

# Laser surface texturing for industrial applications: high static friction and superhydrophobic surfaces

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Over recent years there has been a major interest in surface functionalization through laser texturing. The laser is a very flexible tool that allows precise and repeatable creation of small, even microscopic scale structures. By selecting a specific surface topography, it is possible to achieve particular surface properties. The work that is presented here is a part of the European project SHARK, a collaboration between research organisations, technology providers and end-users focused on the industrialisation of laser functional texturing. In this paper we present two surface functionalities: high friction surfaces and super hydrophobic, self-cleaning surfaces.

Introducing a specific pattern on the surface can be used as a way of tailoring the coefficient of static friction (CoSF). This application is focused on large marine engines where the high friction discs are used as a safety device, which is designed to transfer power but to slip at a certain torque load; hence a well-defined CoSF is required.

Laser texturing (nanosecond fibre laser, 220ns, 72 kHz) created a hexagonal pattern of peaks, with a honeycomb like pattern. After laser processing the surface was hardened using a chromium-based hardening process. It was possible to tailor surface properties to achieve a CoSF of 0.58 with a surface hardness of ~ 270 HV.

Anti-wetting surfaces, known as well as superhydrophobic, exhibit water repellent features, and these can be used as low adhesion and self-cleaning surfaces. Using a low-cost nanosecond fibre laser (220 ns, 25 kHz, 150 mm/s) we have successfully created superhydrophobic surfaces on thin sheet sheets of 316L stainless steel. Directly after laser texturing surface is in fact hydrophilic, and then transitions to superhydrophobic over some days or even weeks depending on storage conditions. In this paper we demonstrate storage environments that significantly speed up this transition process, making it better suited to industrial applications.

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