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Changes in Wood Science Education in Eastern Europe

Marius C. Barbu
"Transilvania" University of Braşov, Faculty of Wood Engineering
Braşov, Romania
Peter NIEMZ
ETH Zürich, Institut für Baustoffe, Holzphysik
Zürich, Schweiz

Abstract

The former regions of the Austrian-Hungarian Empire hold a tradition of more than 120 years of higher education in forest science, including wood processing. After the Second World War, with the political changes and dissolutions in Central Europe, each country established a Faculty of Forestry, which included the wood processing technologies. These departments of wood science educated the first generations of wood engineers, specialists in processing technology and furniture manufacturing, all following five-year diploma programs. Some of these forestry and wood science faculties also established state research centers for forest management, harvest and transportation, primary processing of wood, and furniture manufacturing. Socialist states built a number of wood processing centers, which covered the entire processing line from logs to timber, boards and finally half-products and furniture. Between the 70s and the 90s the demand for highly qualified engineers was enormous and more than 100 students graduated each year and from each study program. Higher education in wood processing included anatomy and chemistry of wood, physics and mechanical processing of wood, chemical processing, adhesives, wood preservation, panels and half-product technologies, furniture design and manufacturing, wood finishing, and marketing.

After the political reforms in 1989, the large integrated production centers were not able to survive the economic changes. Pressure from western countries was high and resulted in a decline of the paper and wood processing industries. Higher salary jobs in other sectors had a major impact on quality and number of students. The effects of these developments during the past two decades have been dramatic for wood-based industries. Imports from multinational corporations, combined with low exports of own products and furniture at low margins impacted the industry. Many of the traditional production centers had to close. The number of students and faculty reduced to half; governmental support declined. Political changes during the past decade, and the expansion of the European Community improved the situation, as foreign companies invested modern processing facilities and created new jobs. The impact of the Bologna agreement required continued reformation of the state institutions, and the quick preparation for the job market requires highly motivated students.

Keywords: Eastern Europe, Forestry, Education, Wood science and technology

Introduction

During the 1950s, the departments of forestry and wood technology at universities in Eastern Europe have been significantly expanded. Apart from the traditional faculties of forestry, programs arose with separate chairs for wood technology, faculties for wood technology and partially even entire universities with a broad spectrum of chairs and institutes, e.g. Zvolen, Poznan, Sofia and Saint Petersburg. Until recently the initial structure of these universities has been retained. This concept can only now be found at some big universities of applied sciences in German speaking countries.

Nowadays education is mostly carried out at an individual faculty. Independent, university level training in an applied science is well established in the wood sector of Germany, Austria and Switzerland, but can scarcely be found elsewhere. Thus, the education on a university level is of higher significance in Eastern Europe, reflected by the number of students currently present in the area of wood technology. The number of first-year students can usually number more than 100. The largest faculty in this area was founded at the TU Zvolen, but also in Poland (Poznan and Warsaw), large institutions were established. The development of these faculties varies widely depending on the economic situation. In some cases the institutions have been considerably cut back or only marginally invested. On the other hand faculties like Warsaw or Sopron have been modernized to a high degree.

At the mentioned universities, Ph.D. study programs are offered and these also own the right to confer a higher lecturer qualification. Several technical books have been published from the faculties in Poland, Slovakia, Hungary and Russia. In Warsaw, Sopron, Brasov and Zvolen technical journals are published in the national language and partially in English. Wood Research, published by Zvolen in cooperation with Bratislava, is ISI ranked. In Poznañ the scientific journal is published only once a year in English. Based on the good personnel infrastructure, the pedagogic organisation of these faculties is sophisticated. The following is a brief overview on the studies of wood technology at the mentioned universities.

Faculty of Forest Industry, University of Forestry, Sofia, Bulgaria

(http://ltu.bg/a/nav/faculty/department/2)

The Faculty of Forest Industry (FFI) is part of the University of Forestry - Sofia. The University of Forestry is the only university in Bulgaria, providing training of specialists in the field of Wood Technology, Furniture Production and Engineering Design of Furniture. The FFI is a successor of the Forest Industry Section, set up in 1949 at the Agricultural Academy in Sofia. This faculty is historically formed to meet the needs of wide specialists in wood processing. In the year 1974 the FFI has been established as an independent academic and scientific structure, based on the specialization of Mechanical Wood Technology. The faculty has rich traditions in training engineers. There are developed curricula and training programs for senior professionals for woodworking and furniture industry, mechanization of processes in the forest industry, but also to ensure these industries with fundamental and applied research projects. The teaching process is provided with appropriate facilities.

There is an established and well functioning system for accumulation and transfer of credits (ECTS). Today 704 students can enrol in three degrees (B.Sc., M.Sc., Ph.D.) in two different types of study: 85% of the students take the regular classes whereas 15% attend in correspondence courses. The two offered degree programs, Mechanical Wood Technology and Interior and Furniture Design, achieved the highest ranking from the National Agency for Rating and Accreditation of the Republic of Bulgaria. The main share of the graduates work as experts for technology at wood processing companies and in the furniture sector, in projects and as consultants and managers at furniture stores and design companies.

Six departments (Wood Mechanical Technology; Furniture Production; Interior and Furniture Design; Woodworking Machines; Mechanization and Automation of Production; Mathematics and Physics) with 37 professors, assistant professors and assistants with unlimited employment contracts, two visiting professors and 12 lecturers with short-term employment contracts conduct education. The FFI owns specialized facilities to theoretically and practically conduct the education programs, such as a teaching and production center for wood processing and laboratories for wood modification, wood processing and wood-based composites with laser cutting equipment and for the manufacture of wood-based products.

The success of the quality management in education based on a system which analyze the public dissemination of the results from the attestation of lecturers, the conducted entrance campaigns, the success of students and changes in the educational documentation. By conducting anonymous surveys positive student comments on the methods and the quality of teaching and assessments of their achievements are registered, and used to optimize and update the curricula and training programs.

International acceptance of the Faculty of Forest Industry is based on the professor's participation at various scientific events abroad. They achieved awards for several projects from international trusts and the participation at international organizations. Furthermore, international acceptance originates from graduates doing their Ph.D. and work at universities abroad, such as USA, Canada, Sweden, Japan, Chile, France, Switzerland, Germany and others, the successful completion of international projects and the cooperation with other foreign universities (Slovakia, Macedonia, Greece, Switzerland, Poland, Russia, Belarus, Czech Republic, Hungary), as well as cooperation with several companies from Nigeria, Sudan, Slovakia, Macedonia, Czech Republic and others.

Faculty of Forestry, University of Zagreb, Croatia
(http://www.sumfak.hr/)

The Faculty of Forestry (FF) is the only institution of higher education in Croatia which trains experts in the fields of forestry and wood technology. It is an outcome of the Križevci School of Agriculture and Forestry, which was founded in 1860, and the Academy of Forestry, founded in Zagreb in 1898, as one of the four institutions of higher education at the University of Zagreb. In the field of research and science, the faculty is registered in the sector of biotechnological sciences, the field of Forestry and Wood Technology. The FF has two departments –Forestry and

Wood Technology – as well as 11 institutes, 15 laboratories and 3,500 hectares of land with a total of five facilities for teaching and research in various forest ecosystems.

Since the 1898 on the Forestry Department graduated 4,580 students, 246 candidates reached the master and 139 the doctor degree, while on the Wood Technology Department gratuated 1,647 students, 99 candidates finished their master and 66 fullfiled the doctor degree.

Since the academic year of 2005/2006, study programs have been organized in accordance with the Bologna Declaration, and are divided into undergraduate, graduate, specialist and doctoral study programs.

The FF offers many undergraduate study programs: Forestry; Urban Forestry, Nature Conservation and Environmental Protection and Wood Technology.

Upon completion of the undergraduate study program in the duration of six semesters (180 ECTS), students can enrol in one of the four graduate study programs (four semesters, 120 ECTS): Forestry; Urban Forestry, Nature Conservation and Environmental Protection; Wood Working Processes; Design of Wood Products. Enrollment quotas in undergraduate studies are 355 students, and in graduate studies 210 students.

Upon completion of a graduate study program, students have the option of continuing training in postgraduate specialist study program (four semesters, 120 ECTS) or in postgraduate doctoral study programs (six semesters, 180 ECTS credits). A postgraduate study for Wood Technology is also available.

The Wood Technology Department focus the development and improvement in the field of wood technology and process quality based on the specialized laboratories for furniture, wood panels and construction.

For the faculty currently are working 20 full professors, 24 associate professors, 18 assistant professors and 53 assistants.

The faculty intensively developing scientific-professional activities through numerous domestic and international scientific and professional projects. Furthermore, the FF is a publisher of two internationally recognized scientific journals: Wood Industry and Croatian Journal of Forest Engineering. It is also a member of the prestigious European associations and has a significant international colaboration with similar faculties from Austria, Czech Republic, Hungary, Slovak Republic, Slovenia, and others.

Faculty of Forestry and Wood Technology Brno, Mendel University, Czech Republic
(www.mendelu.cz/en)

Faculty of Forestry and Wood Technology (FFWT), Mendel University of Agriculture and Forestry (MUAF), Brno was established in July 1919 as a four-year programe with tuition and

with two schools-agriculture and forestry. In October 1920, the inauguration of studies at the Faculty of Forestry took place, enrolling the first 208 students. The transfer of the Adamov country estate in 1922 established the University Forest Estate Reorganisation of UA-Brno began in 1950. In June 1952, The Faculty of Forestry was transferred to the University of Civil Engineering in Brno, and the duration of study was extended to 5 years. The Faculty of Forestry was removed in June 1956 from the University of Civil Engineering and reincorporated into the University of Agriculture in Brno, which was renamed the University of Agriculture and Forestry in Brno (UAF-Brno).

1989 – during the Velvet Revolution the organisation of students strike, and a committee establish the faculty academic boards and the university academic board, later transformed into the current academic senates. Since 1990 a four-year Master's study was extended to five years. Also the Ph.D. programmes started. In 1993 the Faculty of Forestry was renamed to the Faculty of Forestry and Wood Technology. In 1995 UAF in Brno was renamed Mendel University of Agriculture and Forestry in Brno (MUAF). Since 2010 Mendel University of Agriculture and Forestry in Brno (MUAF) is renamed Mendel University in Brno (MENDELU).

The mission of the Faculty of Forestry and Wood Technology is the independent education and creative activities covering all areas of university life, professional, cultural and ethic influence on the public approach to forest, wood, landscape and renewable sources and sustainability.

Wood Technology is taught at the departments for wood sciences and furniture fabrication. At the faculty, 21 professors, 30 assistant professors, 65 assistants and 63 technical and administrative assistants are employed.

There are almost 1,800 students at FFWT MUAF Brno presently. And, there are four study branches: Forestry, Landscape Design, Wood Technology and Furniture Technology. The studies has been divided into three levels: B.Sc., M.Sc. and Ph.D.

There are four undergraduate study programmes (B.Sc.) in Forestry, Wood Technology and Timber Management, Landscape Design and Furniture Design and Furniture Technology.
Equally, there are four graduate study programmes (M.Sc.) as well Forest Engineering, Timber Engineering, Landscape Engineering and Furniture Engineering.

With respect to postgraduate study programmes (Ph.D.), there are 11 of them: Plant Anatomy and Physiology, Forest Ecology, Applied Landscape Ecology, Silviculture, Forest Protection, Game Management, Technology and Mechanisation in Forestry, Forest Management, Forest Economics, Wood Processing and Applied Geoinformatics.

Scientific, research, and creative activities at the Faculty of Forestry and Wood Technology focus on the following: development of biotechnologies, new possibilities for forestry and wood processing in the socio-economic development of Czech society, new technologies and the development of materials engineering - development of new wood-based materials, design of wooden structures and their components, design, technical and utility characteristics of products.

There are 26 courses given completely in English now. Also in Brno will be started a M.Sc.-level programme in English. The programme will be called "European Forestry" and will be designed as four-term-study programme with no distant tuition. In addition, FFWT MUAF Brno has been working on immediate opening one Double Diploma/Joint Degree with Finland and one with France.

The faculty shares on four Czech Ministry of Education programmes for the conceptual development of international relations. Recently, it have been opened a standard "guest professor" programme where both travel and living expenses demands are fully covered.
The students of the faculty have been encouraged to enter foreign topmost study programmes in Denmark, Wales, Germany, Italy and Sweden.

Faculty of Wood Sciences, West Hungarian University, Sopron, Hungary
(www.uniwest.hu)

The history of the present day University of West Hungary goes back several centuries. It is now the 6th biggest university of Hungary with ten faculties. In 1923, a separate Department of Wood Technology was established. The training of wood industry engineers started in 1957, and the Faculty of Wood Sciences became independent in 1962.

The faculty offers study programs in four main areas: Wood Engineering, Applied Arts (form design, architecture, and graphics), Information Science and Industrial Design. The Wood Industry program is the only one in the country. During their studies students complete projects involving planning, design, manufacturing technology and economical aspects of wood and wood based products. They gain complex technical and business skills to use in the wood industry. The Industrial Design Engineering course combines engineering and technical skills with the artistic aspects of product design. Started in 2006 this program focuses mainly on wood, paper and packaging design but more and more plastic, metal and silicate related courses are added. Students in the Polymer Technology program learn about pulp and papermaking, packaging and typography. One of Hungary's first Business Information System Management courses started in 2002. Designers and architects trained in the Institute of Applied Arts enjoy national and international reputation. The four-semester English language M.Sc. program in Wood Science and Technology started in September, 2008. From the fall semester of 2010 a new Mechatronics B.Sc. program was established.

1,000 to 1,100 undergraduate students attend courses in the wood science department.

The number of applicants for this study programs exceeds the number of admissions by factor of 2.5 to 3. The programs can either be conducted through direct attendance of the students or as correspondence courses. Offered degrees at Bachelor level are an engineering degree (six semesters), an engineering degree of applied science at the university level (six semesters) and a training school degree. Furthermore the university holds the right to award Ph.D. degrees. The Faculty for Wood Sciences is divided into nine institutes as well as independent units with 20 full professors, 24 associate professors and 15 assistant professors. Two accredited testing

laboratories are associated with the faculty, where since 1990 and 2005 respectively, several capital investments have been spent to improve the equipment.

The highest level of education is provided by the Cziráki József Doctoral School of Wood Science and Technology. It includes six programs: Wood Science, Wood Processing, Wooden Structures, Fiber Science, Information Technology and Management. Since the establishment of the Doctoral School in 2001, 41 PhD students have already graduated.

The practical training is provided by a woodworking shop, recently equipped with modern woodworking machinery, and was awarded the title 'Accredited Training Workshop' by the Ministry of Agriculture and Rural Development in 2005.

The most important R&D services are supported by the Material and Product Testing Laboratory, Timber Structures Testing Laboratory, Testing Laboratory for Forestry and Wood Industries, Non-destructive Wood Testing Laboratory, Mechatronics Laboratory, Wood Protection Laboratory.

The publication of research results is facilitated by the scientific journals "Faipar" ("Wood Industry") that publishes peer-reviewed scientific articles mostly in Hungarian, with English abstracts and Acta Silvatica et Lignaria Hungarica either in English or in German.

The faculty's teaching programs cooperate with institutions of higher education mostly within the EU, while its research cooperation extends to all five continents. The staff participates in many national and international professional associations as well in international research and teaching networks (COST, Erasmus, FP6-7 Programs, Leonardo etc.). Engineers working in the Hungarian wood industry are almost exclusively Sopron graduates.

The Faculty of Wood Sciences offers a wide variety of academic programs, integrating wood-related technical training (wood industries, pulp and paper, information technology) with design art (interior, product and graphic design).

Faculty of Wood Technology, University of Life Science, Warsaw, Poland
(www.sggw.pl)

The origins of the Warsaw University of Life Sciences (WULS – SGGW) date back to 1816, to the creation of the Institute of Agronomy in Marymont, the first agricultural institution of higher education in Poland and the fourth one in Europe. Currently WULS has over 25,000 students enrolled also postgraduate and doctoral studies and 1,200 members of academic staff employed including 260 full professors. The range of academic programs at WULS was systematically enlarged over years from biological and environmental to economical and humanistic. At the moment it encompasses 27 different majors with 70 different areas of specialization. All academic programs are offered on B.Sc., M.Sc. and Ph.D. level.

The Faculty of Wood Technology (FWT) derived in 1946 from already existing Faculty of Forestry of Warsaw Agricultural University (SGGW). Its separation and expansion was caused by need of educating professionals at technical level for fast growing Polish wood and furniture manufacturing industry. During almost 65 years the Department of Wood Technology (DWT) gave degree of engineer and master to over 4,000 graduates. The DWT has the ability to grant doctoral (Ph.D.) and *Doctor Scientae* (D.Sc.) scientific degrees.

The FWT offers only one major characterized by technical and environmental approach – Wood Technology at two different specializations: Mechanical Wood Technology and Conservation and Renovation of Historical Wood. All programs at engineering (undergraduate, B.Sc.) and master (postgraduate, M.Sc.) level are offered in both regular and vocational schooling system. During their studies students have to attend professional practical training in Poland or abroad. The duration of Ph.D. (tertiary education) program is four years.

In 2003 the FWT was moved from the historic city center into a newly built campus Ursynów of SGGW aside the center equipped with modern high tech laboratories and new lecture rooms.
There are four departments at the Faculty: Department of Technology, Organization and Management in Wood Industry, Department of Wood Science and Wood Protection, Department of Mechanical Wood Processing and Department of Physics. The faculty staff includes 60 professors and assistants. At the moment the faculty has about 900 students.

Currently, the staff of FWT participates in many different European educational programmes.
From the beginning scientists research was focused on topics concerning the wood structure and its physical and mechanical properties, comprehensive resource management, production process waste management, new production methods, implementation of novel and economical production technologies, improvement of wood processing technology, enhancement of machines and equipment efficiency and capacity, new wooden construction designs, quality improvement, production process management and effective methods of wood protection and conservation. At the moment the research focuses of effective and sustainable management of wood as natural resource, improvement of wood structure its utilization and recycling, new wood composed materials, novel product creation systems and technological processing, new designs of wooden furniture and other fabrications for special purposes. The faculty also conducts studies on systems and methods for improvement of management in small and medium scale enterprises of wood management and processing technology.

The FWT cooperates with different institutions and universities abroad including: Dresden Polytechnic, Highschool of Wood Nantes, Latvian Institute of Wood Chemistry in Riga, State Technical Highschool, Zürich, Stuttgart University, Swedish University of Agriculture Sciences, Uppsala, Technical University in Lviv, University of Applied Sciences, Kotka, University Transilvania Brasov etc.

Faculty of Wood Technology, University of Live Science, Poznan, Poland
(http://en.puls.edu.pl/)

Since being founded in 1954, the university provides the following departments existing in the wood-technological sector: Institute for chemical wood technology and the chairs for chemistry (wood chemistry, pulp and paper, wood protection), wood sciences, mechanical wood technology, wood-based composites, adhesives and surface coatings, engineering sciences, thermal processing, and life sciences. The scientific staff consists of 19 professors, 46 doctors, and 50 engineers and technical assistants.

Thus, compared to the western European universities, the personnel and equipment can be characterized as oversized. Especially in the fundamental research sector, a sophisticated education and research is well established in Poznan.

Faculty of Wood Engineering, University „Transilvania“, Brasov, Romania
(www.unitbv.ro/il/resources.en.htm)

The Faculty of Wood Industry was set up in 1959, being at present the unique faculty having such a specialization in Romania. During the 1980s the faculty graduated 150 to 220 annually. This was largely based on a boom of the Romanian wood industry and in particular, furniture production. After 1997 the yearly number of graduates decreased to 100. In 2005 the higher education system underwent a restructuring and was adapted to European systems. Caused by the Bologna-process, the period of the programs was reduced to years, which led to two graduating classes in 2009.

At present the faculty's main concern is the training of specialists for state owned and private sectors of wood processing, not only in the technological field but also in the design and preservation of wood products.

Nowadays it provides the Licence Domain Forestry Engineering in fullfilling the Bologna regulations with the following specializations: Wood Working Engineering, four years of full-time study and Furniture and Wooden Finite Product Engineering, four years of full-time study. After passing final examinations, the graduates get a diploma, with a Engineering degree in one of these specializations.

Since 2008, a new specialization is additionally promoted: Forestry Engineering and Management.

The Wood Working Engineering specialization trains mainly production engineers.

The curriculum provides sufficient knowledge for the graduates in order to carry on other activities, as well, such as: furniture and wooden product design and manufacture, technological organization, product quality control, fundamental and applied research in the field of wood

working technologies. The graduates can provide assistance and knowledge for the optimization of production lines, management as well as marketing in the wood industry.

Over 150 students from Korea, China, Nigeria, Zaire, the Ivory Coast, Russia, the Republic of Moldavia etc. - have been trained within the framework of this specialization.

The Furniture and Wood Products Engineering specialization trains 40 engineers yearly, these engineers being specialized in furniture design and in the design of other products in the wood industry and also in wood preservation and products renovation. The knowledge of design, decorative drawing, styles and ornaments, art furniture manufacturing, wooden product designing and manufacturing, indoor arhitecture and wood construction allows these graduates to be competitive.

Postgraduate courses include specializations in Master study (two years): Eco-Design of Furniture and Restoration, and Advanced Structures and Innovative Technologies.

The teaching staff, acting within the Wood Technology Department and the Machines for Wood Industry Department, is formed by 15 profesors, five assistant professors, six lecturers, four assistants and four consultant professors. Five of the professors graduated to Ph.D. abroad mainly in UK and Austria.

The total number of students in the undergraduate studies – full time and low-frequency numbers 535 undergraduate students and 53 additional graduate students in the master studies. More than 10 graduated students specialized themself in the doctorare study programe.

In 2008 two up-to-date laboratories for the testing of physical and mechanical properties of wood-based composites and finishing have been accredited.

The faculty is involved in 12 erasmus exchange programes with different European countries, and represented in many international organization and participates at different levels in international research and teaching experience exchange projects.

Over 7,100 engineers and about 70 doctors of engineering science graduated the Faculty of Wood Engineering (the new name starting with this autumn).

Faculty of Forestry, Belgrade University, Republic of Serbia
(www.bg.ac.yu/eng/memb/facult/techn/en_sumarski.php)

The Faculty of Forestry of Belgrade University is the oldest and the highest educational and science institution in former Federal Republic of Yugoslavia. The long tradition of studies in forestry science began in 1920, at the Forestry Department of Faculty of Agriculture in Belgrade. Ten years later, the Faculty of Agriculture was renamed to the Faculty of Agriculture and Forestry; and finally in 1949, the Faculty of Forestry was established as a recognized and

independent institution. In 1953, the Faculty of Forestry has been moved to its present location in Belgrade.

Graduated engineers, emerging from the Faculty of Forestry, have achieved many remarkable accomplishments, both domestically and internationally, working in many renowned companies and universities. Until 2006, there were 7283 graduates, 348 with a Master of Science, 151 Doctors of Science.

The Faculty of Forestry is organized in four departments - Forestry, Wood Processing, Landscape Architecture and Horticulture and Ecological Engineering in Land Preservation and Water Resources.

In the recent years, Faculty of Forestry has underwent reform in its study programs, by complying to the Law of High Education of Republic of Serbia and adopting the changes initiated by the principles of Bologna process. University courses are organized in three levels, with each level representing a complete study program. Its structure is based on the four year system for a B.Sc. (undergraduate) + one year for M.Sc. (graduate) + three years for doctoral studies.

During the first level of undergraduate study (B.Sc., four years) students acquire the professional title of Engineer in one of the areas of the departments mentioned before.

The second level of graduate study (M.Sc., one year) initiates a certain specialization for research work. This aspect is essential for the third level, the doctorate study. With successful defense of its master work, a student acquires the academic title of graduate engineer of forestry in the areas of forestry, wood processing, landscape architecture with horticulture and ecological engineering in preservation of land and water resources.

The third level of study (Ph.D., three years) represents the doctoral studies is based on the close supervised work (mentor-student) and active scientific research activities and assignments. In total 135 scientific staff work and 1,500 students are study at this faculty.

After the second year of studies on the Department for Wood Processing, the bachelor students choose one of the three available specializations: Wood Technology, Furniture Designing and Interior and Management and Marketing in Wood Processing.

The program of study in the final two years is conceived in such a way that the students get all necessary knowledge from the area of primary and finishing wood processing, organization and management of production, marketing and business administration.

International cooperation of the lecturers on the Department for Wood Processing provides opportunities to postgraduate students for professional further education abroad as well (Italy, Slovenia, England, Germany, Austria, etc.).

Wood Technology Faculty, Technical University Zvolen, Slovak Republic
(www.tuzvo.sk/sk)

The Technical University in Zvolen (TUZVO) has a unique position in university educational system of Slovakia as it is the only university providing high education in the field of forestry, wood sciences, ecology and environmental and manufacturing technology. It builds on a rich and very old tradition of technical university studies in Slovakia, which dates back to the establishment of the Mining Academy in Banska Stiavnica in 1762, where the Forestry Institute was established in 1807. These facts give evidence that technical and forestry studies in Slovakia originated among the first in the world.

In 1952 the University College of Forestry and Wood Technology was founded in the town Zvolen and in 1991 its name was changed to Technical University in Zvolen. Currently, the university consists of four faculties: Faculty of Forestry, Faculty of Wood Sciences and Technology, Faculty of Ecology and Environmental Sciences and Faculty of Environmental and Manufacturing Technology. The system of faculties offers a range of study programs.

During the latest years the system of university education has been undergoing considerable changes. It has been transformed in keeping with new legal regulations restructuring university education by introducing a three-stage system of university education and the European Credit Transfer System. Consequently, since the academic year 2005/2006, the TUZVO has been running new accredited graduate and post-graduate study programs.

The Faculty of Wood Sciences and Technology currently consists of 11 departments. During the 1970s the faculty significantly expanded and was newly equipped. There was a close cooperation established with the Federal Wood Research Institute in Bratislava, being the largest institute in the former Eastern Bloc with several hundred employees at that time.

The present structure of accredited study programs is as follows:

- Bachelor in Wood Sciences (Construction of Wooden Structures and Furniture, Furniture Production, Wood Processing Technologies, Operations of Machines and Equipment, Biomass Processing Technologies, Management of Wood Processing and Furniture Production and Technical Production and Primary Processing of Wood), of Economy and Enterprise Management (Enterprise Management in Wood Processing Industry), of Design (Interior Design and Furniture Design) and of Protection of Persons and Property (Protection of Persons and Property against Fire)

- Master of Wood Sciences (Wood Engineering, Material Engineering, Construction of Wood Products, Furniture and Wood Products, Biomass Processing Technologies and Wood Processing Technologies), of Economy and Enterprise Management (Enterprise Management in Wood Processing Industry), of Design (Interior Design) and of Protection of Persons and Property (Protection of Persons and Property against Fire and Fire and Rescue Services)

- Doctoral studies in Wood Processing Technology, Wood Structure and Properties, Constructions and Processes of Wood Products Production and Fire Protection and Safety

Biotechnical Faculty, Department of Wood Science and Technology, University of Ljubljana, Slovenia
(http://www.bf.uni-lj.si/en/deans-office/about.html)

The Biotechnical Faculty is one of the largest faculties of the University of Ljubljana, with almost 600 employees and over 3800 students per year. It consists of seven departments, including the Department of Wood Science & Technology (43 employees, around 500 students). The 1st Cycle Academic Study Programme in Wood Science lasts for three years (six terms) and has a workload of 180 credits. The acquired knowledge enables students to continue their studies in a second cycle masters' study programme or to find employment in production sites dealing with wood and wood based composites processing, sale of wood and wood based products, in the area of services that involve wood and wood products, in the public sector (chambers, supervision and certifying organizations, museums, restoration centres), education (secondary schools, colleges, universities). Graduates can also work as independent entrepreneurs or advisors.

The 2nd Cycle Master Study Program in Wood Science has been created because the present state showed that such a study program is needed in Slovenia. Already today, the profession needs at least 10% more employees with higher education than currently available.

The primary activity of the Department of Wood Science & Technology is education on higher/university level. At the same time, it is the only research and development institution in the field of wood science and technology, having a strong co-operation with the Slovenian wood-processing industry. Research activities cover wood technology (anatomy, dendrochronology, wood drying); wood pathology and preservation, wood coatings, wooden constructions, saw-milling, wood chemistry, wood based materials and products, wood machining and economic investigations in wood processing sector. Among other fields, it has expertise in wood liquefaction and use of liquefied wood to produce various polymer materials, in wood modification, development of novel wood preservatives, and in fungal deterioration processes of wood. Surface coating testing (interactions with various wooden and wood based substrates, physico-chemical properties, ageing, etc.) and low VOC coatings are also the related topics. The Department of Wood Science & Technology has been participating in many national and European research programmes (18 COST actions, 7 projects in FP6, 15 projects in FP7, 44 bilateral projects and in 15 other international projects etc.). Organizational structure of the department consists of four Chairs (Wood Technology, Mechanical Woodworking Technologies, Adhesive Bonding, Wood Composites and Surface Finishing and Management and Economics of Woodworking Industry and Product Design & Development), two working groups (Wood Chemistry and Wood Pathology and Preservation) and the group of supporting staff (administration, library, and technical staff).

Faculty of Wood Technology, Ukrainian National Forestry University, Lviv
(http://biblos.com.ua/forest/)

Ukrainian National Forestry University (NFUU) is the only university in Ukraine fully specialized in forestry issues. The university was founded in 1874 as a forestry school. University graduates can receive Bachelor, Specialist or Master degrees and also a Doctoral degree (two levels - Candidate of Science, Doctor of Science).

The University consists of Institute of Ecological Economics, and six other faculties (Forestry, Forest Mechanics, Wood Technology, Economics, Extra Mural, Pre-Diploma and Long Life Training). Also within the University's structure: the Small Forest Academy, the Technological College, the Lyceum of Natural and Technical Sciences, the natural reserve "Roztochya", the Complex Forest Enterprise for Study and Internships, a botanical garden, and five field research laboratories on forest ecology.

The university trains with 400 staff (including 34 Professors and 225 Associate Professors) in 32 departments of the university, 6,000 undergraduate to became professionals for forestry and the economic forest industry sector on the following specialties: forestry, park and garden management, landscape architecture, machinery for the forest sector, forest engineering, automatic management of technological processes, wood technology, chemical technology for wood and plant resource processing, design, management of enterprises, and management of international economic activity.

The Technical Faculty (TF) of the NFUU was set up in 1945. Throughout it's history it underwent several restructurings accompanied with different names: from 1945 to 1962 – Faculty of the Mechanical Technology of Wood and from 1963 to 1975 – Mechanical-Technological Faculty.

In 1975 the faculty was again restructured; initiated by the huge number of 1,800 regular undergraduate students and 300 undergraduate students attending the evening school. Thus the faculty was divided into two separate faculties, namely the 1st and the 2nd Technological Faculty. In 1988 the latter separate faculties were unified under the name of Faculty for Wood Processing Technology, which was renamed to its current name in 2003.

Today 900 undergraduate students attend the TF. The education is organized by eight chairs with a teaching staff 87, with 11 professors and more than 50 assistant professors with an unlimited contract of employment.

Form 1992, the following programs are offered by the TF: Wood harvesting and Wood processing, Technology of Wood Processing, Chemical Technology and Engineering, Chemical Technology of Wood and Other Raw Materials and Art and design.

From 2004 the offered programs have been supplemented by a program in Computer sciences and information technologies for design.

Beginning in the year 2007/08 the three steps education (bachelor, specialist, master) were transformed to two steps (bachelor and master). The bachelor study focus on wood processing technologies, chemical technology and engineering and design and computer sciences.
The teaching staff of the TF is in a close contact to their colleagues in Poland, Czech Republic, Austria, Germany and Switzerland.

In more recent years, a clear tendency arose to an increased demand for professionals of all subjects offered by the TF. Especially in the specialization, Technology of wood processing and design the demand significantly exceeds the supply. The special knowledge of the TF`s graduates is highly asked for. They mainly work as technologists or on projects.

The funding of the education is shared by the federal budget (75%) and by founders and sponsors (25%).

Russia

Today in Russia, forestry and wood technology is taught at about 20 universities. Herein the education is conducted in forestry (partially in combination with landscaping), mechanical wood technology (including wood sciences), chemical wood technology and automation technology in forest and wood industry.

Especially in the field of forestry, the number of students is very high: Forestry 1,760, Mechanical wood technology 3,090, Chemical wood technology 390, and automation technology in forest and wood industry 350. Roughly one professor is employed for every eight students.
Nowadays in Russia there are federal research institutes and 20 private research institutes in the field of wood technology with a staff of 7-30 each.

This picture is meaningfully characterized by the example of the Research Institute of the Wood Industry (WNIIdrew), Balabanowo. Until 1987, around 800 people were employed at this institute, 470 of which were scientists (two associated professors, 71 Ph.D.). Today only three Ph.D.'s work at this institute. Presumably it was one of the world's largest research institutes in the field of wood science.

Other countries:

Forest and Wood science education exists also in Albania, located in Tirana at the Forestry Faculty, and Republic of Macedonia, located in Skopje at Cyril and Methodius University. There have also been some signs of new departments developing in Bosnia Herzegovina.

Greece has two centers for higher education and research in wood science in Larrissa, at the Technological Education Institute, and in Thessaloniki at the Aristotle University.

In Turkey there are many universities with tradition in Wood science education incorporated in the Faculty of Forestry of Istanbul, Bartim, Trabzon, Kastamonu, Kaharamannmaras among others.

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Literature:

BUDAU, G.; CAMPEAN, M. 2009, The Faculty of Wood Industry - 50 Year Jubilee 1959-2009. PRO LIGNO Journal Vol. 5 No. 2, pp. 9-20

NIEMZ, P. 2006, Ausbildung auf dem Gebiet der Holztechnologie an der Universität Sopron, T.1 Holz-zentralblatt v. 132(23) S. 705.

NIEMZ, P; BARBU, M.C.; CÂMPEAN, M. 2010, Ausbildung auf dem Gebiet Holztechnologie in Osteuropa. AFZ-Der Wald. Nr.10, pag.42-43.

PLOTNIKOW, S.; NIEMZ, P. 2010, Lehre und Forschung auf dem Gebiet der Forstwissenschaft und der Holztechnologie in Russland. HolzZentralblatt, pag. 366