

ABSTRACT

The invention describes a device and a process that render possible the production of a layer system for wear protection, corrosion protection and improvement of the slipping properties and the like with an adhesion layer to be arranged on a substrate, a transition layer to be arranged on the adhesion layer and a covering layer of diamond-like carbon, wherein the adhesion layer comprises at least one element of the group of elements that contains the elements of the fourth, fifth and sixth subgroup of the periodic table and silicon, the transition layer comprises carbon and at least one element of the aforesaid groups and covering layer consists essentially of diamond-like carbon, the layer system having a hardness of at least 15 GPa, preferably at least 20 GPa, and an adhesion of at least 3 HF according to VDI 3821, Sheet 4.

The process used for the production of this layer system is such that the initial introduction of the substrate into a vacuum chamber and pumping to produce a vacuum of at least 10^{-4} mbar, preferably 10^{-5} mbar, is at first followed by the cleaning of the substrate surface to remove any adhering impurities and then by the plasma-supported deposition of the adhesion layer. Subsequently the transition layer is applied by the simultaneous deposition of the components of the adhesion layer and the deposition of carbon from the gaseous phase by means of plasma-CVD. The diamond-like carbon layer is then applied solely by means of plasma-supported deposition of carbon from the gaseous phase. During the process a biasing voltage is applied to the substrate, this voltage being pulsed in the medium-frequency range, while a superposed magnetic field stabilizes the plasma in the individual process steps.

An appropriate device for carrying out the coating process therefore consists of a vacuum chamber (1) with a pumping system (9) for the production of a vacuum in the vacuum chamber, substrate holding devices (3) to receive the substrates to be coated, at least one gas supply unit (18) for dosing the supply of process gas, at least one vaporizer device (14) to make available coating material for deposition, an arc generation device (10, 13) to ignite a low-voltage d.c. arc, a device (16) for the generation of a substrate biasing voltage and with at least one or several magnetic field generator devices (17) for the formation of a far magnetic field.



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