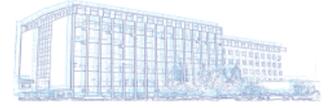




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Improvement of Product Development Studies in Serbia and Bosnia and Herzegovina

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Abstract— The aim of the paper is to show results of Tempus project EACEA 530577 – 2012 – RS – TEMPUS – JPCR “Improvement of product development studies in Serbia and Bosnia and Herzegovina“ (IPROD). Project coordinator is University of Nis, partner Universities from Serbia: University of Belgrade, University of Novi Sad and University of Kragujevac; Universities from Bosnia and Herzegovina; University of Banjaluka, University of East sarajevo and University of Mostar; partners from EU: Karlsruhe Institute of Technology, Slovak Technical University - Bratislava and Technical University Sofia. Project duration is 2012-2015.

Keywords— product development, innovation management,

I. INTRODUCTION

The survival and success of modern enterprise can be ensured through innovative products and manufacturing processes. However, the implementation of innovative products and manufacturing processes is quite complex and requires a new approach, which is primarily related to the optimization of available resources, the precise definition of competencies and cooperative approach to work.

The basic of a cooperative approach during work are methods and systems, which in all phases show transparently the entire process of product development and its production. Methodical approach involves the application of different methods for the development of products, methods for planning and management of production processes and methods related to project management and organizational management. Systematic approach includes computer support in all phases of product development process and its production. Modern prototyping with the use of information technology can accelerate several times the product development process.

Strategy of product planning and processes determines the future market. Starting from the strategy of the company the potential for new business is analyzed, ideas for new products and processes are identified, and product concepts are developed and evaluated. The result of the strategic planning of products and processes are developing new innovative products, their production and placing on the market.

In order to enable modern companies to successfully solve these complex problems, those must have access to comprehensively educated engineers. This imposes the requirement that the Universities carry out appropriate

reform of education, according to the demands of contemporary techniques and technology.

II. PROJECT OBJECTIVES

The main objective of this Project is to enhance the competitiveness of the economy in the region trough improving the education in the field of industrial product development. The wider goal of the project will be achieved through completion of set of specific objectives:

- Establishment of new curriculums in the field of Management in Product Development and Innovation Management, Development of Eco-products and modernisation of existing curriculums in Industrial Product Development at master/specialist and doctoral level
- Establishment of continuous education courses in the field of Industrial Product development
- Harmonization and modernization of education in the field of Industrial Product Development through training of teachers at colleges of applied sciences

III. PROJECT REALISATION

A. Introduction of new and modernisation of existing study programs

New study program are integrated curriculum from field of Industrial product development and Economic sciences with special focus on innovation processes. Basic goal of study program is to educate human resources that are gravitate to product development with use of modern methods, systems and processes of Industrial product development, Innovation management and Eco-product development. Project results in field of introducing new and modernisation of existing study program is shown in Table I.

As it can be seen in Table I, at University of Niš is introduced new Master module *Management of Innovation and Product Development* and 26 students were enrolled in study year 2014-15.

At University in Banjaluka is adopted new study program *Construction and Design* at Master level which should start in year 2016-17.

On other Universities is modernased existing program at Bachelor and Master level.

TABLE 1. NEW AND MODERNISATION OF EXISTING STUDY PROGRAMS

University	Realisation
University of Niš	New Module: Management of Innovation and Product Development Modernisation of existing Study program in field of Product Development
Belgrade University	Modernisation of existing Study program in field of Product Development
University of Novi Sad	Modernisation of existing Study program in field of Product Development
University of Kragujevac	Modernisation of existing Study program in field of Product Development
University of Banja Luka	New Master module: Construction and Design
University of East Sarajevo	Modernisation of existing Study program in field of Product Development
University of Mostar	Modernisation of existing Study program in field of Product Development

B. Training in field of Industrial product development in frame of Long Life Learning

In cooperation with enterprises in Serbia and Bosnia and Herzegovina as well as with National Employment Service is organised great number of courses for engineers from Industry and unemployed persons. Overview of courses has been shown in Table II.

TABLE 2. OVERVIEW OF COURSES IN FRAME OF LONG LIFE LEARNING

University	Training
University of Niš	<ul style="list-style-type: none"> • Innovation management • Rapid prototyping • Structural analysis
Belgrade University	<ul style="list-style-type: none"> • Basics of product development and relevant technical legislative • Management of product development projects using MS Project
University of Novi Sad	<ul style="list-style-type: none"> • Product design • DFM Design for Manufacturing • DFA Design for Assembly • DFE Design for Environment • DFX Design for eXcellence • PLM Product lifecycle management
University of Kragujevac	<ul style="list-style-type: none"> • Basics of 3D modeling in CAD software • Calculation of mechanical elements using modern software
University of Banja Luka	<ul style="list-style-type: none"> • Eco-design and product development
University of East Sarajevo	<ul style="list-style-type: none"> • Basics of product development and competences of product development engineers
University of Mostar	<ul style="list-style-type: none"> • Basics of technology for rapid prototyping of products

Trainings for unemployed persons have been organised with help of National employment service at all

Universities in Serbia. Trainings for employed persons have been mostly organised at Enterprises.



Fig. 1 Training Structural analysis at University of Novi Sad

C. Training of teachers from Technical colleagues in area of Industrial product development

Training of teachers from Technical colleagues in area of Industrial product development was carried on mt. Kopaonik 26-30 May 2014. Training program is shown in Table 3.

TABLE 3. TRAININGS FOR TEACHERS FROM TECHNICAL COLLEAGUES

Training
Industrial product development
Industrial product design
Risk management during new product development
Matematical optimisation of technical systems

The training attended two teachers from every Technical colleague in Serbia:

- The School of Higher Technical Professional Education - Niš
- Subotica Tech-College of Applied Sciences
- College of textile- Leskovac
- College of Applied Mechanical Engineering - Trstenik
- The Railway College of Vocational Studies - Belgrade
- College of Applied Sciences - Požarevac.



Fig 2. Participants of training

Participants concluded:

- that the training was carried out successfully
- training professionally and comprehensively covered the complete field of education
- that training is in the area of interest for the Technical colleagues in Serbia and

- that many chapters of the training may be involved in the future teaching

It was noted that it would be practical to performed training that is illustrated by more practical examples of specific products.

An important project result in this field is that the field of training is already involved in teaching in the school year 2014/2015, which significantly innovated and upgraded teaching in this area. The request of the participants was to hold one more training with more content of product development with specific products.

D. Equipment

In the frame of project were planned funding for equipment procurement for all the participants at the partner countries Universities.

Universities in Serbia and Bosnia and Herzegovina procured various equipment such as: 3D printer, 3D scanner, laptop computer, desktop computer, printers, hardware for virtual infrastructure, projectors etc.

All this equipment has been planned to improve teaching process.



Fig. 3 3D printer Envisiontec ULTRA 3SP installed at University of Nis

E. Textbooks

One of the important project activities was publishing of textbooks in field of Industrial Product Development and Innovation management. Project plan includes publishing of 7 textbooks in framework of IPROD project, but the plan is exceed, so that 14 textbooks will be published:

- *Anišić, Z., Marjanović, N., Adamović, D., Miltenović, A., Banić, M.*: **Product Development** (Basics of Product Development, Product Development methods, Integrated Product Development). University of Niš, Faculty of Mechanical Engineering, 2015.
- *Mitrović, R., Burkardt, N., Banic, M., Miltenović, A., Tica, M.*: **Innovation Management**. University of Niš, Faculty of Mechanical Engineering, 2015.

- *Anišić, Z.*, Management of products and services. University of Novi Sad, Faculty of Technical Sciences, 2015
- *Milojević, Z., Rackov, M., Kuzmanović, S., Knežević, I., Navalušić, S., Vereš, M., Marković, B., Ivanović, L.*: Making Constructional Documentation. University of Novi Sad, Faculty of Technical Sciences, 2015.
- *Kuzmanović, S., Rackov, M., Knežević, I., Čavić, M., Kostić, M.*: **Special mechanical elements for agricultural machines**. University of Novi Sad, Faculty of Technical Sciences, 2015.
- *Mitrović, M., Mišković, Ž., Markovic, B., Tica, M.*: **Basics of technical regulations**. University of Belgrade, Faculty of Mechanical Engineering, 2015.
- *Ivanović, L., Kuzmanović, S., Vereš, M., Rackov, M., Marković, B.*: **Industrial design**. University of Kragujevac, Faculty of Engineering, 2015.
- *Stojanović, B., Blagojević, M.*: **Mechanical transmissions**. University of Kragujevac, Faculty of Engineering, 2015.
- *Marković, B., Milovančević, M., Jeremić, D.*: **Management of development projects**. University of East Sarajevo, Faculty of Mechanical Engineering, 2015.
- *Marković, B., Blagojević, M., Rackov, M., Mišković, Ž., Košarac, A., Đorđević, Z.*: **Machine Elements - Introduction for homework**. University of East Sarajevo, Faculty of Mechanical Engineering, 2015.
- *Marković, B., Ivanović, L., Milutinović, M., Prodanović, S., Trifković, S.*: **Engineering Graphics - Introduction for homework**. University of East Sarajevo, Faculty of Mechanical Engineering, 2015.
- *Tica, M., Rackov, M.*: **Eco-design of products**. University of Banja Luka, Faculty of Mechanical Engineering, 2015.
- *Tica, M., Mitrović, R., Miltenović, A., Banić, M.*: **Basics of solving inventor tasks theory**. University of Banja Luka, Faculty of Mechanical Engineering, 2015.
- *Obad, M., Vučina, A., Rašović, N.*: **Constructing of products for multi-layered production** University of Mostar, Faculty of Mechanical Engineering and Computing, 2015.



Fig. 4 Cover of textbook Management of development projects published on University of East Sarajevo

These textbooks can be used as very useful material in education of the students from Technical faculties to acquire professional competences and innovative readiness in field of Industrial Product Development and Innovation management. Also, this material is recommended for engineers from industry which is engage in development of innovative, market competitive products for solving of the practical problems.

IV. CONCLUSION

Based on presented project results, it can be concluded:

- One of the most important project results is introducing of new study programs in field of Management of Innovation and Product Development and Eco-product Development. Also, all PC universities finished modernization of the existing study programs in field of Product Development.

- More than 400 participants (unemployed persons and engineers from industry) attended trainings

- Professors from Technical Colleges attended 4 courses in field of Industrial Product Development are finished. As result of the courses, teaching process in Colleges are innovated and modernized.

- All PC Universities got significant equipment in framework of the project, which will contribute to the improvement of student program in this field.

- 7 PC universities published/will publish 14 textbooks in total, which will significantly contribute to the education of the students from Technical faculties, as well as engineers from industry to acquire professional competences and innovative readiness in field of Product Development

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