

# Education of engineers at the Silesian University of Technology for the needs of the labour market in the region

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**Abstract** — *Students' education is the basic mission of university. Currently we live in the era of knowledge society and as such this society sets new tasks for both universities and graduates. According to Bologna documents one the prime aims of tertiary education is preparing graduates for the needs of the labour market. The source of competitive advantage is knowledge and the ability to use it in an innovative way. Therefore, joining knowledge with entrepreneurship is one of our main goals at the Silesian University of Technology (SUT), which can be reflected in the way our mission has been defined: "The mission of SUT as a technical university is to educate future graduates who are capable of entrepreneurship and creation of innovativeness as well as to carry scientific research, financed from different sources and commercialization of their results"<sup>1</sup>. Carrying this mission, our university takes great care to enable students to obtain industrial experience in the most modern companies in our region and country, which gives them an opportunity to test theoretical knowledge with the expectations of employees and also forms important element of engineering education.*

**Index Terms** — *Knowledge society, engineering education mission.*

## INTRODUCTION

The paper presents elements of didactic process, which in an import way add to the realization of the assumed aim. The focus has been placed on actions supplementing the educational process with additional elements excluded from educational standards.

## ELEMENTS OF EDUCATIONAL PROCESS

Meeting the targets is possible owing to multidirectional actions, which will be discussed below.

1. Participation in realization of the Project by the Ministry of Science and Higher Education - 'Ordered education at the technical, mathematical and nature courses'.

The aim is to increase the number of students studying technical courses of key importance for the economy by means of creating preferable conditions for making education more attractive.

In the pilot study which was started in academic year 2008/2009 SUT was among 46 universities which took part in it.

The conditions were met at the following courses: Automatic Control and Robotics, Biotechnology and Biomedical engineering at the Faculty of Automatic Control, Electronics and Computer Science, Mechanics and Machinery Design and Mechatronics at the Faculty of Mechanical Engineering and Mechatronics at the Faculty of Electrical Engineering. 60 students were included in the program. In the competition for ordered courses for the academic year 2010/2011 the following courses have been chosen for financing: Automatic Control and Robotics at the Faculty of Automatic Control, Electronics and Computer Science, Mechanics and Machinery Design and Mechatronics at the Faculty of Mechanical Engineering, Computer Science at the Faculty of Electrical Engineering and Environmental Engineering at the Faculty of Energy and Environmental Engineering. Financial assets allocated to education at these ordered courses allow to give the best students additional high scholarships and to make classes more interesting by means of organizing:

- remedial courses on mathematic, physics, chemistry and foundations of automatic control,
- English language courses,
- scientific trainings and summer school courses,
- classes carried by prominent specialists from outside the university,
- courses providing additional vocational skills and qualifications,
- e-learning,
- students' participation in Polish and international conferences,
- lectures given by foreign lecturers,
- trips to companies and industrial placements.

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<sup>1</sup> Silesian University of Technology - innovative centre of education and science in the European Area of Higher Education, Declaration of Policy for the years 2009 – 2012, Gliwice, March 2009r.

All these factors significantly add to the increase in the level of teaching.

2. Organization of extra curriculum mathematics, physics and chemistry classes for pupils taking final secondary school exams in Gliwice

This project is a joint venture with City Council in Gliwice. The classes are carried by academics of SUT and in our premises. The aim is to promote our university as well as to improve the level of knowledge in the above mentioned subjects of potential candidates for students of SUT.

3. Realization of the program '21st century engineer' which allows to
  - enhance didactic offer of SUT by giving possibility to acquire practical knowledge
  - promotion of the best students and graduates by giving them a possibility to have internships in companies and thus providing a head start in their professional career

Employers offers paid internships in order to enable senior students and graduates to gain practical engineering skills and ensure close contact with advanced technology by solving tasks in a company.

Within the internships the participants realize standard program of training for employees and take part in courses chosen by the employers. They also participate in projects realized in a company and can get their individual tasks. The internship progress is assessed by both the management and the representatives of the SUT.

4. Organization of presentations of companies and trips to company premises

These are organized for students interested in particular issues for given course students, compatible with the company line of business. The aim is to get to know each other in the area of qualifications needed for future employees.

5. Organization of workshops and trainings in collaboration with companies.

They cover trainings in the line of business the company is in. The participants get additional qualifications and the company invests in the potential future staff.

6. Signing bilateral agreements on collaboration between the university and companies, which facilitates the exchange of experience of scientific output of SUT and the potential of a company for mutual actions leading to the development of both parties.

The collaboration covers the following domains

- agreement on the topics of R&D works,
- mutual choice of BSc, MSc and PhD theses realized for the companies by means of university potential
- mutual presentation and promotion of achievements,
- collaboration in the hiring of graduates,
- broadening the offer of specialized lectures,
- exchange of experience in the scope of knowledge management
- setting up a panel of specialists for strategic technical and organizational solutions
- collaboration in the area of improving educational programs and development of laboratories
- organization and participation in professional development vocational courses, courses for PhD students and other specialist courses
- cooperation in workshops organization for students, which develop their competence in order to enter the market
- mutual usage of equipment, facilities and library resources

7. Spreading academic entrepreneurship which covers such action as:

- a) annual organization of a contest 'My idea for business'. The aim is to evoke innovativeness and entrepreneurship among students, graduates and employees. It assumes realization of economic ventures based on the awarded works. The ideas should be easily implemented into practice and use environmentally friendly new technologies.

- b) creation of possibilities of attending trainings and workshops such as :

- 'Business Plan' prepares for individual writing of plans of entrepreneurial ventures
- 'Introduction to the entrance to the labour market' where techniques of staff recruitment, application documents and interviews are discussed
- 'Graduate- an employee or an employer' serves for development of knowledge and skills necessary for setting up one's own company and running private enterprise

8. Organizing Labour Fares and Employment Exchange events which constitute a site of mutual meetings of students and graduates with employers.

This event is a grand possibility for companies to present their development potentials, take on competent and committed employee as well as a chance for students and graduates to find internships or employment. They also show how the university adapts its educational offer to the requirements of the labour market and on the other hand, it shows what

possibilities for students and graduates of technical universities are offered by companies, which are known and recognized not only in Poland but also abroad

#### 9. Creation of Social Council of SUT

In order to fulfil the university mission it is necessary to cooperate with the region and its economy. Therefore, representatives of the University, local council, politics and different branches of industry are members of the council. Its aims have been formulated in the Declaration of Policy for the years 2009-2012. Within the scope of education the following tasks have been mentioned:

- a) formulation of proposals of changes in the educational offer of the university
- b) presenting suggestions about improving the organization of students' internships and realization of diploma theses

exchange of experience in the ways of creating entrepreneurial and innovative approach in students.

### **SUMMARY**

The presented actions complement the elements of educational process and their realization forms an essential condition of appropriate level of teaching. Joining these elements results in education of a graduate who is entrepreneurial, creative and innovative and therefore able to meet the requirements of contemporary labour market.

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