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Integration of macro particle filter system in Larco®-technology for ta-C-coatings in an industrial batch system

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The vacuum arc evaporation technique stands out for a very high degree of single and multiple ionised carbon atoms with increased energy necessary for condensation in the dense tetragonal amorphous diamond- like carbon film structure (ta-C). Applying this technology beside low friction also super hard coatings can be deposited. But one disadvantage of vacuum arc evaporation process is the emission of macro particles. These macro particles increase surface roughness significantly. Thus for many applications it is necessary to post-treat the surface by mechanical processes like brushing or polishing. In particular this is a difficult and expensive treatment for complex 3-dimensional objects. Therefore a new filter system was developed to minimize the amount of macro particles on substrate. One important requirement for the new filter system was in addition to the high absorption of macro particles an enlarged admission of carbon ions to ensure a deposition rate high enough for industrial applications.

The hard material coating system DREVA 600 from VTD Vakuumtechnik Dresden GmbH has been equipped with a laser arc module and the additional new filter system. The plant concept and first results of the deposition of smooth ta-C-thin films in industrial conditions will be shown in this contribution.

The carbon plasma during deposition process was examined by optical emission spectroscopy (OES) and Langmuir probe. Finally the standard and the filtered laser arc system will be compared.

Resulting of this the effect of the new filter system on plasma parameters and thin film properties will be shown.

Keywords

ta-C

DIAMOR

laser arc module

macro particle filter

OES