

EB-PVD Coater

Measured values

- Coating thickness up to several 100µm

Description of facility

For the manufacture of thermal barrier coatings the institute runs two EB-PVD coaters (EB-PVD: electron beam physical vapour deposition): one single source 60kW coater (Leybold) and one 150kW two source coater (vonArdenne Anlagentechnik). Deposition rates are in the range of between 4 and 20µm per minute.

The 60kW equipment has the classical three chamber design (loading, preheating, deposition chamber) with a sting for manipulating samples. The 'one crucible – one e-beam gun' arrangement allows deposition of metallic and ceramic coatings!! Additional possibilities include DC plasma, BIAS voltage on the substrate, and controlled gas flows that allow manufacture of variable microstructure and composition of the coatings.

The two source equipment offers the possibility to evaporate two different materials simultaneously. The fast scanning electron beam ("jumping beam") allows both homogeneous and sequential evaporation from the two crucibles, thus metallic and ceramic layers in monolithic, graded, or multilayer design can be obtained. Coating thickness is in the order of 5 to several 100µm. The coater has also the classical three chamber design and is equipped with some options for pre-treatment (sputter etching, DC/RF magnetron sputtering, annealing), pressure and gas flow control, online temperature and coating thickness monitoring etc. A wide variety of sample holders such as planetary drives and multi-plane holders

allow the use of many substrate geometries, including turbine blades. Cameras control the evaporation behaviour of the pools that help to optimise processing parameters. Processing parameters of industrial equipments can be fully reproduced.

Application

Manufacturing of thermal barrier coatings

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This handout, and cross-references to related measurement techniques and facilities are available at: <http://messtec.dlr.de/link-254-en>.

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