

Extract from the Annual Report 2023
To the website: www.ist.fraunhofer.de/en.html

Tribology and sensor technology

Resilient and intelligent tribo systems

What are the focal points of the department?

Friction, wear and corrosion cause damage running into billions of euros every year, thereby harming the environment and even endangering human lives. We develop high-performance surfaces for resilient tribological systems and adapt them precisely to customer-specific requirements. As a result, the systems consume less energy and are more durable. Furthermore, additional functions can be realized. We thereby always consider each and every process step necessary for cost-effective production, and develop individual, highly resilient sensors for the continuous monitoring of such tribological systems, with which incipient damage can be detected promptly."

What are the plans for the future?

Further developments in materials technology, production technology and digitalization as well as increasing ecological requirements, such as the renunciation of fluorinated hydrocarbons, are constantly presenting us with new challenges. The requirement profiles for surfaces are constantly increasing and new functionalities have to be implemented. At the same time, however, cost pressure is also growing. In order to meet these requirements, we will have to combine different surface technologies more and more frequently in the future and, at the same time, reduce the costs of the necessary processes."

What were the highlights in the reporting year?

In the context of the digitalization of production processes or products, the acquisition of data via high-performance sensors is becoming increasingly important. We develop widely differing sensor types for use in highly stressed tribological systems, e. g. on forming and prototype tools, but also on any type of machine element. The sensor technology enables real-time monitoring of the tool load and, consequently, individual adaptation of the production processes. Furthermore, tools can be replaced in good time before a final failure occurs."

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- Analysis and design of tribological systems
- Development and adaptation of surfaces to customer-specific requirements
- Performance of tribological tests and characterization of surfaces
- Development of application-specific thin-film sensors
- Bio-inspired surfaces and bio-based processes for surface design
- Digitalization of surface-technology processes

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Mold core with temperature sensor for aluminum die casting.