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**A systematic study of friction and wear behaviour of DLC coatings under various testing conditions**Volker Weihnacht<sup>1</sup>, Stefan Makowski<sup>1</sup>, Gregor Englberger<sup>1</sup><sup>1</sup>Fraunhofer IWS, Dresden, Germany

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Diamond-like carbon films (DLC) like a-C:H, a-C:H:Me, a-C, and ta-C are known for their unique combination of low friction and high wear resistance. Especially under dry and mixed lubrication conditions, as well as under emergency-running situations DLC coatings can help to increase load capacity and reduce friction losses of sliding components. The friction and wear performance of a DLC coating is strongly dependent on specific coating type, lubrication and loading condition. Simple laboratory tribometric testing of a DLC coating mostly produces unusable result, as testing conditions are far away from real application situation.

In this contribution, a systematic tribometric study of friction and wear behaviour is carried out with different DLC coating types to see the dependence of tribological parameters on tribological properties. Under consideration of practical tribological contacts as in gears or valve-train applications, appropriate testing conditions were chosen and systematically varied. In particular, the influence of real contact pressure and temperature on friction and wear were investigated with different viscosity engine and gear oils. After tribometric testing the coatings and counter-bodies were analyzed with respect to wear and surface modification.

The measured data are demonstrated in friction and wear maps to illustrate the dependence on testing parameters. The results are discussed with regard to chemical interaction between DLC-coating and oil as well as tribochemical reactions in the contact zone.

**Keywords**

DLC

ta-C

coating

friction

wear