Diamond-like Carbon (DLC) coatings have been used for some years within the motorsport industry to improve the life and performance of components such as piston pins, tappets, camshafts and crankshafts. A high surface hardness > 2000 GPa and a low surface roughness Ra ≤0.05 are typically requested in combination with low wear rates, and low friction coefficients for maximum efficiency. In addition, other factors may be important such as colour indicators of high wear or ease of stripping to reclaim expensive parts. Closed field unbalanced magnetron sputtering produces high quality low friction coatings with good adhesion to a variety of substrate materials. DLC (a-C:H:Me) coatings were produced by sputtering carbon combined with high flow rates of hydrocarbon gas to produce hard, electrically insulating coatings on top of TiN based underlayers in a single process. Substrate bias pulsing conditions (pulse width and frequency) were used to optimise coating hardness. Silicon is recognised in the literature as a dopant to improve the thermal characteristics of DLC, hence co-sputtered silicon was introduced and its relative composition varied to find optimum wear rates.

**Keywords**
DLC  
Silicon  
Hydrocarbon  
hardness  
wear