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**Improvement of Product Development Studies
in Serbia and Bosnia and Herzegovina**



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**UNIVERSITY OF NOVI SAD
FACULTY OF TECHNICAL ENGINEERING**

R E P O R T

**Education in the field of Industrial product development
and management of Product Development
& Innovation Management**

Novi Sad, 2013.

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Introduction

University of Novi Sad is the only university on the territory of Vojvodina and the second largest university in the country. It was founded on 28th June 1960 and it is autonomous, educational, scientific and artistic institution of higher education. It comprises 14 faculties located in 4 cities in Vojvodina: Novi Sad, Subotica, Sombor and Zrenjanin. It is situated in specially landscaped campus on the left bank of the Danube, an area of 260,000 m², which places seven faculties, student center, institute for students' health care, two student dormitories, housing for the accommodation of young teaching research workers, the central student restaurant, Center for Physical Culture with different sport fields, university student organizations and other scientific, technical, informational, cultural and sports organizations. 40,000 students are studying at the University and thus, it employs over 3,000 teachers, associates and technical staff. Faculty of Technical Sciences is the largest faculty of the University of Novi Sad.

Faculty of Technical Sciences originates from the Faculty of Mechanical Engineering which was established by the Decree of the National Assembly of People's Republic of Serbia on 18th May 1960 as a Faculty of Mechanical Engineering in Novi Sad and it was a constituent part of the University of Belgrade. After the founding of the University of Novi Sad on 28th June 1960, the Faculty along with six previously established faculties in Vojvodina was regarded as a part of the University of Novi Sad.

In the first period of its development the Faculty provided educational activities for three different profiles of mechanical engineering. In 1971 electrical and civil engineering studies were founded. Establishment of the Department of Electrical Engineering as well as the Department of Civil Engineering brought about the change of its name into the Faculty of Technical Sciences on 22nd April 1974. In 1979/80 academic year started the studies in the area of traffic engineering, and in 1996/97 the first generation of students of architectural engineering was enrolled. In academic year 1999/2000 several different studies for the new professional profile were introduced: Industrial Engineering and Management, Graphic Engineering and Design, and Environmental Engineering. Study programme for Postal Services and Telecommunications were introduced at the department for traffic engineering in 1999/2000. Interdisciplinary studies of Mechatronics were established in 2002/03 academic year. In 2006/07 academic year the first generation of students of PhD studies was enrolled at the Faculty (according to the Law on Higher Education), and in 2007/08 academic year the introduction of the studies of geodesy and geomatics engineering rounds off the educational activities of the Faculty. Faculty of Technical Sciences offers a very prominent educational profile for prospective engineers, which ranks it among the most developed institutions in the field of technology in our country.

Educational activity

Higher education activities are carried out through academic and professional studies based on accredited study programmes for obtaining higher education degrees in the three cycle model.

First cycle studies are:

- Undergraduate academic studies
- Undergraduate professional studies

Second cycle studies are:

- Master academic studies
- Specialist academic studies
- Specialist professional studies

Third cycle studies are:

Doctoral academic studies

Academic studies are divided into the following categories:

- **Undergraduate academic studies** – last for four years (worth at least 240ECTS) and after graduation a candidate is awarded a Bachelor with Honors degree in engineering in a particular field of studies.
- **Master academic studies** - depending on the completed undergraduate study program, last for one year (worth at least 60 ECTS), 1,5 years (worth 90 ECTS) or 2 years (120 ECTS credits). Upon completion of the Master studies a student is awarded a Master's degree in the corresponding field.
- **Specialist academic studies** - last for 1 year (at least 60 ECTS credits) or 2 years (at least 120 ECTS credits). Upon completion of the Specialist academic studies a student is awarded a Specialist degree in the corresponding field.
- **Doctoral academic studies** - last for 3 years and are worth at least 180 ECTS credits. After completing the doctoral academic studies a student is awarded a Doctoral (Ph. D.) degree in the corresponding field.

There are currently over 11,000 students enrolled at the Faculty of Technical Sciences.

The Faculty is the first in this region that issued Diploma Supplement before signing Bologna Declaration. Since 2004 it has started issuing Diploma Supplement to students in Serbian and English, which has greatly facilitated mobility and employment of our students in Europe and worldwide. Diploma Supplement is a document that is merged with the Diploma of Higher Education, also published in Serbian and English, and was made to offer a description of the nature, level, context, content and status of studies that was attended and successfully completed by the student named in the original diploma, which this supplement incorporated.

On 23rd May 2008 Faculty of Technical Sciences received the Decision on the accreditation of the Faculty as a higher education institution. Until now, 71 study programmes for academic and professional studies have been accredited.

Department for Mechanization and Design Engineering

The studies at the DEPARTMENT FOR MECHANIZATION AND DESIGN ENGINEERING at the Faculty of Technical Sciences in Novi Sad are divided into three cycles:

First cycle studies – Undergraduate Academic Studies, lasts four years (eight semesters) and students are obliged to obtain 240 ECTS (European system of accreditation points), including the final paper, which is worth 15 ECTS.

Second cycle studies – Master Academic Studies, depending on the study programme last for 1 year (at least 60 ECTS credits), 1.5 years (90 ECTS credits) or 2 years (120 ECTS credits) and is

the continuation of the undergraduate academic studies, while the students are obliged to obtain additional 60 ECTS, so that after completing the second cycle of studies each student has obtained no less than 300 ECTS. In the course of the second cycle of studies, the student can choose between 2 modules (study groups):

- Machine Design, Transport and Logistics
- Engines and Vehicles

with numerous elective subjects which will enable the student to get directly involved in the chosen field of economy in the country or abroad.

Third cycle studies - Doctoral Academic Studies, lasts three years (six semesters) and are the continuation of the Graduate Master Studies. The student is obliged to obtain 180 ECTS, so that after completing the Doctoral studies the student has obtained at least 480 ECTS in total.

Organization of the Department

At the Department for Mechanization and Design Engineering classes are carried out at three subdepartments:

- Subdepartment for Machine Design, Transport Systems and Logistics
- Subdepartment for Engines and Vehicles
- Subdepartment for Machine Elements, Machine and Mechanism Theory and Mechanical Engineering in Agriculture

Scientific and Research Work

Scientific research work is carried out within the projects of the Ministry of Science and Environmental Protection of the Republic of Serbia, of the Provincial Secretariat for Science and Technological Development and within other projects carried out by international institutions and associations. 130 scientific research projects and topics have been carried out at the Department. At its disposal, the department has 9 laboratories, out of which 5 are used for classes and scientific research work.

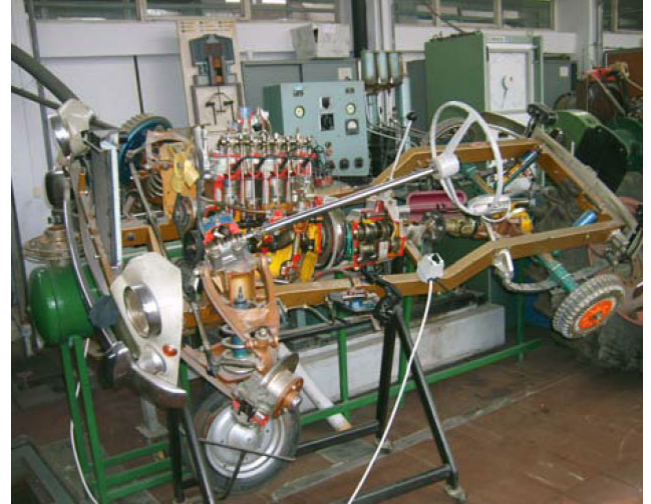
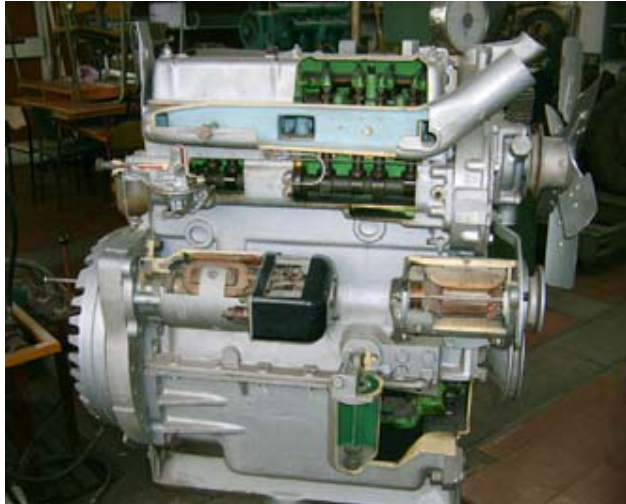
The following projects are currently being carried out:

- Continual remote monitoring of vital exploitation parameters of the supporting structures for mobile field equipment, relevant in determining its lifespan as being one of the reliability factors and something that will have a direct impact on the prevention maintenance
- Development, design and optimization of systems and design elements of the supporting structures of assembly halls
- Transport of goods in the Danube region, the infrastructure, the EU and local logistics centers, the efficiency of container terminals, the impact of management on the technical performances and lifespan of container cranes used in river ports
- Watermode, SEE (South East Europe)
- Development of a software-hardware system for the verification of the post-operative results of the reconstruction of the front crossed ligament of the human knee
- Research and development of rolling bearing assemblies and their components

Program of Economic Support

- The Department for Mechanization and Design Engineering has completed more than 400 projects, carried out in the direct cooperation with different companies in the economy. The fields of cooperation between the Department and the economy are:
 - Design, construction and technical supervision of machines, vehicles, devices and equipment, metal constructions, technological lines, etc.
 - Testing the quality and conducting preventive periodical maintenance of machines and equipment, keeping in mind the safety and health issues
 - Conducting expert and forensic work and giving consulting services

- Attesting vehicles as licensed by the authorities, testing vehicles for the transport of dangerous materials and attesting the installation of LPG vehicle devices
- Supervision of a traffic control system in a meteorological laboratory accredited by the Accreditation Council of Serbia
- Expert training, courses and seminars



Laboratory in Department for Mechanization and Design Engineering

The Department for Mechanization and Design Engineering is in charge of classes in subjects on all levels of study. The subjects are shown in following table.

1st year, Bachelor degree

Subject	Old curriculum
Mathematics 1	3+3 (I)
Mechanics 1 (Statics)	2+2 (I)
Technical physics	2+2 (I)
Machine materials	4+4 (I)
Fundamentals of computing	0+4 (I)
Mathematics 2	3+3 (II)
Mechanics 2 (Kinematics)	2+2 (II)
Engineering graphic communications	4+4 (II)
Electrical machines and power electronics	3+3 (II)
English or German Language	2+0 (II)

2nd year, Bachelor degree

Subject	Old curriculum
Machine elements	4+4 (III)
Strength of materials	4+4 (III)
Technical exploitation of machines	2+2 (III)
Mechanics 3 (Dynamics)	3+3 (III)
Fundamentals of Thermodynamics	2+2 (IV)
Fundamentals of Fluid Mechanics	2+2 (IV)
Fundamentals of machine technologies	4+3 (IV)
CAD	2+4 (IV)
Theory of mechanisms and machines	2+2 (IV)
Driving systems	2+2 (IV)

3rd year, Bachelor degree

Subject	Old curriculum
Praktikum CAD / CAE	1+3 (V)
Fundamentals of engines with internal combustion	2+2 (V)
Fundamentals of motor vehicle	3+2(V)
Machines for biosystems 1	2+2 (V)
Hydraulic transmitters in the mechanization 1	2+2 (V)
Theory of oscillations or Numerical mathematics	2+2 (V)
Technical logistics and simulation	2+2 (VI)
Production systems	2+4 (VI)
Metal constructions	3+3 (VI)
The theory of motion of road vehicles	2+2 (VI)
Machines for biosystems 2	3+3 (VI)
Professional practice	0+3 (VI)

4th year, Bachelor degree

Subject	Old curriculum
Engines with internal combustion	3+3 (VII)
Motor vehicles	3+2 (VII)
Continuous and automated transport	3+3 (VII)
Construction and material handling equipment	3+3 (VII)
Technology of welding	2+2 (VII)
Mechatronics of transport and construction machinery or Mechatronics of engines and road vehicles	3+3 (VIII)
Storage and Accessories	3+3 (VIII)
Cranes	3+3 (VIII)

Master degree

There are two study groups at the Department for Mechanization and Design Engineering:

1. Machine design, transportation and logistics
2. Engines and vehicles

The subjects for master degree are shown in following table.

Master degree, study group Machine design, transportation and logistics

Subject	Old curriculum
Safety and protection with the mechanization appliances	2+3 (I)
Eurologistik	3+3 (I)
Automated machine design	2+3 (I)
Hydraulic transmitters in the mechanization 2	2+2 (I)
The methodology of design	2+2 (I)
Vibrodiagnostics	2+2 (I)
Professional practice	0+3 (I)

Master degree, study group Engines and vehicles / Automotive engineering

Subject	Old curriculum
Product design	2+3 (I)
Equipment of engines with internal combustion	3+2 (I)
Equipment of motor vehicles	3+3 (I)
Simulation and design of engines with internal combustion	3+3 (I)
Testing of engines with internal combustion and vehicles	2+4 (I)
Tractors or Simulation and modeling of motor vehicles	2+2 (I)
Professional practice	0+3 (I)

Conclusion

Currently, University of Novi Sad, Faculty of Technical Sciences, Department for Mechanization and Design Engineering does not offer the curriculum in field of Management of Product Development & Innovation management. It offers only one subject Machine elements in this field. Since there is no clearly defined entity (module or study program) which is exclusively dedicated to product development, there is a need for improvement of the current state in this field.