



A portrait of BLOKON locations

## Denkkendorf

### *Location in profile*

The research unit Bionics under the direction of Dr. Thomas Stegmaier is a promising, topical focal point within the manifold fields of research at the Institute of Textile Technology and Process Engineering (ITV) Denkkendorf. Bionics is integrated into ITV, the largest textile research center in Germany with over 200 scientific and technical staff, the aim of which is basic textile research and the development of innovative processes and products along the whole textile production chain. Following long standing tradition ITV Denkkendorf undertakes comprehensive material and product research comprising process and mechanical engineering, polymer and general chemistry, biology, and medicine. Research at the Institute is supported by modern machinery close to production thus ensuring practice orientation. Bionics is embedded into this research environment in the business unit Functionalization. The focus is on the functionalization of textile materials by special technologies. Besides bionics, surface and nano-technologies are important research topics in this business unit. The aim is the development of innovative products with novel properties taking nature as an example.



Dr. Thomas Stegmaier

ITV Denkkendorf forms together with the Institute of Textile Chemistry and Chemical Fibers (ITCF) the German Institutes for Textile and Fiber Research Denkkendorf (DITF) – a research center that is unique in the world covering all areas of textile technology almost completely. This diverse and special research structure ensures a sound basis and a considerable development potential for the works in bionics.

### ***Bionic working method at ITV Denkkendorf***

The task of ITV Denkkendorf is to implement biological findings, i.e. to achieve new fiber-based materials and components respectively. This requires close cooperation with biological institutes and their experts for goal-directed analysis of biological materials and their function mechanisms. The development of new materials and their functions is realized by applying all processes and methods used in related industrial branches such as plastics technology or electronics. Previous experiences have shown that bionic developments often take several years of basic analyses and development up to finished product stage – or they can be realized within short time.

Besides BLOKON, ITV Denkkendorf is also a member of the Baden-Württemberg network of competences Biomimetics (together with Freiburg and Tübingen University). Thorough basic research of our cooperation partners and the interdisciplinary possibilities in the Center of Excellence Technical Textiles Denkkendorf are outstanding conditions for bionic development works which range from basic research to industrial production.

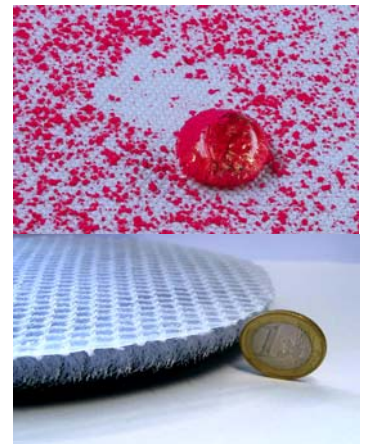
### ***Bionic research and development projects***

The manufacture and processing of fiber-based materials - from polymer synthesis, spinning of special fibers, special fabric formation as well as surface modification and nano-technology up to the manufacture of composites by coating, lamination or resin injection are the core competences. A wide range of production technologies from lab scale dimension up to industrial production can be used. Special productions are daily routine.

The major focus of ITV is on the combination of application-oriented research with industry. The close integration with industry results in many tasks which biology tries to find solutions for or which allow to realize new findings in biological structures as manifold applications.

The previous research projects include:

- Development of self-cleaning surfaces according to the Lotus-Effect® principle on textile surfaces
- Manufacture of extremely light vibration-stable and pultruded composites on the basis of plant stems
- Composites based on spacer structures for lightweight engineering
- Flexible, transparent thermal insulations for solar-technological applications on the basis of light-technological functions of the fur of polar bears
- Changeable pore sizes for low-energy micro-filtration
- Adaptive breathable membranes
- Extremely liquid-conducting textile materials
- Surfaces resistant against abrasion and with low friction.



These developments are led with industrial partners and competent research institutions such as Freiburg, Tübingen, Bonn University, and Stuttgart University (MPI).

### ***Public relations, education and training***

Besides research transfer, the imparting of basic bionic principles to pupils and students is of special importance for ITV Denkendorf. The scientists of the Institute substantially contribute to education and training at pupils' and students' visits, teachers's seminars and lectures at the universities of applied sciences as well as within the scope of the course of studies Textile Technology and Biomedical Engineering at Stuttgart University. New findings and products in the area of bionics are imparted to industry by international symposia (1st textile bionic symposium scheduled for 2006) and working groups.

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