured by atmospheric plasma spraying of partially stabilized zirconia. The bond layer between metal and ceramic is usually a sprayed metallic coating and the thermal barrier coating reliability is essentially influenced by the behaviour of this metal ceramic interface.

Damage to the ceramic coating can be caused by thermal shock fatigue and by oxidation of the bond cout too.

The Ni(Co)CrAlY low pressure plasma sprayed (LPPS) coatings are speed widely like resistant to high temperature oxidation layers and bond layers of thermal barrier coatings, for heat engines and gas turbine applications. For such the conditions, the resistance to the high temperature oxidation is a basic coating property, which is known to depend on its structure hardly. Among the parameters, controlling the LLPS-coating structure, the sprayed powder quality is one of the most substantial. Probably the influence of gases contents on the coatings properties is the less investigated factor of the LPPS-process. In spite of the known recommendations to reduce the oxygen content in these coatings as far as possible, it is necessary to take into account the conformity of the coating price growth and the properties achieved.

The coating resistance to the high temperature oxidation was estimated as the samples weight growth ratio to the tested surface square m/s, after each hour of ageing at 1100 or 1220 °C. The metal-ceramic coatings were also thermal cycled by heat treatment at 1050 °C for 30 minutes with water cooling to 20 °C.