are core competencies of Fraunhofer IKTS. Their potential is exemplarily shown by the demonstration system iron.

»HeiCer« is one of six subprojects within the Fraunhofer Demonstration Center »Advancen« (system solutions with advanced ceramics) that have already been completed.

A soleplate of a high-quality iron has to meet specific requirements: easy glide, high mechanical strength and hardness, good thermal conductivity as well as non-sticking properties. Silicon nitride ceramics fulfill these requirements much better than currently used materials like aluminum or stainless steel.
The advantages of the technique in terms of process and work result are:

- roughing and finishing is possible in one single-work cycle
- reduction of processing times of more than 80 %
- stable manufacturing processes
- self-sharpening of the grinding layers is possible
- excellent flatness and plane parallelism
- small tolerances in terms of dimensional accuracy of the work pieces
- improved surface quality: i.e. with grinding wheel grain size D107, roughness Rₐ down to 0.05 µm
- reduction of damage to the surface layer of ceramic components

We would like to analyze and optimize the face grinding processes with planetary kinematics of your components. Furthermore, we are able to machine ceramics as well as metals and composites.

Please find further information under www.ipk.fraunhofer.de/advancer.
News
From the City of Science 2006

On November 5, 2006 Dresden was "Landmark of the Day" within the project "Germany - Land of Ideas". To mark this special day, Dresden organized the exhibition "Fascination Technology: Science in Everyday Life". The newly restored Dresden main station was an exciting place for that particular exhibition due to its architecture characterized by the fusion of different materials and technologies. The mix of tradition and modernity – just in the sense of the "City of Science" – is reflected by the regained elegance of the building.

Dresden’s research institutes and business companies presented their results in the field of high technology at an area of 120 m² which was divided into six rooms (kitchen, children’s room, living room, study, fitness room and garden).

Besides exhibits of Fraunhofer IKTS such as an electric stove with ceramic hot plates, »Advancer« presented its demonstrator »HeiCer« and showed the extreme scratch resistance and outstanding gliding properties of a ceramic iron sole.

More than 3,000 people, mainly Dresden citizens but also tourists and travellers, visited the unique exhibition.

»Fascination Technology« was the first public event after the main station had been restored. It already took place one week before the main station was officially opened.

»Advancer« at EuroMold 2006

Under the motto »Rapid manufacturing – rapid prototyping and utilization of optimal rapid prototyping processes. In collaboration with national and international partners they significantly promote progress in rapid manufacturing.

»Advancer« successfully presented its demonstrator »HeiCer« and »CerMo«.

Innovation Award of AiF for Developers of Ceramic Paper

This year’s Otto von Guericke Prize of the German Federation of Industrial Research Associations (AiF) was awarded to Dr. Andreas Hofenauer and Renate Kirmeyer of Papiertechnische Stiftung (PTS) in Munich as well as to Dr. Nahum Travitzky and Hans Windsheimer of Friedrich-Alexander University Erlangen-Nuremberg. They succeeded in increasing the ceramic filler content of paper up to 90%. The highly filled papers can be produced, coated and shaped by conventional paper-production processes allowing for the realization of extremely thin-walled and complex-shaped ceramic components.

Current Training Courses

»Advancer« continuous its training courses »Advanced Ceramic Materials for Technicians and Engineers«. The three training parts on offer are meant to be taken consecutively, but they can also be taken individually. Dates and locations are as follows:

- Part 1
  Introduction into ceramics: Manufacturing technologies, properties, applications. March 14 and 15, 2007 in Dresden
- Part 2
  Machining of advanced ceramics. May 8 and 9, 2007 in Aachen
- Part 3
  Construction, quality assurance and application. November 15 and 16, 2007 in Freiburg

A comprehensive introduction is offered in the fields of construction/quality assurance and material testing.

Please find further information under www.advancer.fraunhofer.de

Furthermore, the following advanced training courses of the German Ceramic Society (DKG) will take place at Fraunhofer IKTS in Dresden:

- April 26 and 27, 2007 »Technology fundamentals of granulation and granulate processing« (13th edition)
- September 12 to 14, 2007 »Spray drying of ceramic suspensions – Technology and statistical test planning«
- October 4 and 5, 2007 »Thermoplastic shape-forming of advanced ceramics – Technology and training«

Please find further information under www.dkg.de
Success Stories
Innovative Ceramic Tools for Working under Applied Voltage

As long as working under applied voltage exists, energy suppliers wish for insulating tools to work safely in the field of power distribution. During the past years the next process step became obvious. As energy suppliers wanted to have specific tasks to be carried out under reduced protection equipment, they expressed their tasks to be carried out under reduced voltage-carrying lines.

Ceramic tools meet these requirements and guarantee additional safety. Furthermore, they are developed for and to determine future technologies. Tests with ceramic blades for insulating cutting tools have already been performed in 1994. A cable stripping knife having insulating properties and reducing injuries should be the first step in the development of an innovative tool generation. »In the product group Live-Line Working we succeeded in changing insulating tools into insulating tools by intensive R&D,« emphasizes Hans-Günther Gänslein, technical director of ESV GmbH. »Non-conducting ceramics and plastics helped us to develop these tools. Thus we can prevent short-circuits during live-line working. Furthermore, ceramics show very good wear-resistance and high strength,« says Gänslein. Due to these advantages numerous tools have been successfully implemented by many big energy suppliers for years.

The cable stripping knife was produced with two blades that can easily be replaced. The straight blade »KM2« was optimized for the dismantling and stripping of cables. The risk of injury was reduced as well, because the blades do not have to be ground as sharp as steel blades to achieve the same cutting performance. A patent cap allows for a fast replacement and blade protection. By means of a special radial grinding technique an extremely high cutting performance of the blade »KM3« can be achieved. Due to the special ceramic materials the blades do not show any wear. Just a diamond is harder!

Ultra Precise Tools with Ceramic Inserts for Precision Glass Molding

Aixtooling GmbH was established in June 2005 as a spin-off of Fraunhofer IPT and member of the WZL group in Aachen. The young enterprise focuses on the fast and individual supply of forming tools, inclusive sample molding. Due to the numerous advantages of precision glass molding, in which optical functional surfaces with high dimensional accuracy have not to be ground or polished, it gains more and more importance in Europe. The market requires highly complex and precise glass lenses in small and medium quantities, which are used in medical, laser, sensor and security technology, as well as in automotive industry.

To press such lenses, precision forming tools with long lifetimes are required. As the first company in Europe Aixtooling produces forming tools for precision glass molding and offers its customers services along the entire process chain of ultra-precise tool building. One development focus is put on inserts made of advanced ceramics which are highly resistant to corrosion, thermal shock, wear and oxidation.

Leibniz Prize for Peter Gumbsch

Professor Peter Gumbsch, director of the Fraunhofer Institute for Mechanics of Materials IWM in Freiburg and Halle, is to receive the 2007 Gottfried Wilhelm Leibniz Prize award for his outstanding research on the deformation and fracture mechanisms of materials. Worth 2.5 million euros, the Leibniz prize is Germany’s most highly endowed research prize, and also the most prestigious. »Advancer« congratulates Peter Gumbsch for this high distinction.

Publication information

- Newsletter of the Fraunhofer Alliance for High-performance Ceramics »Advancer« project – a joint effort of IKTS Dresden, IPK Berlin, IPT Aachen, ISC Würzburg, IWM Freiburg, IZFP Saarbrücken and LBF Darmstadt
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