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Dry and minimal-lubricated tribological systems

The Fraunhofer-Institut für Werkstoff- und Strahltechnik IWS Dresden along with ten further industrial and scientific research partners receive a € 7.2 million funding grant from the Federal Ministry for Economic Affairs and Energy (BMWi). The Ministry supports the research project, which focusses on energy reduction in dry and minimal-lubricated tribological systems. The alliance is developing material solutions for friction-reducing effects within the next three years.

The primary goal of the project is to optimize sliding systems in gears, bearings and chains in such a way that they no longer require lubrication through additional lubricants (grease, oil). The result should be that these systems operate nearly maintenance-free and with hardly any impact on the environment. Furthermore, due to the consequent friction reduction, they would imply an improvement in energy efficiency and finally a reduction of CO₂.

Within the last years considerable progress has been observed in the field of lubricated systems, in particular due to new lubricants and surface coatings. However, with respect to minimal or non-lubricated systems there is still substantial research needed to develop suitable, consistently stable material systems. "The most important task is to find suitable coating materials, which guarantee sufficient self-lubrication, so that sliding systems can constantly operate with low friction and low wear under various loads", explains Dr. Volker Weihnacht, head of the department "Carbon Coatings" and IWS project manager. Coating concepts with integrated lubricant supply are one defined aim of the research.

The solutions must be economically feasible and be scalable for mass-production. In the end, the advantages of these optimized products must clearly exceed the higher production costs. This is the reason why, right from the beginning, the project concept is designed in such a way that only economically feasible coating approaches will be continued and optimized. Project partners coming from the areas of job coating and plant engineering support the development work.

Fraunhofer IWS research concentrates on the development of coating systems without solid lubricants based on hard carbon coatings. At the same time the development of hybrid systems, consisting of carbon and solid lubricants, starts. In addition, comprehensive experimental studies of friction and wear mechanisms accompany the above mentioned research. Finally, the research results of the coating developments will be implemented in the set-up of a universal, industrial coating module, in which the Laser-Arc technology is included. The module's functional capability will be demonstrated in the coating plant.

The project was launched on October 1, 2015 and will run over three years. It is funded by the Federal Ministry for Economic Affairs and Energy (project number 03 ET 1286B).

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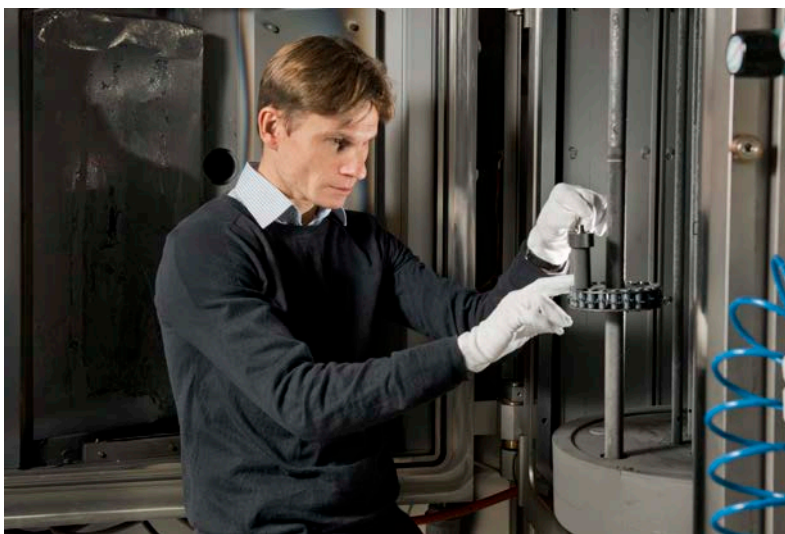
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IWS research concentrates on the development of self-lubricating coating systems based on hard carbon films.

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