



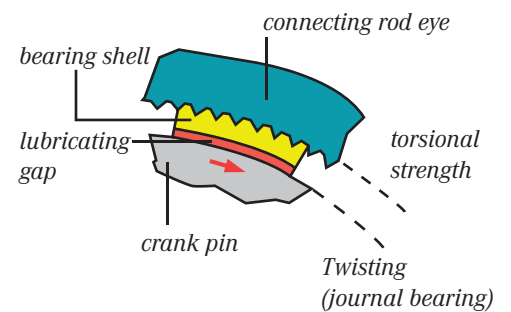
Laser structuring for roughening surfaces is being increasingly used. This produces raised micro profiles, which achieve the highest possible static friction to the counter body. The pulsed laser beam is focused on one point the material surface, resulting in very high local intensities. The thermal machining process temporarily transfers the material into the melting phase. This leads to melted beads, which protrude from the surface as ridges. These individual profile peaks are comprised in melt rims, which as raised surface structures function as components and bond with the surface of the counter body, and thereby create a high static friction.

Goal of laser structuring

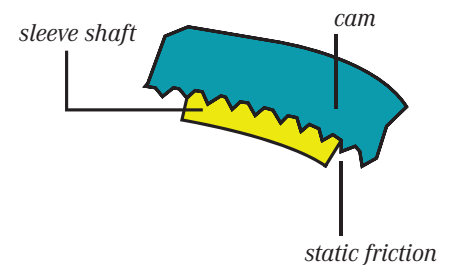
The roughening of technical surfaces with static friction function creates a lossless torsion-proof and/or anti-slide connection between two components. This combination fulfills the functional requirements, simplifies the engineering design of the components and substitutes friction enhancing intermediates such as diamond foils and thereby reduces the production costs of one unit.

Principle of laser structuring

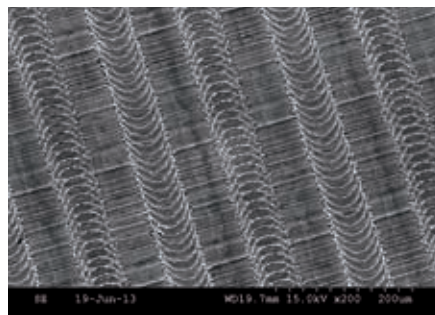
The raised profile structures cause a micro-positive contact between the contact surfaces, which results in traction thru static friction. A structural transformation and hardness increase during the machining process are the result of steep temperature gradients from the energy input of the laser beam. The raised melt protrusions of ferritic materials are composed of martensitic microstructures. Because of their increased hardness, they work invasively on the surface of the counter body. They press into the softer exterior of the unstructured material, i.e. the bearing shell, thereby enabling a reliable energy transfer.



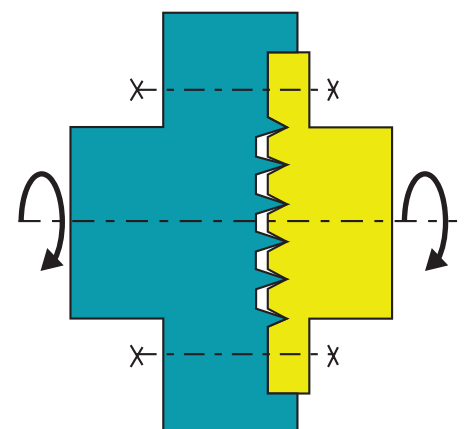
Function of the lasered connecting rod



Function of the assembled camshaft



Laser structuring to increase the static friction



Front face connection

Devices for laser structuring

To industrialize laser structuring, devices were developed that work in modern production lines with high process reliability. Q-switched solid state lasers with Galvo scanner optics, which are generally used for the labelling and marking of surfaces, are used as the beam source. To reduce the cycle time, multiple beam sources can be arranged. The arrangement depends on the machining job. During the structuring of bored segments, the beam passes into the bore at a diagonal. During machining of directly accessible surfaces, the beam guidance to the machined surface takes place normally.

Application examples



Connecting rod



Front face connection



Assembled camshaft



Gehring Laser Structuring Device

Advantages

- Substitution of diamond foils (press fit connection)
- Substitution of slot and feather key (connection hub - shaft)
- Freely selectable structure
- No tooling costs
- Short machining time from a few seconds (depending on job and layout of the machine)
- No tensioning of parts
- No heating the part
- High reliability
- High degree of automation
- Worldwide series production experience

**Trust in the technology leader with many years' experience and global presence!
Innovative technology combined with an economical mindset sets us apart.**