



## Technology: ultrashort pulse laser The tool for precise material processing

**PULSAR**  
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APPLICATIONS

The use of laser radiation as a tool for industrial production is established in many areas and effected a change where laser-based processes replace classical manufacturing processes. With the ultrashort pulse laser (USP laser) a new class of lasers is available that can emit extremely short and intense pulses. These pulses allow to selectively evaporate almost any material without influencing the surrounding material. So it is possible to process all materials of any nature, such as metals, ceramics, semiconductors, polymers and even biomaterials at high precision and without additional tools.

Outstanding features of the ultrashort pulsed processing compared to longer pulsed laser systems (e.g. nanosecond laser) are the strong localisation of the energy input as well as the focused use of non-linear absorption mechanisms. Due to the energy input into the workpiece in the range of a few picoseconds and the high intensities, the energy remains at the surface of the workpiece even with good heat conductors such as metals.

As a result the ablation is evaporation dominated with a depth structure resolution in the range of nanometers, a lateral resolution in the range of micrometers as well as a minimal thermal influencing zone in the surrounding material. The high intensities of ultrashort pulses also allow to process so called Wide-Band Gap Materials, for example glasses or ceramics. Non-linear absorption mechanisms such as multi-photon absorption can be used here.

With ultrashort pulse lasers a high-precision tool is available for production with the potential of an enormous range of applications, such as in the fields of tool technology, electronics, the optical industry and medical technology. Based on many years of experience in the area of process and application development with USP lasers, Pulsar Photonics is the competent partner for your applications.

Figure 1: Structuring of a tool use by USP processing

Figure 2: Functionalisation of piston rings for the friction minimisation with an USP laser

### KONTAKT

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