/ BACKGROUND ARTICLE //

ultraTEC – specialists in ultrasonic deburring

Every machining process produces unwanted burrs and protruding fibres in and on components. The Swabian technology company ultraTEC innovation GmbH has developed a new process to remove these automatically and contact-free: Its systems deburr metal and plastic components with the power of ultrasound. For this purpose, components are guided along in a process water basin along the tip of an ultrasonic sonotrode, whose generated vibrations cause the burrs and fibres to break off in an energy-efficient manner. Since July 2022, the start-up – which was founded in the southwestern German town of Laupheim in 2019 – has been a company of the international VOLLMER GROUP from Biberach an der Riß.

"We founded our company in 2019 based on our son Jonas' successful project on ultrasonic deburring as part of the "Jugend forscht" initiative, my wife's economic expertise and my will to turn these into a start-up company," said Dieter Münz, CEO of ultraTEC innovation GmbH. "Today, we offer four different ultrasonic deburring systems and with VOLLMER, we have an experienced partner at our side who can help us bring our technology to customers across the world with their size."

Successful "Jugend forscht" project with Rayleigh waves

At the "Jugend forscht 2019" German national youth competition for STEM subjects, 17 year-old Jakob Rehberger and 16 year-old Jonas Münz were awarded the German President's Prize for Outstanding Work – acknowledging them as the best young scientists. Under the project name "ultraTEC – and the burr is gone!", they presented an ultrasonic deburring process which could be used to deburr titanium bone implant screws – used by doctors for bone injuries. Prior to that, it was only possible to use ultrasonic deburring on components made from plastic or aluminium. The young researchers were able to generate Rayleigh waves via indirect ultrasonic irradiation. Other than that, Rayleigh waves are generated during earthquakes and are feared because of their destructive potential. In the ultrasonic deburring process, the force of the Rayleigh waves is used on components in a targeted manner, to deburr even internal edges and the smallest cross holes in a contact-free and process-safe manner.

"Jugend forscht" project transformed into a family-run business
Even before Jonas' success in the "Jugend forscht" competition, his parents – Iris and Dieter Münz – had already decided to turn the project into a business. The company's name – ultraTEC Anlagentechnik Münz GmbH – drew inspiration from the name of the project. Not even a year later, the Laupheim-based start-up developed its first market-ready ultrasonic deburring system and brought it onto the market. Two years later, in the summer of 2022, the start-up found a strong partner for strengthening and expanding its sales and brand identity globally in the form of the Biberach-based VOLLMER Group.

The company now operates under the name "ultraTEC innovation". Nevertheless, contact-free ultrasonic deburring with the patented sonotrode remains the foundation of ultraTEC. Machining metal or plastic – whether by means of drilling or milling – produces unwanted burrs and fibres on edges, cross holes and surfaces. In addition to deburring common metals, ultraTEC systems can also be used with components made from various titanium and nickel alloys, brass and fibre-reinforced plastics.

Ultrasonic deburring with high-frequency sonotrodes
In the process developed by ultraTEC, components are guided along in a process water basin past the high-frequency ultrasonic sonotrode. Stimulated by a generator, the sonotrode oscillates back and forth 20,000 times per second over 0.1 millimetres. These generated vibrations move burrs and fibres back and forth until they are broken off with sharp edges in a process-safe manner. Users can dispose of the process water without any problems and without further treatment.

Compared to conventional methods, ultrasonic deburring is the only method that can be implemented fully automated, virtually independent of the material, contact-free, energy-efficient and with a process that can be validated. By contrast, thermal processes, for example, burn away burrs, which can discolour and deform the components. Likewise, ECM (electrochemical machining) processes are often not possible with small components because they cannot achieve a definable material removal rate. High-pressure waterjet deburring requires around 20 times as much energy as ultraTEC's ultrasonic deburring systems when machining comparable parts. Ultrasonic deburring is even a viable alternative for components that are difficult to deburr and currently require manual deburring.

Ultrasonic deburring system features a digital control system

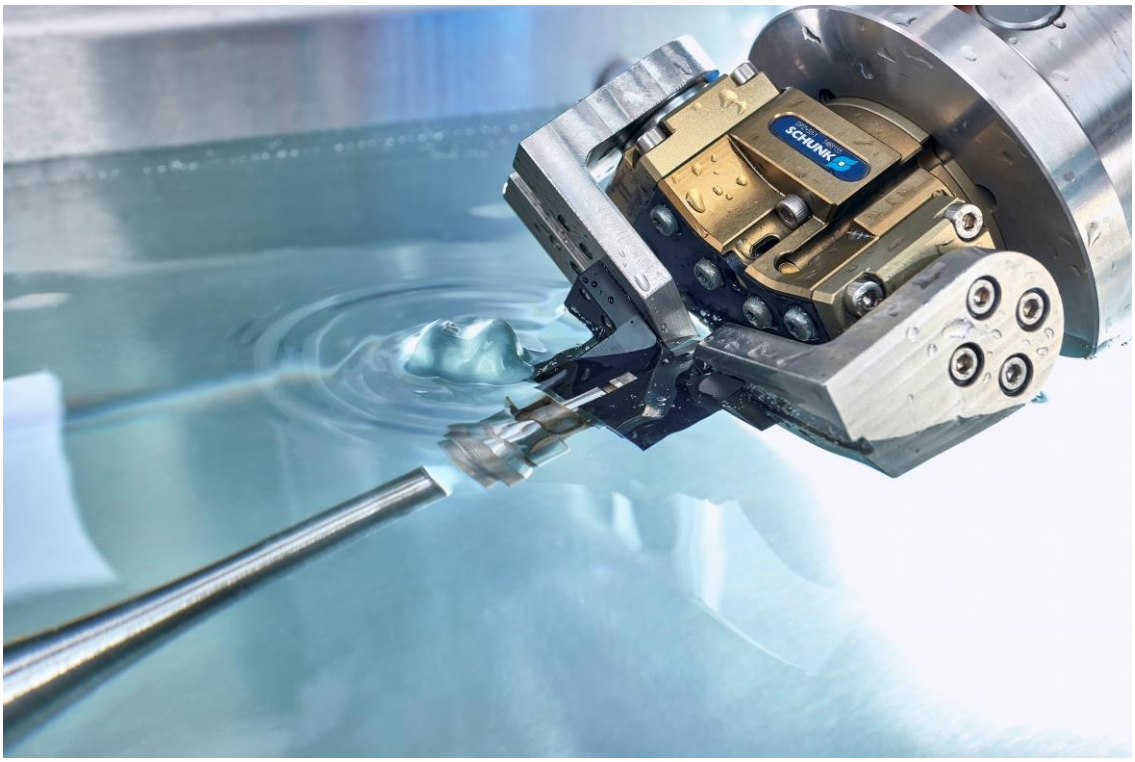
In ultrasonic deburring systems, individual components are guided along the firmly anchored tip of the sonotrode at a defined angle with the aid of an industrial robot that can operate 24/7. For microparts that cannot be gripped with a robotic arm, ultraTEC has developed a process in which the sonotrode is positioned flexibly on the robot arm and guided along the component. Tool manufacturers and machine manufacturers can also use ultraTEC systems to gently deburr sensitive surfaces. The targeted process control enables selective deburring on individual edges or cross holes. The range of components that can be machined extends from microparts for the optics or watchmaking industry, to precision tools for machining, through to 20 kilogram elements required for mechanical engineering or vehicle construction.

Digital control of ultrasonic deburring

The programming of an ultrasonic deburring system is similar to the CAM programming of milling centres and is created offline. to do so, a STEP file of the component is loaded into the CAM system and graphically positioned, the edges and points are defined and then conventional postprocessing is carried out. The machining can also be simulated beforehand using a digital twin and the deburring process can be monitored. This ensures safe and precise deburring, particularly for new components. Using IoT-based (Internet of Things) remote maintenance modules, the machine can be controlled web-based, for example, to rectify faults without an on-site service visit. The digitalisation of ultraTEC systems is to be further expanded with the support of the VOLLMER Group.

(Approx. 6400 characters)

Press images



Caption: The A25 ultrasonic deburring system from ultraTEC innovation, a VOLLMER Group company, can be used to remove unwanted burrs and fibres from machined components.

About the VOLLMER Group
With its comprehensive range of machinery, the VOLLMER Group – which has sites in Germany, Austria, Great Britain, France, Italy, Poland, Spain, Sweden, the USA, Brazil, Japan, China, South Korea, India, Russia and Thailand/Taiwan – enjoys global success as a tool machining specialist in the areas of both production and service. The range of products offered by this leader in technology includes the most advanced grinding, eroding, laser and machining tools for rotary tools and circular saws in the woodworking and metalworking industries, as well as for metal-cutting band saws. In offering this, VOLLMER draws heavily on the company's long-standing expertise and its strengths: Local contacts for efficient communication channels, quick decisions and rapid action by a family-run company. The VOLLMER Group currently employs approximately 800 workers worldwide, with around 580 of these at the main headquarters in Biberach alone, including more than 75 trainees. The company invests around eight to ten per cent of its turnover in the research and development of new technologies and products. The VOLLMER Group is a reliable partner and provider of technology and services to its customers.

Further information and relevant images are available at:
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