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**Different types of DLC coatings by Controlling the ion assistance in highly energetic pulsed magnetron discharges in an industrial coating system**

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DLC – coatings in their complexity with most different types are hydrogen-free amorphous carbon (a-C), hydrogenated amorphous carbon (a-C:H), tetrahedral amorphous carbon (ta-C) or Metal-doped DLC (such as Cr-doped DLC). Due to their individual wear-resistant, corrosion-resistant and tribological properties they are widely used on components and wear parts, cutting tools, dies and molds. For the production of such most different DLC - coatings an industrial coating system xPro4C was developed on the basis of HiPIMS and pulsed magnetron sputtering. Large area rectangular magnetron-sputtering sources with variable magnetic fields were used to deposit multi-layered coatings. The optimum level of ion assistance to the growing films is adapted in the different coating steps by an automatic change of the magnetron magnetic configuration, i.e. the degree of balanced or unbalanced. The plasma can be excited in both HIPIMS and DC-Pulsed mode, that in combination with an optimum adjustment of the magnetic field design, smooth coatings with high hardness and ideal adhesion can be produced efficiently. Detailed process description will be given.

The technology is very much up-scalable.

A wide variety of DLC coatings as described initially can be deposited in the system with hardness values up to HV 4000.

Detailed information on coating properties will be given.

As an additional benefit, the design of the system also allows the deposition of extremely smooth hard nitrides and carbo-nitrides, such as all standard multi-layered, nano-structured TiN, TiC,N, AlTiN, AlCrN and Si-doped coatings.

For industrial production purposes the system runs in a fully automatic mode. For R&D - applications the system can be operated in full manual mode.

**Keywords**

DLC

HiPIMS

variable magnetics

ionbombardment

industrial coating system