

PO3070

High Performance PVD coatings for highly loaded engine components

Dave Doerwald¹, Ruud Jacobs¹, Roel Tietema¹, Thomas Krug¹

¹Hauzer Techno Coating B.V., Venlo, Netherlands

ddoerwald@hauzer.nl

For many years carbon based coatings such as WC-C:H and a-C:H as well as CrN coatings are used on automotive engine components. Initially these coatings were applied as a final solution for solving a wear problem of a certain component. For turbo diesel injection technology soon coatings started to become a design element inevitable for the function of the high pressure turbo diesel injection systems.

In February 2007 new regulations were introduced for the reduction of CO₂ emission based on the Kyoto protocol. This gave again a boost to the market of DLC coatings because of their low friction properties. Initial applications were DLC's on valve train components. Nowadays DLC coatings are applied on many components in the engine.

Modern trends in automotive industry like engine down sizing, start stop engines, hybrid engines and partial cylinder shut off are putting an even higher demand on the components and hence, the coating. The increasing power densities on components as well as more frequent operation in mixed and boundary lubrication (start-stop, cylinder shut off) and the higher temperatures inside the engine combined with low viscosity engine oils are causing conventional DLC coatings to reach the limits of their potential. ta-C coatings are recognized for their ability to reduce wear (due to their high hardness) and to reduce friction as well. Besides they possess a higher temperature stability than most hydrogenated DLC coatings. In this talk the performance of newly developed ta-C coatings and the relation to temperature stability will be discussed. Mechanical properties as well as tribological performance of these coatings will be addressed. Finally the aspects of high volume production of such coatings will here be presented as well.

Keywords

ta-C

DLC

low friction

wear reduction