

3M™ Friction Shims and Coatings for Wind Energy Applications

Formerly known as EKagrip®

3M™ Friction Shims and Coatings provide a reliable solution to increase the coefficient of friction in bolted or shaft-collar connections. They enable higher potential loads and torque rates with a compact and lightweight design.

Technical and economic demands

In the wind energy sector as well as in many other industries, technical and economic reasons are drivers for the following trends in component requirements:

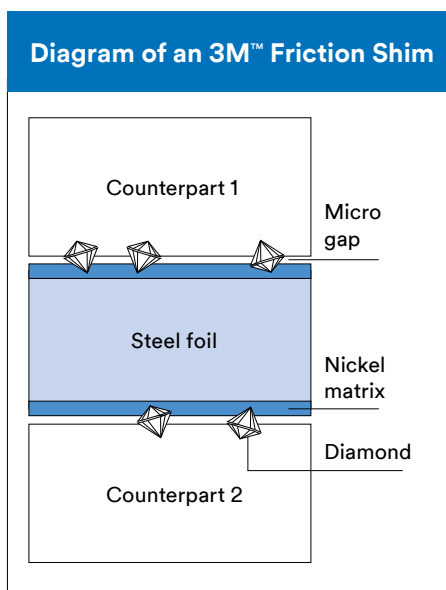
- Higher power density: Increasing loads with reduced weight and constructed space
- Ease of installation
- Long life and maintenance free operation
- Reliability and safety
- Cost efficiency

To transfer higher loads in friction joints such as flanges or shaft-collar connections, components or fasteners generally have to be increased, which in turn impacts negatively on size, weight and costs of the overall system. A better approach than increasing the size of components is trying to increase the coefficient of friction between the components using 3M™ Friction Shims technology.

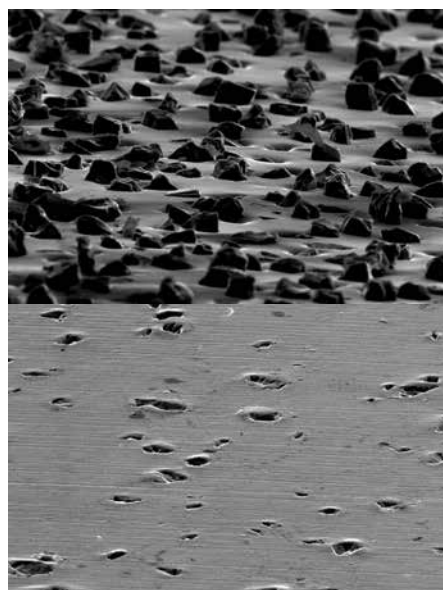
Advantages

3M™ Friction Shims and Coatings increase the friction at the joining surface of two components up to a factor of 4, and so extend the freedom in the design of individual components or the entire system. 3M™ Friction Shims and Coatings offer a simple yet very effective solution to the following requirements:

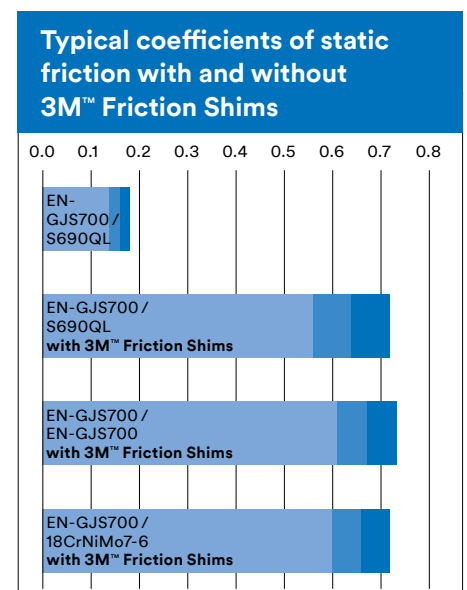
- Increase of transmittable forces and torques of a connection
- Reduction of component sizes and weights
- Consequential weight reduction of adjacent components and the overall system
- Increase of safety factor
- Cost reduction of individual components
- Ease of use
- Insensitivity to lubricants
- Principally reusable after disassembly
- Application without the need of constructive changes



Tribosystem with 3M™ Friction Shim



Contact surface of friction joint with 3M™ Friction Shim after assembly and disassembly



Results of series of tests on the coefficient of static friction (the shaded areas of the bars show the variation)

Functional principle

The functionality of 3M™ Friction Shims is the result of diamond particles with defined size and distribution protruding from a nickel coating. The coating is applied on thin steel foils or directly on the surface of one of the mating parts. During assembly of the components, the diamonds penetrate the counter surfaces and create a micro-scale interlock. This method allows higher loads to be transmitted through the connection in a reliable and reproducible way. The resulting coefficient of static friction can reach a value of 0.6 or even higher, depending on the application parameters.

Applications

Typical examples of applications in the field of wind energy are flanges and other connections in the powertrain, bolted connections on the bed plate and the fasteners of bearings, brakes and other components. For shaft-collar connections and torque limiters, the components are usually coated directly. The manufacturing process is certified according to ISO TS 16949 and therefore meets the stringent requirements for automotive applications. To date, 3M™ Friction Shims and Coatings have been used millions of times by the automotive and various other industries. 3M™ Friction Shims has also been certified by Germanischer Lloyd for various material combinations and application parameters, making it versatile for use in the wind energy sector.

Product is manufactured and sold by 3M Technical Ceramics, Zweigniederlassung der 3M Deutschland GmbH.

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