

**PROFILE**

With regards to the ever-growing demand for high and highest precision micro parts and structures in sophisticated materials, conventional machining technologies and strategies are no longer sufficient.

Developing manufacturing processes for the micro world and applying new approaches to optimize the micromanufacturing process chains are our areas of expertise.

Providing the latest information and working on the frontiers of research and technology development, we educate the engineers of tomorrow's key industries in microtechnology/mechatronics, mechanical engineering and automotive production technologies.

Our range of capability includes multiphysics simulations, development and optimization of cutting, ablating and forming technologies in the micro scale and the use of hybrid technologies for the creation of the optimal process chain for the special needs of microscale parts as well as micro scale structures and surfaces on macro scale parts, be it for prototype use or mass production.

Focal points are (micro-) turning, milling, Jet-ECM, PECM, EDM, laser ablation, cold- and hot embossing and glass pressing, combined with the suitable measurement equipment, respectively.

**RESEARCH ACTIVITIES**

In micro-EDM, the process enhancement and optimization is a key research topic. Direct vibration superposition in the low-frequency and the ultrasonic range has been extensively tested to push the process speed and stability, enabling EDM to machine high quality high aspect ratio structures and bores at high speed. In-depth process analysis and control are a foundation for the application of new strategies such as usage of multi-axis piezo stages and fast drives. The micromachining of very challenging materials, such as nonconducting ceramics, by means of EDM is another hurdle we are currently tackling.

**PUBLICATIONS**

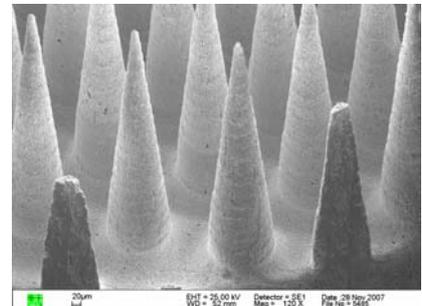
**Schubert, A.; Zeidler, H.:** Machining of nonconductive  $ZrO_2$  ceramics with Micro-EDM (*Proceedings of the 9th international conference of the european society for precision engineering and nanotechnology 2009*)

**Schubert, A.; Zeidler, H.:** A Novel Approach to Efficiency Determination in Micro Electro Discharge Machining (*Proceedings of the 10th anniversary international conference of the european society for precision engineering and nanotechnology 2008*)

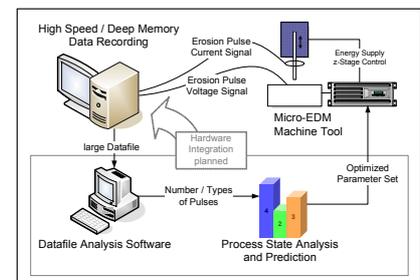
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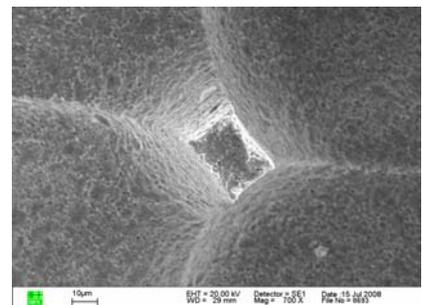
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Example of US-assisted EDM (cone dia.  $150\mu\text{m}$ (bottom)- $7\mu\text{m}$ (top), height  $850\mu\text{m}$ , distance  $250\mu\text{m}$ )



EDM analysis setup for in-depth process understanding



Pole structure in ceramic material



Micro bore array (bore dia.  $85\mu\text{m}$ , depth  $800\mu\text{m}$ , distance  $125\mu\text{m}$ , overall size  $5.5 \times 3.0\text{mm}$ , US-assisted)