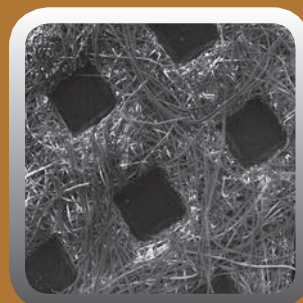




# TECHNICAL UNIVERSITY OF LIBEREC

## Faculty of Textile Engineering





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## TECHNICAL UNIVERSITY OF LIBREC

### FACULTY OF TEXTILE ENGINEERING

The Technical University of Liberec (TUL) is a middle-sized dynamic school which matches forms of technical education with university education system. Within six faculties and university institutes, it offers a large spectrum of acquirements in technical, scientific, humanity as well as artistic and interdisciplinary study branches. TUL has well equipped laboratories and top quality teams of research workers for humanities. TUL has actively participated in creation of common European education area and common European research area. The Technical University of Liberec reaches excellent results in the fields of science and research.

The Faculty of Textile Engineering was established in the year 1960 and provides as the only one in Czech republic academic education through whole textile subject. There is possible to study textile materials, technologies, marketing and design. Faculty of Textile Engineering is active in research and development. Inventions like new technology for production of flat nanofiber textiles classify the faculty to prestigious



institutes. The faculty participates in greatness on cooperation with industry and solves a lot of projects supported by various grants.

Faculty of Textile Engineering consists of six departments. There are Department of Textile Technologies, Department of Nonwovens and Nanofibrous Materials, Department of Clothing Technologies, Department of Material Engineering, Department of Design and Department of Textile Evaluation.

Faculty of Textile Engineering at Technical University of Liberec is one of the leading research institutions in field of textile and clothing technologies in Europe. Research and development is a follow-up to earlier directions, in which the faculty has always had high class and top quality research workers. Research activities supported are those, which are consistent with the rapidly developing research trends. The focus of future research activities will be oriented towards following main areas:



## NEW MATERIALS

Utilization of new materials in field of apparel and technical textiles; development of composite structures containing inorganic fibers; nanoparticles and textile reinforcement; construction and evaluation of smart textiles.

## METROLOGY AND NEW METHODS OF QUALITY EVALUATION

Computer aided modelling of textile structures properties; development of new method in comfort evaluation; quality evaluation of textile processes; automatic inspection of fabric defects.

## ADVANCED TEXTILE TECHNOLOGIES

Development of new technologies for recent textile material processing; finding of new sources of energy and modern transport media in textile processing; development of sensors suitable for use together with textile products; usage of optical fibres and materials with shape memory.

## APPLICATION OF NANOTECHNOLOGIES

Integration of nanotechnologies in the industry; production and quality improvement of nanofibres and nanofibrous layers; preparation of scaffolds for biomedical applications.

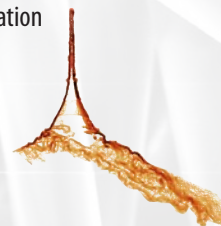
## LONG TERM-PLAN

The research results are available in all these fields and there are well-prepared specialists. Many activities are partly covered by grant projects. To enable development in research and development it will be necessary to build scientific schools with regard to ensuring their staff capacities, staff qualification, experimental background and possibility of cooperation with both national businesses and foreign institutions. It will be necessary to increase the reputation through the grants and to provide realization of results of these scientific schools. It will be advantageous to increasingly engage students and foreign specialists in dealing with these grants.

- FT will create a quality environment for scientific research activities of its academic staff.
- FT will intensify activities related primarily to gaining new grant projects (making proposals) and solving existing projects (research centres, projects GAČR, TAČR, TIP, program VaVPI, EU research projects, etc.).
- FT will increase competition among academic staff.
- FT will allow further education of academic and other staff of the faculty (language courses, MBA, courses in further education, etc.)

## TOOLS

- Making precise possibilities of building scientific schools with regard to capacities and obtaining funds from grants, respectively based on cooperation with strategic partners from industry.
- Using projects of Ministry of Education, Department of Commerce, projects OP to improve teaching and projects from other grant agencies to improve the quality of scientific activities.
- Systematic search for and preparation of specialists for fundamental focus of research.
- Cooperation with national universities, AV ČR and foreign partners in joint projects with the use of research in the laboratory as well as mental capacities.
- Creating a system for implementation of selected post-doctoral projects focused on the place of researchers.
- Providing teachers' financial and other motivation for this activity.
- Enrolling specialists from abroad for short and long stays (from India, China, USA, Hong Kong, Turkey, Japan, Canada etc.).
- Systematic search and professional preparation of specialists for key research fields.





**TECHNICAL UNIVERSITY OF LIBEREC**  
**Faculty of Textile Engineering**



## **Department of Textile Technologies**



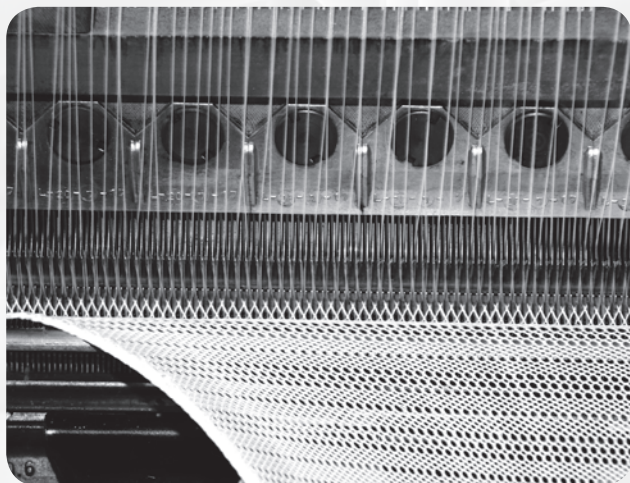


## DEPARTMENT OF TEXTILE TECHNOLOGIES

### DEPARTMENT PROFILE

In its research work, the Department focuses on the modeling of spinning and weaving processes and systems, their optimization, structure modeling and properties of yarns, woven and knitted planar textiles; development of software for prediction and optimization of the properties of yarn and fabrics including visualization; development of new types of special textiles with higher added value for clothing and technical applications, ring spinning system modification and development of new yarn types; theory of textile unevenness and its application; development of new laboratory procedures for verification of the quality of non-standard textile properties.

In terms of education, the Department specializes in two major areas. One is the area of textile technologies including spinning, weaving and knitting, in which we focus on the issue of technologies, technological systems and processes, machinery and the theory and modeling of technological systems, processes and fiber formations. The other, no less important area, is of the structure and properties of textiles focused on relations in the line of fiber-yarn-planar textiles – production technology, design of textile properties and textile mechanics.



### EDUCATIONAL ACTIVITIES

The Department employees provide education for study in the area of textile technologies focused on spinning, weaving, knitting, as well as special productions in the spinning technologies – sewing threads, fancy yarns, texturing of filaments, in the area of weaving and knitting technologies – production of plush, planar textiles with surface loops, leno fabrics, ribbons, distance and multiaxial knitted structures. The specialized branches are oriented not only on the production process analyses, but also on the structure and properties of textiles. The Department offers training in computer-aided textile design aimed at raw material optimization, textile structure and properties and structure of virtual textiles for electronic trading. The students can test the basic textile production principles, starting from spinning on a spinning wheel, weaving on handlooms, to weaving of complex patterns on Jacquard machines, where they prepare the fiber structure



in advance including the weave, number and color of threads, 2D and 3D simulation and calculation of the fabric on a computer. The students can test the properties of fabricated textiles in state-of-the-art laboratories, thus directly receiving feedback. During the studies, they can participate in activities focused on development of new products and optimization of their properties in the area of clothing and technical textiles.

## RESEARCH ACTIVITIES

The main research activities of the Department are focused on:

- modeling spinning, weaving and knitting processes and systems and their optimization

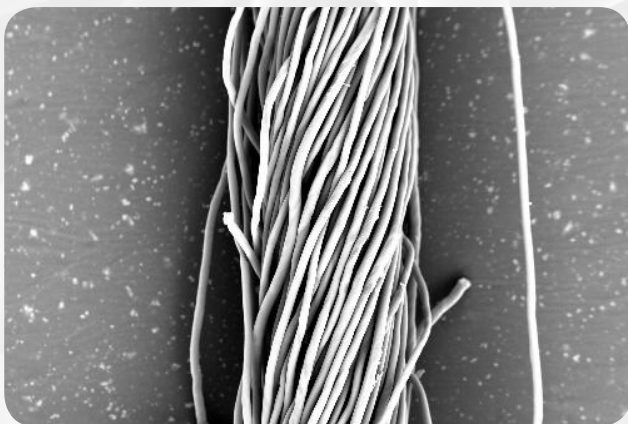


- modeling of the structure and properties of yarns, woven and knitted surface textiles
- modeling of the properties of PET and POP monofilaments, multifilaments and planar textiles made of these
- development of software for predicting and optimizing the properties of yarns and fibers including visualization
- development of textiles with enhanced resistance to mechanical damage
- development of textiles made of shape memory materials
- development of textiles for ionex membranes
- modifications of a ring fine spinning system and development of new yarn types
- analysis of the material unevenness of linear and planar textiles in relation to the technology
- development of laboratory methods and equipment for analysis of nonstandard textile properties
- fragile material processing

## LABORATORIES AND SPECIAL EQUIPMENT

### TEXTILE STRUCTURE LABORATORY

The laboratory is equipped with the image analysis for examining the geometric parameters of textile structures. There were internal standards generated including software for determining the geometric properties of fibers, for measuring the packing density, diameter and hairiness of single and ply yarns, for measuring tips on rotor yarns, inclination of surface fibers, coverage of yarn core, for measuring the mixing quality (mixing index, testing the rate of aggregation of the sequences of fiber components), geometry of fabric binding points including yarn deformation in the binding point and textile porosity. The laboratory is equipped with devices for measuring the diameter, hairiness, material unevenness, yarn abrasion (Uster Tester 4-SX, QQM 3, Zweigle G 552, G 555, G 567), for measuring filaments shrinkage (TST 2 Lenzing), measuring the mechanical properties of textiles, such as tension, compression, shear (Instron 4411, Testometric M350-5CT), ball penetration, cut resistance (Testometric M350-10CT), air burst strength (EC 37), measuring the acoustic dynamic module of fibers and planar textiles (DMT PPM5R Lawson Hemphill). The dynamic and mechanical properties are tested using the multi-functional device (CTT Lawson Hemphill), where besides measuring the material unevenness, number of thin places, thick places, neps, yarn diameter and hairiness, we can also measure the cross section profile of textured



yarn, strength, elongation and shrinkage in dynamic mode, friction properties, abrasion and share of short fibers in abrasion. There is also a prototype of the yarn compression measuring device available.

### SEMI PRODUCTION LABORATORY

The Semi production laboratory is focused on the assurance of production of small parts of conventional and rotor yarns, ribbons, spliced cords, woven and knitted textiles. The machines are modified as required for the production of textiles from special fiber. For spinning, it has a mini-line available for production of conventional yarns that comprises the laboratory carding, drawing and ring spinning machine. The laboratory also has a winding machine and plying machine. It also has the rotor spinning machine available. The woven fabrics are produced using the pattern mini-line from single thread slashing and preparation of the warp single thread to the pattern weaving loom. There is also the Jacquard, needle and ribbon loom. The knitting lab is equipped with weft- and warp-knitting machines. The fabric weave is prepared for the Jacquard loom using the Design Scope pattern software. The knitwork pattern software can also be used.

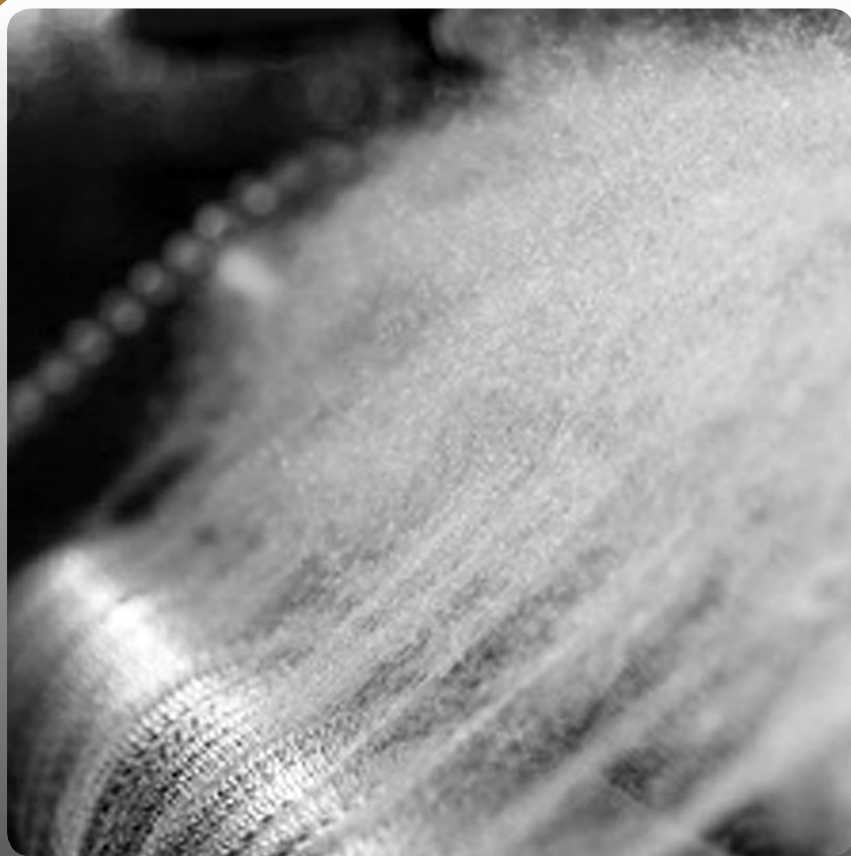




**TECHNICAL UNIVERSITY OF LIBEREC**  
**Faculty of Textile Engineering**



**Department of Nonwovens and  
Nanofibrous Materials**



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## DEPARTMENT OF NONWOVENS AND NANOFIBROUS MATERIALS

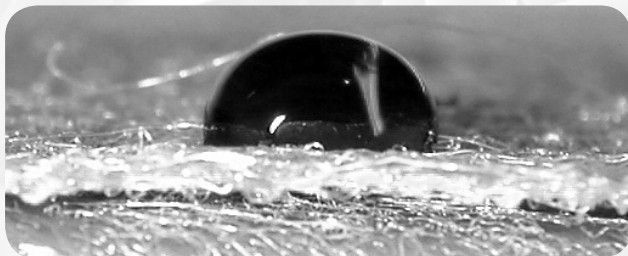
### DEPARTMENT PROFILE

The Department of Nonwovens and Nanofibrous Materials is a unique department of its kind in the Czech Republic and in the world that educates qualified graduates with high education in the area of nonwovens, dealing with the tasks of basic and applied research concurrently in cooperation with Czech and foreign companies.

Since its foundation in 1968, the Department has been focusing on the development of nonwoven and fibers layer production systems, as well as on theoretical material research in the given area. In the last decade, the Department of Nonwovens and Nanofibrous Materials was mainly engaged in research and development of nanofiber materials and nanocomposites for various applications. The nanofiber materials not only have unique filtration and acoustic properties, but they also have a huge potential in bio-medical applications.

### EDUCATIONAL ACTIVITIES

The Department of Nonwovens and Nanofibrous Materials provides education in more than twenty subjects designated for bachelor, master and doctoral students. The subjects are focused on practice so that the students get a picture of the textile product production, applied materials and possible applications, as well as on theory in order to apply the received knowledge of mathematics, physics and chemistry as tools for describing the effects and actions they can experience with textiles or polymer materials. The Department of Nonwovens and



Nanofibrous Materials is a guarantor of the Nonwovens specialization and Technical Textiles branch.

The Department of Nonwovens and Nanofibrous Materials offers training and professional consultancy in the following areas:

- nonwovens
- polymers and polymer bonding agents
- spunbond, meltblown technologies
- electrostatic spinning
- textiles for the automotive industry
- textile material recycling
- filtration
- nanofibrous materials



## RESEARCH ACTIVITIES

The main Research and Development directions can be split to Nanofibers and nanomaterials: in this area, we solve practical and theoretical problems of electrostatic spinning and the preparation of nanofiber layers. The main directions include: preparation of polymers, copolymers and polymer compounds, development of texture carriers, production of nanofiber yarns with defined number of twists, preparation of carbon nanofibers, production of thin composite materials reinforced with nanofibers, production of bi-component nanofibers, basic physical description and simulation of electrostatic spinning. A separate area is represented by the design and production of mechanical, electronic equipment, lines and elements.



**Nonwovens:** this area is focused on searching for new methods of nonwoven production and derived products, as well as the possibilities of utilizing the existing technologies for new applications. The most significant areas include development of mattresses for long-laying patients, recycled textile materials, development of sandwiches resistant to high temperatures and special filters for highly clean operations, as well as for special applications or description of capillary effects using simulations.

## LABORATORIES AND SPECIAL EQUIPMENT

The laboratories are equipped with devices for electrostatic spinning applying various principles, e.g. (i) capillary, (ii) coaxial or (iii) needle-free – the Nanospider method. The optional accessories enable spinning of a wide range of polymer and inorganic solutions.

### ELECTRON AND OPTICAL MICROSCOPY LABORATORY

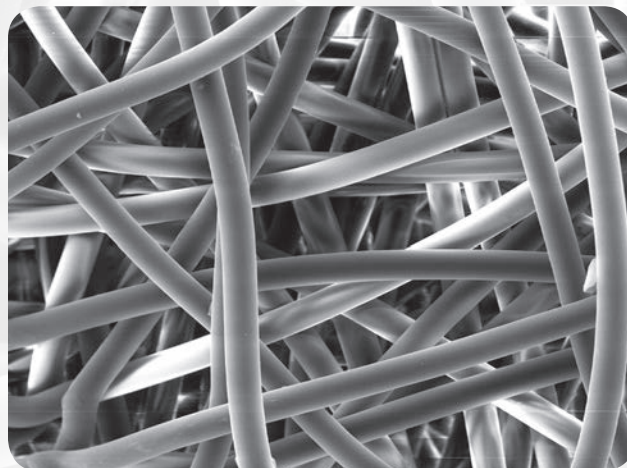
To receive images at high zoom, we use the Phenom environmental scanning electron microscope. As compared with the standard electron microscopes, its advantage is the fast obtaining of an image without the need of using conductive, resp. gold-powdered samples. The laboratory is also equipped with a Nikon, Eclipse line, optical microscope with digital image output. The equipment has the image NIS elements analysis.

### **FILTRATION PROPERTIES LABORATORY**

The laboratory is equipped with devices for determining the filtration properties in liquid filtration and air product filtration processes. Testing can be done with synthetic powder, aerosol, oil mist, water or oil.

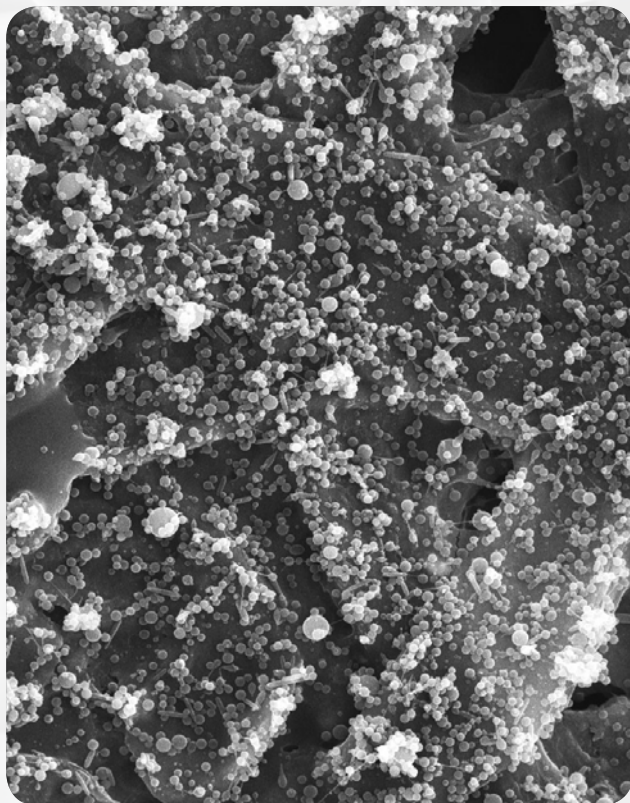
### **MECHANICAL PROPERTIES LABORATORY**

The laboratory is equipped with universal testing devices and specially designed accessories and frames for determining the multi-axial stress of planar and bulky textiles. The laboratory can carry out most of the static and quasistatic tests of textile and composite materials including plastics.



### **SEMI PRODUCTION LABORATORY**

The equipment installed in the Semi production laboratory covers a significant part of the nonwovens production technologies. The mechanical method can prepare fiber layers, which can be reinforced in a thermal, chemical or mechanical way. The complete lines include production of needle punched textiles, production of perpendicularly laid and thermal bonded textiles and the pilot line Desktop unit for the meltblown technology.







**TECHNICAL UNIVERSITY OF LIBEREC**  
**Faculty of Textile Engineering**



## Department of Clothing Technologies



## Department of Clothing Technologies

### DEPARTMENT PROFILE

The Clothing Department is a department providing education in the area of clothing and ready-made clothing production involving the entire technological process of clothing production and technical ready-made clothing production, starting from preparation of production, the partitioning and assembling process, ironing, and shaping including making-up. In addition, the graduates of the magisterial study learn the theoretical principles of these processes in detail. In the doctoral studies, the students preferentially deal with clothing comfort, heat-insulation properties, the utility properties of clothing and clothing materials, somatometry and development in the parametric design of clothing patterning.

### EDUCATIONAL ACTIVITIES

The Clothing Department provides education in the area of clothing technology and clothing production management.

The study is focused on the deepening of the general disciplines of clothing production and design. It supports problem-solving in a complex way from the product design to its realization in the



technological production process with support of deepening the knowledge of clothing materials.

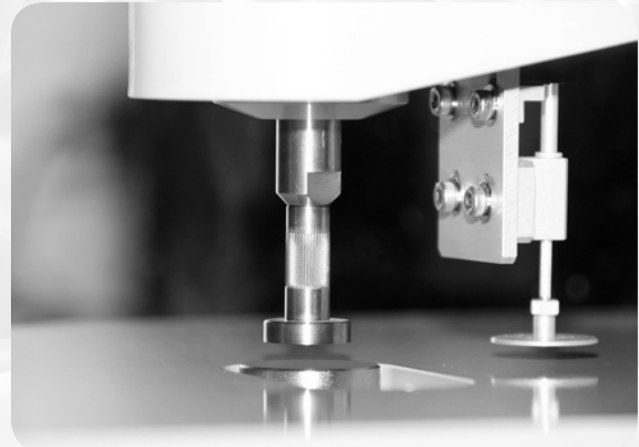
The structure of all subjects in the bachelor and master study has been adapted to this, of which we shall note the following subjects: Technical Preparation of Production, Clothing Design, Clothing Production Machinery and Equipment, Theoretical Principles of Clothing Machinery, which is a subject making the students familiar with the basics of the sewing process, also looks at unconventional assembling methods. The modern production methods are presented in the Apparel Production Automation subject, where the student is made familiar with the practical applications of automation and robotization in clothing production, being taught the special technologies and measurement in the Special Technologies and Measurement in Clothing Production subject. The subjects also include Computer-Aided Designing and Computer Simulation of Clothing Production.





## RESEARCH ACTIVITIES

- Development of methods for textile and clothing comfort evaluation including evaluation of transport effects in flowing air in an aerodynamic tunnel
- Development in the area of textile sensors, conducting paths and sensors suitable for use in textiles and clothing
- Application of temperature fields measurements using thermovision equipment for evaluation of the physiological comfort of Hi-tech sport and working clothes
- Development of special medical clothes for laying patients, or those with impaired mobility while respecting easy access to treatment, physiological comfort or monitoring of physical vital signs in application of temperature, pulse and humidity sensors directly in the clothes



- Dynamic effect analysis in seam creation and deformation of sewing threads with the utilization of a high-speed camera.
- Evaluation of the utility properties of clothing materials – drape, air permeability
- Somatometric investigation of the Czech population; prediction of the design dimensions of clothing patterning; parametric design development.

## LABORATORIES AND SPECIAL EQUIPMENT

The Clothing Department has a number of laboratories equipped with special measuring devices for textile evaluation. Measurement is done in compliance with the applicable standards in fully air-conditioned laboratories. The laboratories specialize in objective evaluation of physiological and hygienic properties of clothing materials, mainly in terms of the clothing comfort, hand, abrasion, pilling, snagging testing, air, moisture, water and heat permeability. In the laboratories, we can complexly evaluate the mechanical properties, color fastness and other special properties of planar textiles, such as the flame retardancy of textiles and clothes.

The laboratories have modern systems for production automation with the Festo training system with pneumatic and hydraulic elements,

and special equipment for image processing using image analysis. The Clothing Department also owns a number of special devices for alternative measurement and processes analysis. These devices, for instance, include thermovision and a high-speed camera, measuring pressure mat and Micro-CT. Another unique device is the aerodynamic tunnel for the evaluation of heat transfers in flowing air.

The Clothing Department is equipped with some state-of-the-art devices, such as the I-speed3 high-speed camera for monitoring the sewing process creation, an FLIR thermo-camera for evaluating the physiological comfort of clothes. The laboratories are also equipped for unconventional methods of



clothing material bonding.

The Clothing Department takes part in the projects of FRVŠ, the ESF, grants, and projects with the Textile Center and gets involved in solving specific research in the area of conducting path creation for “smart” clothes with the students. Patents have been granted for these methods – conducting path sewing.



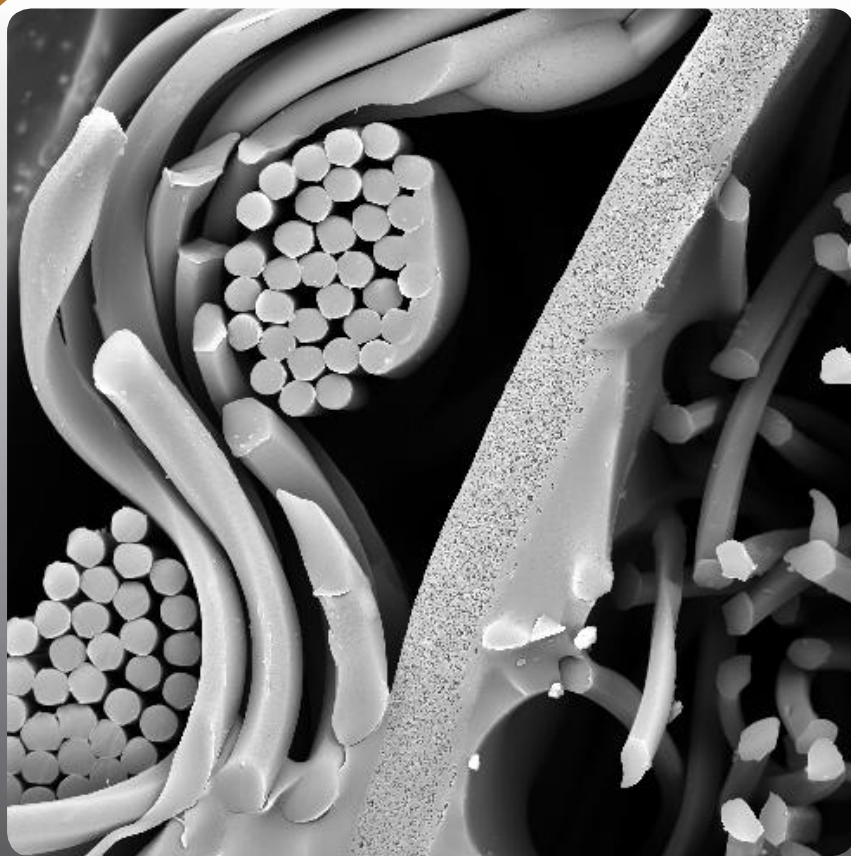




**TECHNICAL UNIVERSITY OF LIBEREC**  
**Faculty of Textile Engineering**



## Department of Material Engineering



## DEPARTMENT OF MATERIAL ENGINEERING

### DEPARTMENT PROFILE

In its research and education work, the Department of Material Engineering focuses on the area of textile and special fibers (structure, properties, use), textile metrology (textile properties measurement principles, analysis of results, prediction model construction, surface analysis), composites with textile reinforcement (geometric structure, thermal and mechanical properties, special inorganic fibers), experimental data treatment (univariate and multivariate exploratory data analysis, calibration, regression) and textile quality control (utility value, hand, appearance, surface properties). Department further specializes in the chemical technologies of textile finishing, the production and development of SMART textile materials, advanced colorimetry, environmental aspects of textile production, and last but not least, utilization of historical methods of textile production and maintenance.



### EDUCATIONAL ACTIVITIES

The Department employees provide education in subjects for bachelor study, full time and part time master study, and post-graduate study. The subjects focus on theory, as well as practice with laboratory practicing.

The individual subjects mainly cover the following areas of study: textile and specialty fibers, composite materials, textile testing, experimental data treatment, programming in MATLAB, quality evaluation, textile chemistry, treatment and pre-treatment, dyeing, printing, finishing, coloristic and textile maintenance. For some other specializations of the study branch or doctoral studies, we lecture subjects in the area of textile fiber application, textile testing, textile history, information technology utilization and selected mathematical modeling methods, chemical aspects of textile treatment, sorption processes and applied optics – colorimetry. Most subjects are lectured in parallel in the Czech and English languages.

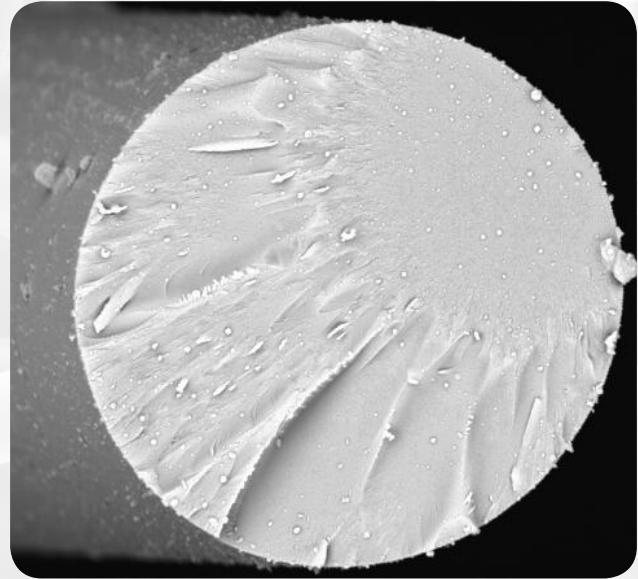
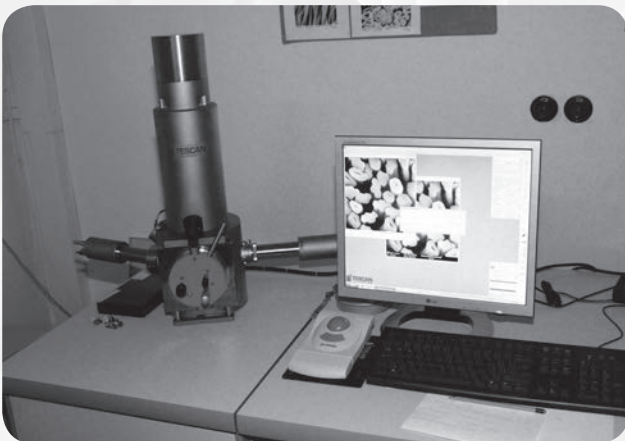
### RESEARCH ACTIVITIES

The research activities of the Department are derived from the research specialization of the individual employees. It is partly financed from grants and industrial projects. Some general issues are solved only with the use of the Department funds. Our effort is to complete solution of partial stages always with a publication. According to the long-term orientation of the Department research activities and with respect to the currently solved research projects, the individual research directions are split to the following groups:

- special fibers and materials (with specialization in basalt fibers and examination of their ultimate mechanical properties, side illuminating optical fibers, fibers with enhanced electrical conductivity, metallic fibers with shape memory and carbon nano-powders)



- evaluation of textiles hand (with specialization in objective procedures of hand prediction and calibration model creation)
- composites on the basis of carbon and basalt fibers (with specialization in examining the textile component properties and selected thermal and mechanical properties)
- microscopy and image analysis application (with specialization in procedures suitable for textile structure analysis, textile surfaces and evaluation of surface evenness).
- thermomechanical analysis (with specialization in development of methods of investigation of combined thermal and mechanical field's exposition of textile structures)
- quality management (with specialization in complex quality evaluation and nontraditional computer-oriented procedures)
- experimental data treatment (with specialization in modeling and specific textile induced problems)
- development of active safety textiles with fiber-optics
- development of textiles resistant to electromagnetic radiation



- theoretical application studies of dyeing and printing of natural and synthetic fibers, textile pretreatment and finishing, functional dye testing, chemical-textile analyses of textile materials, dyes and auxiliary materials, as well as on the environmental aspects of all textile production and maintenance technologies.
- development of textile material structure components (optical-fiber materials, smart structures, encapsulation, use of PCM in textile structures, etc.).
- application of nanolayers and nanoelements in textile structures
- in the area of colorimetry, the research is focused on the theoretical aspects of evaluation of color differences under various conditions of lighting and observing.
- development of textile sensorial systems for identification of hazardous radiations, gases and chemicals.

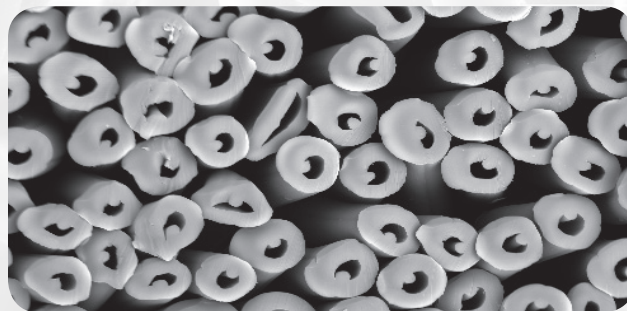
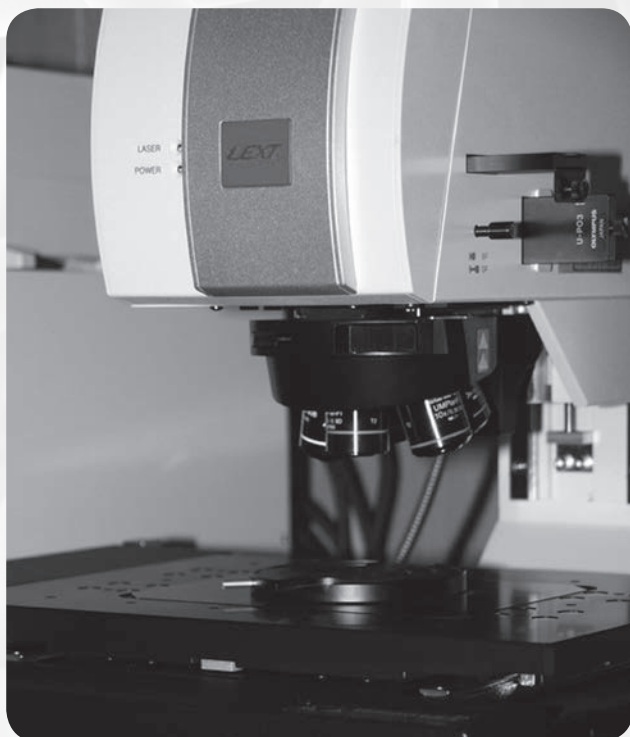
## LABORATORIES AND SPECIAL EQUIPMENT

### TEXTILE TESTING LABORATORIES

The laboratories are equipped with standard devices for measuring the properties of fibers, yarns and planar textiles. It has the image analysis systems available, along with microscopes and special equipment for surface structure reconstruction from a series of virtual profiles.

### LABORATORY FOR EVALUATION OF ELECTRICAL PROPERTIES OF TEXTILES

The laboratory is equipped with devices for electrical resistance measurement in surface and volume. Equipment with circular electrodes has been designed for measurement of electrical resistance anisotropy of surface textiles.



### MICROSCOPY AND IMAGE ANALYSIS LABORATORY

The laboratory is equipped with a number of microscopes associated usually with the image analysis system. Besides standard optical microscopes, it also has the electron scanning microscope, laser confocal microscope and environmental scanning microscope available.

### LABORATORY FOR MEASUREMENT OF THERMAL AND THERMOMECHANICAL PROPERTIES OF TEXTILES

The laboratory is equipped with devices for thermal, thermomechanical and dynamic mechanical analysis of textiles.

### LABORATORY FOR MEASUREMENT OF ANTIBACTERIAL PROPERTIES OF TEXTILES

The laboratory is equipped with devices for bacteria incubation and completion of various tests for evaluating the bacteriostatic and bactericidal effects.

### CHEMICAL LABORATORIES

The laboratories are equipped with the following state-of-the-art equipment: unique LCAMSPEFO 2 and Shimadzu UV 3101 PC spectrophotometers, spectrofluorimeter, microspectrophotometer, BÜCHI B-290 Spray Dryer, plasma generator, ultrasonic and microwave textile treatment equipment, particle size analyzer, laser emission spectroscopy, laser for textile modification. It also possesses several special devices: Zimmer printing table with magnetic blade, Mathis AG and BC 27 laboratory padder equipment.





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**Faculty of Textile Engineering**



## Department of Design



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## DEPARTMENT OF DESIGN

### DEPARTMENT PROFILE

The Department is a creative workplace that guarantees education in Textile and Fashion Designing. The study concept is based on creative activity associated with searching for new methods for the visual processing of materials and nontraditional realization of products. Since the beginning of the visual study, the student is guided to produce designs in certain textile and fashion technologies, glass technologies, jewel-related technologies, or interior accessories. This concept is rare with respect to the technological facilities for designing at universities of a similar character. In its own creative work, the Department searches for new modern tools and methods of decorating and utilizing material structures in the process of product design. The Department activities are also focused on exhibiting activities; a part of the Department is the Gallery N in Jablonec nad Nisou.

### HISTORY AND PRESENCE

After 1989 we witnessed fast lifestyle changes also associated with the market being flooded with commodities from abroad. The textile products, whether clothes, fashion accessories or soft furnishings, became assortment for expressing a person's personality, lifestyle or



working image. Our producers finally started to realize not only the need for a different view of assortment offer creation (besides quality and a precise fabrication, they also need to offer originality, style and novel visual effects of fashion or traditional textiles), but also the lack of specialists in this field with high education. The Faculty of Textile Engineering started with the idea of educating designers – specialists in 1991. This resulted in proposal of a new study direction – Textile and Fashion Design branch, at the birth of which were Doc. Ing. Otakar Kunz, CSc. (the Dean of the Faculty of Textile Engineering at that time), Prof. Ing. Radko Kovář, CSc. (Head of the Knitting Department at that time) and the study guarantor Prof. Bohdan Mrázek from the Applied Arts College of Prague. The branch passed more development changes, which can be summarized in the following phases:



- October 1992 – start of the 1st year of the Bachelor study of Textile and Fashion Design under the guarantee of the Knitting Department (Head of Department Prof. Ing. Radko Kovář, CSc.), academic painter Svatoslav Krotký became the guarantor of the arts education
- 1994 – the Knitting Department led by Ing. Renata Štorová, CSc.
- 1995 – new Department of Textile and Fashion Design is found, Head of Department was academic painter Svatoslav Krotký
- from 1997 till now – the Department of Textile and Fashion Design (present name is the Design Department) is led by Ing. Renata Štorová, CSc., the arts education guarantor is academic painter Doc. Svatoslav Krotký
- 2000 – the Department was relocated to new facilities in the



Harcov location.

- 2002 – the Textile and Fashion Design expanded with glass and jewel design (original name was Fashion and Interior Accessories Design); education is concentrated in a detached facility in Jablonec nad Nisou
- 2006 – study focused on “Textile and Fashion Design 2” opened in Jihlava
- during the 18-year existence of the branch the innovative changes and expansion of the offer of studies into the present shape appeared

## EDUCATIONAL ACTIVITIES

- the study concept is based on comprehensive art education, whereas the studio art education is focused on design and making products of the given technology
- the studio structure includes art subjects (Drawing, Painting, Studio Works, etc.), specialized technological subjects (fabric pattern weaves, Fashion Design and Modeling, Glasswork and Jewellery Expertise, etc.) and subjects of further theoretical base (History of

Culture, Theory of Colors, Cultural History, Computer Design, etc.)

- students' creativity development is guided in connection with searching for new directions in material processing in design
- we emphasize realization of students' projects in textile technologies (weaving, printing, knitting), fashion, jewellery and glasswork shops
- the study is innovated with respect to the present needs of designing
- support of computer assisted design in education to expand possibilities of appraising students' ideas, establishment of the PC design labs
- the Department has extensive technological facilities, i.e. clothing



lab embroidery technique, weaving, knitting, printing lab, digital printing on textile and paper, glass engraving lab, glass cutting lab, jewellery shop, pattern shop, drawing labs, studios

## OTHER ACTIVITIES

- support of the technical and technological facilities standard for design realization,
- presentation of students' works in domestic and foreign exhibitions and contests,
- support of students' foreign mobility,
- participation of students in Czech and foreign workshops,
- activity of own Gallery N in Jablonec nad Nisou.

## LABORATORIES AND SPECIAL EQUIPMENT

Besides standard technological equipment, the Department has, for instance, a MIMAKI TX 1600S digital printer, TAJIMA TEJT II-C1501 embroidery machine, AVL Looms electric loom jacquard for practical training and realization output from the studio work.

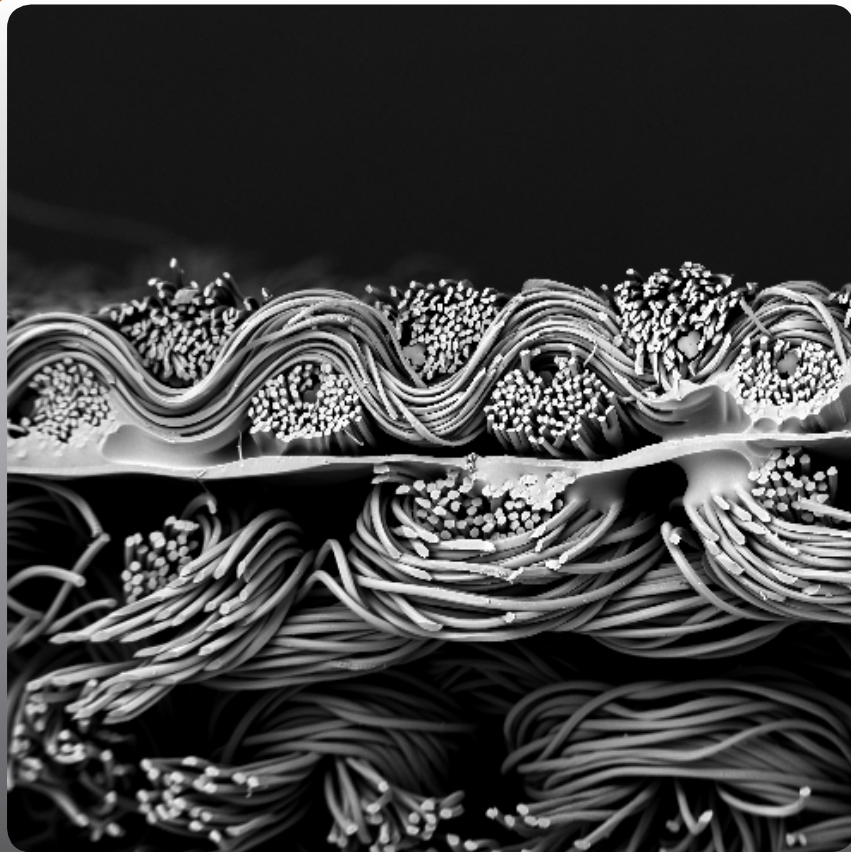




**TECHNICAL UNIVERSITY OF LIBEREC**  
**Faculty of Textile Engineering**



## **Department of Textile Evaluation**



## DEPARTMENT OF TEXTILE EVALUATION

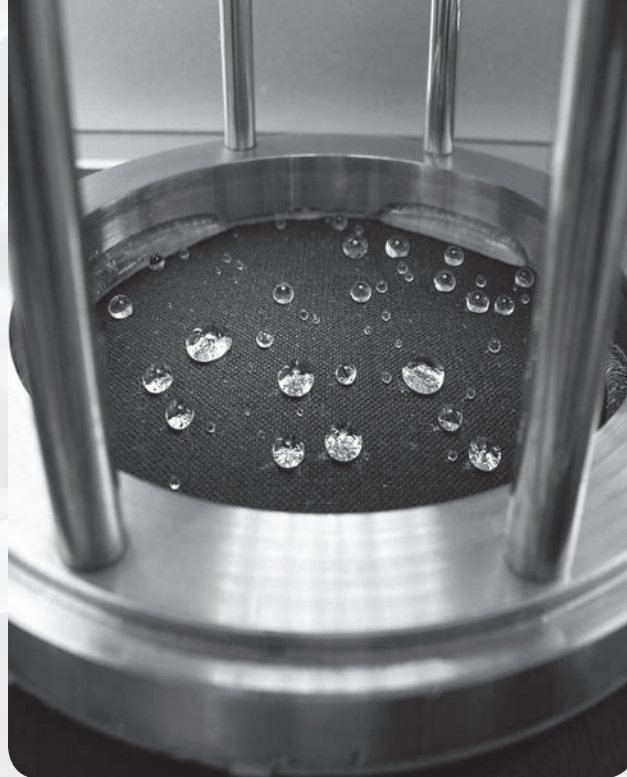
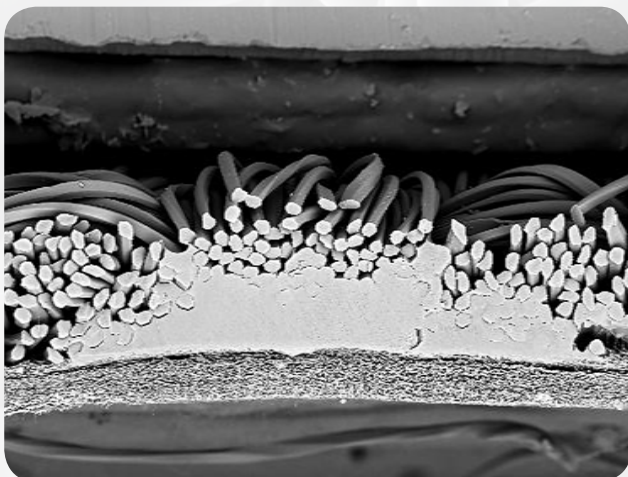
### DEPARTMENT PROFILE

The Textiles Evaluation Department is focused on high education of textile marketing specialists that uniquely combine the marketing education with knowledge of textiles and industrial management, where the graduates receive education in the area of new product development and quality management.

The department currently concentrates on development of measuring equipment for evaluation of comfort and automatic defect detection.

### EDUCATIONAL ACTIVITIES

The Textile Evaluation Department guarantees the study of more than 20 subjects designated for bachelor, master and doctoral students. The subjects of the bachelor study have rather a practical focus, when the students learn the complex approach to the textiles evaluation. They are made familiar with the comfort of textiles, mainly with the essence of heat and humidity transport, thus learning to understand in comprehensive context not only how the textile behaves but also why. In terms of marketing, they learn the market survey principles. They are also made familiar with the required documentation and



basics of dealing with business partners. After graduation, the students can assume positions as textile marketing specialists with knowledge of at least one world language. The students also receive the knowledge for conducting own business – eventually establishment of textile trade or an advertising company. In the master studies, the students are made familiar with quality control and management. They learn to analyze data, learn quality planning principles from the product design to final inspection. The Department thus ensures complex preparation of the students for positions of project managers or quality control and quality assurance managers.

The Textiles Evaluation Department offers training and professional consultancy in the following areas:

- textile evaluation,
- textile business,
- data analysis,
- textile comfort.



## RESEARCH ACTIVITIES

The main scientific and research activities of the Department are focused on:

- development of new methods and devices for comfort evaluation – development is focused on transport effects in the area of heat and moisture transport in textiles
- hand evaluation and prediction – development is focused on creating procedures for subjective evaluation of hand and hand prediction with utilization of ordinal logistics regression
- evaluation of textile utility properties – flexural rigidity, drape, air permeability, surface roughness – examining the mechanical and



physical properties of textiles in connection to their structure: will monitor The dynamics of air permeability changes in dependence on the maintenance process and possible prediction and projecting of utility properties is investigated. The surface analysis is focused on the evaluation of the influence of fabric construction

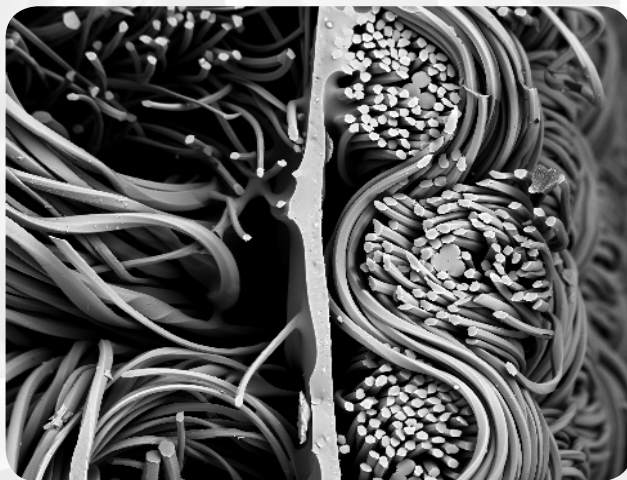
- optimization of textile maintenance in terms of lifetime – proposal of the optimum maintenance procedures in terms of functionality preservation
- automatic detection of defects in textiles – research is focused on constructing an device enabling automatic detection of nonconformities in planar textiles in the full width
- textile evaluation
- modeling of transport effects in porous materials – research is focused on study and creation of models of transport effects in nano porous materials using computer simulation
- development of new textile structures with higher comfort
- analysis of composite structure properties (composites, layered textiles) – the research in this area is focused on the study of geometry and mechanical properties of composite materials with textile reinforcement, composition of heterogeneous structures

by multilevel modeling, influence of the internal structure and interaction of components on properties of the whole composite, prediction of properties applying the finite element method, simulation of composite materials with textile reinforcement in 2D and 3D images with inherent defects, analysis of heterogeneous structures properties (composites, sandwich materials)

## LABORATORY AND SPECIAL EQUIPMENT

Olympus BX51 microscope with the possibility to observe textile fibers, linear and planar structures in passing and/or incident light and eventually studying their fluorescence.

Miele Professional maintenance system consisting of an industrial washing machine, drier, exhaust ironing table and mangle for



complete servicing of household and industrial data maintenance. The washing machine is fully computer-programmable as required including the precise dosing of gel detergents, selecting the number of pre-washes, main washes and rinsing, as well as automatic cycle repetition. It enables to observe any change of properties after the textile treatment.

Hydrostatic pressure or water column value measured by an SDL Atlas Hydrostatic Head Tester. The material resistance against penetration of water under the pressure is characterized by the water column height. The examples tested so far include membranes for fire-fighters' uniforms, under-roof foils for the building industry, membrane and conventional materials for sport clothing, new textiles with nano fibers for filtration.

Set of devices developed in the Textiles Evaluation Department for evaluation of heat (Alambeta) and humidity (Permetest)







**TECHNICAL UNIVERSITY OF LIBEREC**  
**Faculty of Textile Engineering**

## **Internationalisation**



## INTERNATIONALISATION

The activities of international co-operation are as old as the faculty. The faculty is responsible for overall activities of the international students at all levels (BSc, MSc and PhD).

Apart from the regular courses, the faculty organizes short term courses for participants of various countries. It also organizes seminars and expert lectures by the faculty members of the university in various locations of the world.

### MSC PROGRAMME

Since 2008, the faculty started fulltime MS course in English for international students. The students are from South Africa, India, Pakistan, Turkey and other countries.

### PHD PROGRAMME

The faculty has produced lot of international PhD graduates since the 1970's. Many students from Egypt, India, Thailand, Turkey, Pakistan, Vietnam, Bangladesh, China, Sudan have earned their PhD from the faculty. Currently there are a lot of international PhD students pursuing their studies and research in various departments of the faculty.

### SHORT-TERM COURSES

The faculty organizes short term courses for professionals workers



in industry, research organizations and academic institutions. Each programme is tailor made taking into consideration the professional background of the participants and their countries of origin. Many such courses were organized for participants from South Africa, India, Mauritius, Thailand etc.

### PROFESSIONAL SEMINARS

In order to address to current issues in technology and to bring the modern technology to a greater mass from the industry, various technical seminars are organized in different countries by the faculty members of our university. In the past several such seminars were organized in South African cities like Durban, Cape Town, Johannesburg, Ladysmith etc. Also seminars are planned for rural and small scale industries. Seminars were also organized in India, Pakistan, Egypt, Thailand, Mauritius and other countries.

### MEMORANDUM OF UNDERSTANDING (MOU)

The faculty also organizes for signing and execution of agreements with other universities in the world for mutual cooperation in scientific education and research. Many such agreements have been established between TUL and universities like Durban University of Technology (South Africa), Indian Institute of Technology (Delhi), Wuhan Textile University (China), Rajamngala University of Technology (Thailand), Pakistan Textile University (Faisalabad),



Faculty of Textile Science and Technology, Shinshu University (Japan), National Research Institute, Giza (Egypt), Bahir Dar University Institute of Technology for Textile, Garment and Fashion Design (Ethiopia), The University of Alabama at Birmingham (USA) etc.

## OTHER ACTIVITIES

The faculty organizes summer internship, short-term visits for students and faculty, joint projects, lectures by visiting professors under these agreements.

## INTERNATIONAL STUDENTS

Only students with accepted previous foreign education can enter the study. Completed and proved secondary education can be accepted into Bc. programmes with nostrificative appendix of high-school diploma which is provided by local authorities. Certificate of equality of university education which is provided by the Czech university is necessary for the higher levels programmes.

In close cooperation with the Institute for Language and Preparatory Studies of the Charles University in Prague, we offer a one-year

preparatory course. As well as intensive Czech language lessons they will be thought technical subjects on the university grounds by lecturers and professors. Students will learn the whole system of Czech grammar, a relevant amount of vocabulary and syntax structure. Students will be also introduced to geography, history, political and cultural affairs of the Czech Republic.

## GENERAL REQUIREMENTS

The General requirements for admission of foreign students are as follows:

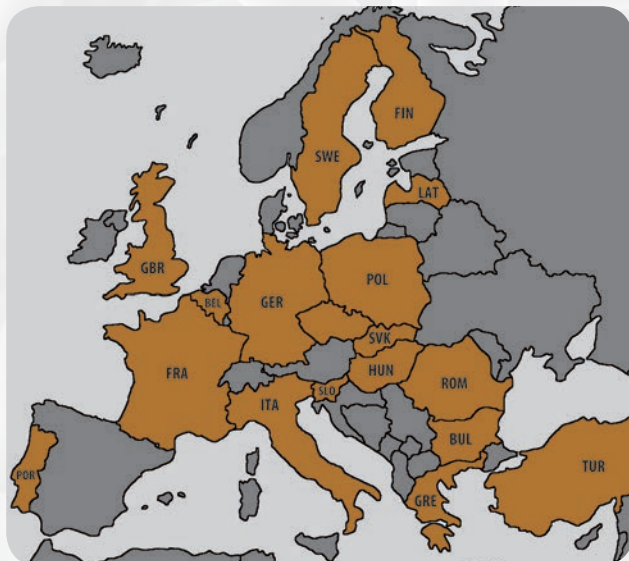
- photocopied Secondary School Certificate or any other equivalent of a school-leaving or qualification certificate recognized by the University
- photocopied passport pages with student's photograph
- Health Certificate
- brief Curriculum Vitae
- photocopied documents confirming all student's qualifications or degrees

All documents are required in English. If they are written in any other language they must be translated into Czech and verified.

The documents must be delivered to the University at least three weeks before the entrance examination (usually the end of May).

## TUITION FEES

1. The conditions for foreign students taking courses in Czech language are the same as for Czech students and no tuition fee is required.
2. Foreign students taking courses in English language pay tuition fees that vary according to the faculty and the chosen course. Tuition fees for one academic year are approx. 4 000 USD. Accommodation and catering services are not included.
3. Within certain projects foreign students can choose subjects taught in Czech and in English. The tuition fees are then specified by special regulations.



## HEALTH INSURANCE

After their arrival to the Czech Republic, international students must be examined by a Czech physician to prove their ability to study in the Czech Republic. All foreign students are required to have health insurance either with an insurance company in their home country or with the General Health Insurance Company in the Czech Republic (at the cost of approx. USD 50 monthly). This insurance covers all standard treatment.

## VISA

A valid passport and a long-term visa are essential for all international students. They can apply for their student visa at the relevant Czech Embassy or Consulate in their home country. It is advisable to apply for the visa well in advance because the processing time is approximately nine weeks from the date of submitting the application form.

## DOCUMENTS NEEDED TO GET A VISA

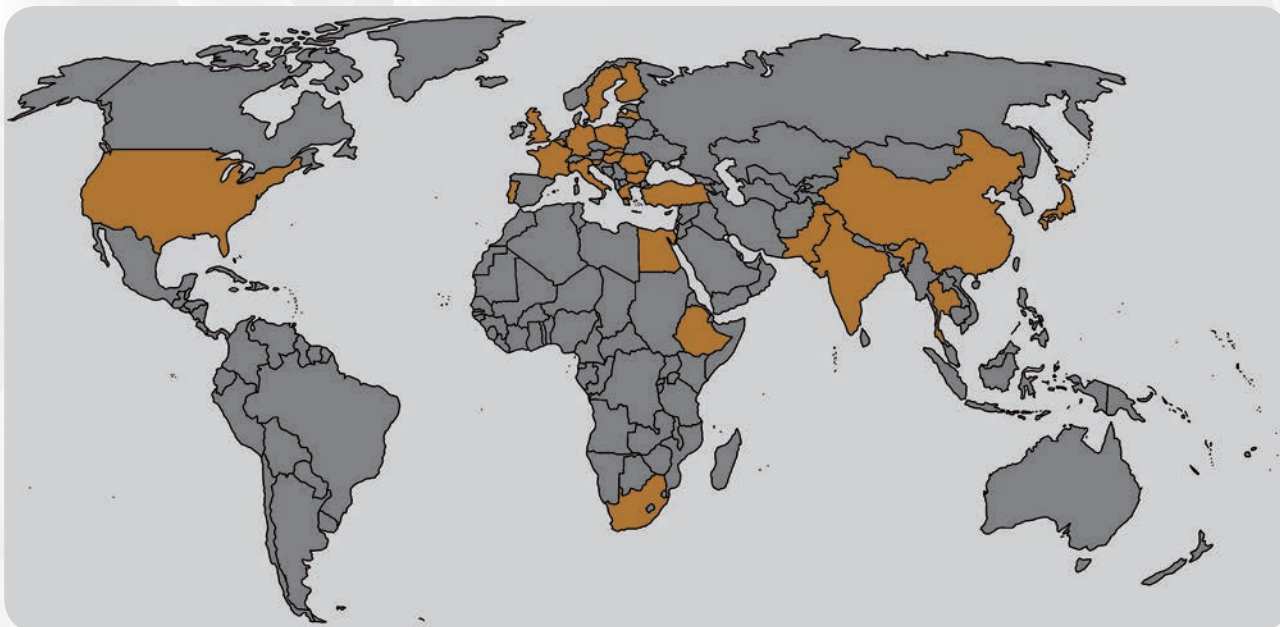
Documents needed when applying for a stay longer than 90 days:

- Letter of Acceptance (supplied by Technical University)
- Financial statement to confirm sufficient funds for a study period in the Czech Republic
- Confirmation of guaranteed accommodation in the Czech Republic
- three photographs
- health insurance and birth certificate
- Confirmation of absence of a criminal record in the home country (must be translated into Czech and notarized)
- Application Form for a report from the Czech criminal record register confirming that the applicant has no criminal record in the Czech Republic (available at all Embassies or Consulates).

## VERY IMPORTANT INFORMATION

Up to 3 days after your coming to Liberec, it is necessary to go to Liberec foreign police for stamp of registration of your stay here.

Contact: [hana.musilova@tul.cz](mailto:hana.musilova@tul.cz)



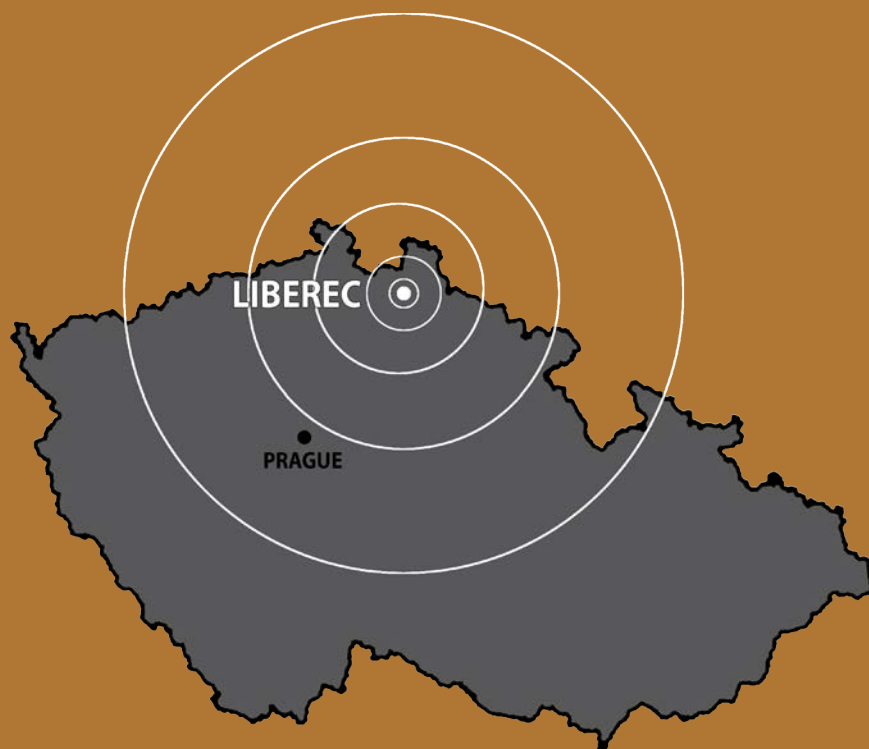




**TECHNICAL UNIVERSITY OF LIBEREC**  
**Faculty of Textile Engineering**



## Technical University of Liberec



[ft.tul.cz](http://ft.tul.cz)

## TECHNICAL UNIVERSITY OF LIBEREC

The Engineering University was founded in Liberec in 1953. Today, the Technical University consists of six faculties and two institutes. Currently, TUL offers a wide range of degree programs and connects technical education with humanities.

### FACULTIES AND UNIVERSITY INSTITUTES

- FACULTY OF MECHANICAL ENGINEERING
- FACULTY OF TEXTILE ENGINEERING
- FACULTY OF SCIENCE, HUMANITIES AND EDUCATION
- FACULTY OF ECONOMICS
- FACULTY OF ARTS AND ARCHITECTURE
- FACULTY OF MECHATRONICS, INFORMATICS AND INTERDISCIPLINARY ENGINEERING STUDIES
- INSTITUTE OF HEALTH STUDIES
- INSTITUTE FOR NANOMATERIALS, ADVANCED TECHNOLOGIES AND INNOVATIONS

### ACADEMIC YEAR

The Academic year is divided into two terms (semesters); the winter and the summer term. Each includes approx. 14 weeks of courses and 5 weeks of examinations.

Winter term: October - February

Summer term: March - June

The months given above are approximate. Exact dates may slightly differ. Vacations are in July, August and September.

### DEGREE SCHEMES

1. The University offers Bachelor courses leading to the degree of Bc. equivalent to B. Sc. or B.A. (in Czech called „bakalář“). The studies are more practical than other courses provided by the University. Bachelor studies are concluded by the Final State Examination, part of which is the bachelor thesis defence. Standard duration of regular daily studies is three or four years.



2. Another type of courses offered by the University are courses leading to the degree of Master, equivalent to M.Sc. or M.A. (in Czech Mgr. - „magistr“ or „inženýr“). Some Bachelor degree programmes are designed as the first stage of the Master degree programme which may follow. This allows students to make career decisions while still studying. They can either graduate as Bachelors or continue and obtain a Master degree. Other students enter Master programmes from the very beginning. Master studies are more theoretical and after five or six years of regular daily studies they are concluded by the Final State Examination and the diploma thesis defence.
3. The University offers also postgraduate Doctoral courses leading to the degree of Ph.D. (in Czech „doktor“). These are completed by the State Doctoral Examination and doctoral thesis defence. Standard duration of doctoral studies is three years.

### DISTANCE EDUCATION

The University also provides various types of distance education for charge through the Distance Education Service. Courses for trainers of manual workers, for graduates from secondary schools of pedagogy or teachers and workers in educational institutions and courses focused on marketing are offered. A special counselling centre for disabled people was founded as part of the Distance Education Service.



## ASSESSMENT

Study assessment comprises mid-term, end-of-term and other tests, credits, classified credits and oral examinations.

At present, two systems are used for assessment of students:

1. the European Credit Transfer System (ECTS) which was developed by the Commission of the EU in order to provide common procedures to guarantee academic recognition of students abroad. The students must acquire a certain number of credits every academic year. In the ECTS, 60 credits represent the workload of an academic year of study.
2. a scale of grades from 1 to 4 (1 - excellent = „A“, 1,5 - excellent minus = „B“, 2 - very good = „C“, 2,5 - very good minus = „D“, 3 - good = „E“, 4 - failed/unsatisfactory = „F“)

## COMMUNICATION SERVICE

In 1993, the LIANE (Liberec Academical Network) was launched to provide communication services within the University, all over the Czech Republic and throughout the world. The network is connected through CESNET and INTERNET. It ensures the connection of all computers in University campuses, administration buildings and Halls of Residence and is widely used both by University employees and students. For more information see <http://www.tul.cz/liane>



## LIBRARY

The Library of the Technical University of Liberec was established in 1953. The library includes a lecture hall used for conferences, seminars, meetings of scientific and academic councils and for expositions as well. Displayed sources are available. There are books in English, German and French language within separate sections. Dictionaries and other reference books are at disposition as well. Students also dispose of modern study rooms, magazines and graduation theses study rooms. A simple library resources search system allows the use of PC and on-line catalogues. Also, the Library web page displays access to allocated databases, UKN fund search and, at the same time, presents the latest additions to the library resource fund. (<http://knihovna.tul.cz/en/>)

## ACCOMMODATION

The Technical University in Liberec disposes of an accommodation

capacity of more than 3 500 beds, available in the University Halls of Residence in Harcov. The students live in Harcov Residence Halls, in units of two to three double-rooms with shared conveniences in each unit. Students appreciate, among others, high-speed internet connection in each room that is included in accommodation cost. They like the possibility of free parking in the residence premises and the proximity of the University Sports Centre.

In the residence areas, there are refectories and several university clubs. Many sports and cultural leisure activities are available in the neighbourhood of Harcov, as the cultural hall Lidové Sady, the Zoo, and the botanical garden. Another advantage is a good transport connection to the centre of Liberec.

## BOARDING

The Technical University of Liberec provides within its premises quality boarding to its students and employees. At the present the university



disposes of four catering establishments.

Meals are ordered through internet or directly in the catering facility. Every day menu offers the choice between five different meals, including one without meat. In the evening and at weekends, the choice is between two meals. The cost of a meal includes a soup, the main dish and tea. At lunch, there is an additional choice of salads and complementing selling of desserts, sandwiches and beverage.

The Technical University of Liberec is permanently improving its boarding services. In two of its catering establishments, it now offers, during week days, the possibility of choosing from a menu of quick meals, without preliminary ordering.

Apart from cooking and distributing food TUL refectories ensure also catering for social events held at the university.

## SPORTS

The Technical University of Liberec offers its students a large range of sporting activities, not only in the frame of compulsory physical education, but also as an optional activity or a hobby. Students have the possibility to spend their free time in TUL Sports Centre near Harcov Residence Halls. TUL Sports Centre includes two large gyms, an artificial mountain-climbing wall, a mirror hall for spinning and aerobics, fitness, sauna with physiotherapy and a table-tennis playroom. TUL outdoors sports complex consists of a football pitch, a beach volleyball court and tennis courts.

But sporting is not restricted to TUL Sports Centre. Comparing with students in other universities, students in Liberec have one more major privilege which is nature in the surroundings of Liberec, providing an exquisite terrain for winter and summer sports. TUL exploits this advantage, as well.

Another possibility for TUL students is to participate in summer and winter courses held by the department of Physical Education. Summer courses take place in the Czech Republic, and are oriented towards outdoor activities: cycling, touring by water, trail running, hiking. Winter courses in snowboarding, cross-country and down-hill skiing take advantage of the proximate ski centres of Bedřichov and Tanvaldský Špičák.





INVESTMENTS IN EDUCATION DEVELOPMENT



# TECHNICAL UNIVERSITY OF LIBEREC

## Faculty of Textile Engineering



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