Deburring on a Next Level! Using Ultrasound to Deburr Tensile Materials

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We developed a new ultrasonic based deburring system, that makes it possible to remove burrs from complex working pieces and also to remove burrs inside the working pieces. We took a bone implant screw, as an example for our deburring procedure. Deburring bone implant screws is a challenge for the manufacturer of the screws. The problem is, that the burr is inside the screw and the screw has to be clean. Today, every screw is deburred by hand, which is not a reliable process and also problematic for the purity of the screw. We used an ultrasonic Sonotrode to bring ultrasound in our process water. To optimize the working parameters, we had developed a comparative test with a 11µm titanium foil. Through many experiments we found out, that it is really important in which angle we deburr our screws. With a special angle, different for every material and depending on the water parameters like temperature and $CaCO_3$ concentration in water, our ultrasound can trigger Rayleigh waves on the surface of the working piece. This makes it possible to deburr high tensile materials like our bone implant screws out of titanium grade 5 as well as other working pieces out of, for example, Alloy718 or out of stainless steel. We use the power of imploding cavitation bubbles to intensify the strength of the acoustic waves. We not only can deburr the screws, we also are able to remove microorganisms and chemical contaminants from our screw, due to the high frequency.