

Ultrasonic and Ceramic Machining Technology and Polished Glass Substrates for Brittle Materials used in Semiconductor, Microfluidics, Aerospace, Defense and MEMS Applications



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“Our ability to machine multiple features at once and to provide a low stress machining solution provides unparalleled value for our customer.”- Tim Beatty

Interview conducted by:
Lynn Fosse, Senior Editor
CEOCFO Magazine

CEOCFO: Mr. Beatty, what is the focus at Bullen Ultrasonics today?

Mr. Beatty: We do ultrasonic machining of hard, brittle materials like glass, sapphire, quartz and ceramic matrix composites (CMC) for a wide variety of industries including aerospace, semiconductors, and MEMS devices (which includes Microfluidics for DNA Sequencing and Pressure Sensors for Automotive).

CEOCFO: How does the technology work?

Mr. Beatty: Ultrasonic machining is a loose abrasive machining process in which the mirror image of a shaped tool can be created in hard, brittle materials. Material removal is achieved by the direct and indirect hammering of abrasive particles against a workpiece by means of an ultrasonically vibrating tool. Many industries like semiconductors, aerospace, defense, and MEMS require a low material removal rate, low depth of damage process because of the nature of their applications. You do not want to propagate cracks inside the aircraft engine. You do not want small chips falling off inside body parts. In semiconductors, it can mean the difference between a good computer chip or a bad computer chip. All of these processes are very different in the various industries but the commonality for us is it involves machining our customer's unique pattern on to a hard, brittle material. We have the advantage of machining all the features at one time versus one at a time with competing technologies like CNC or laser. We also have the capability of machining thousands of holes at one time on a glass wafer, silicon wafer, CVD silicon carbide plate, or ceramic matrix composite substrate.

CEOCFO: Do customers care as long as they get a good end result? Where does process come into play?

Mr. Beatty: First, The most important thing to the customer is the value we provide by machining multiple features at one time versus machining one feature at a time. By using this method, you are able to do it much more cost effectively. That is the bottom line to our customers. It is a better value. Second, we are able to provide a higher quality product using ultrasonic machining because it is a micro-chipping process and it is using very fine, abrasive slurry and ultrasonic energy, which is vibrating thousands of times a second. Those two combinations create a very high quality product that provides real value to our customer.

CEOCFO: Are there industries that value Bullen's value more than others?

Mr. Beatty: Definitely high precision, high technology industries see the most value in ultrasonic machining due to the tight tolerances and quality requirements.