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## Modification of Diamond Like Carbon (DLC) to improve specific tribological characteristics for automotive steel components

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Carbon-based materials play an important role in today's science and technology. Carbon is a very versatile element whose two most interesting allotropic forms are Diamond (sp<sup>3</sup>) and Graphite (sp<sup>2</sup>). On this way the DLC has consolidated all its applications in the automotive and mechanical in general. The management of sp<sup>3</sup>/sp<sup>2</sup> ratio generates various types of DLC that allow to enhance the hardness, contain friction and improve the corrosion resistance of the steel component.

The demand for the application of DLC on steel components for endothermic and hybrid engines (pins, valves, camshafts, gears) is constantly growing; DLC allows improvement in terms of engine performance and reduction of emissions into the atmosphere.

In this presentation, the DLC deposited with hybrid technology PVD-PaCVD (Physical Vapor Deposition-Plasma assisted Chemical Vapor Deposition) will be examined. The modification of the layers, the thicknesses, the compositions, and the containment of surface defects allow enhancing the characteristics of hardness, reduction of friction, and resistance to corrosion of the layer. These characteristics can therefore be objectified with laboratory instruments such as nanoindenter, contact tribometer, and salt spray chamber. The next step is the bench test to appreciate the results near to the real condition. After laboratory analysis and bench tests, the applications are shown in 3 case histories: the increase of abrasion resistance in injection pins, the reduction of the friction coefficient on rocker arms and the corrosion resistance in bipolar plates.

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