Collaboration Of The Faculty Of Electrical Engineering And Computer Science With Industry, Students' Practice And Mobility

Petr KREJCI[1], Ivo VONDRAK[2], Zdenka CHMELIKOVA[3], Pavel SANTARIUS[4]

[1~4]Faculty of Electrical Engineering and Computer Science,
VSB-TU Ostrava, 708 33 Ostrava-Poruba, Czech Republic

petr.krejci@vsb.cz [1], ivo.vondrak@vsb.cz[2]
zdenka.chmelikova@vsb.cz[3], pavel.santarius@vsb.cz[4]

Abstract

The Faculty of Electrical Engineering and Computer Science, which was founded as an independent faculty in 1990, is developing in line with the needs of restructuring of industry in the North Moravian region of the Czech Republic. A mutual active collaboration with large industrial and power companies and smaller private firms, as well as foreign partners is essential for the faculty in terms of education and also science and research.

Besides engineers the labour market is also seeing the assertion of bachelor course graduates, who, however, lack the possibility of gaining practical experience, particularly in full-time courses. Therefore, the Faculty of Electrical Engineering and Computer Science decided to offer students, as of the 2008/2009 academic year, the option of undertaking practice at companies as a substitute for a classical bachelor thesis. The interest of students and companies is immense. The faculty will also support practice in other countries, ideally in combination with a study residence abroad.

Also, the faculty provides the mobility of students and teachers in the Erasmus programme, which is included in the Lifelong Learning Programme (LLP). Students have interest, above all, in English speaking countries (e.g. United Kingdom and Ireland); our university has a few contracts with universities in these countries. Again, foreign students, who want to study at our faculty, generally come from southern countries (Italy, Greece, Spain, Portugal and Turkey).

Introduction

The history of the ***Technical University in Ostrava*** dates back to 1717, when the first mining school was founded in Jachymov following the Emperor's order. In 1849, the Emperor gave order to found a mining school in Pribram, and in 1865 it got the right to use the name Mining Academy. (The year 1849 is recognized as the official year of founding of our University, and so in 2009 we will celebrate our 160th anniversary). In 1894 the mining school was declared a university with all due rights. In 1904 the name was changed to the Mining University. After the end of World War II in 1945, the University was moved to Ost-rava.

Historically, electrical engineering was given a significant importance in University education from the very beginning of its dynamic application in production processes in mining, metallurgy and mechanical engineering. Students were acquainted with electricity and magnetism already in 1860 during physics lectures. In 1945, an independent department of electrical engineering was founded and in 1970 the field of High-tension Electrical Engineering was established at the Faculty of Mechanical Engineering. In 1977, the Faculty was renamed to the Faculty of Mechanical and Electrical Engineering.

The ***Faculty of Electrical Engineering and Computer Science officially*** began operation from 1st January 1991 after the splitting of the original Faculty of Mechanical and Electrical Engineering into two independent faculties. The faculty identifies to the century history of this University, follows in its traditions and complements the current Faculty of Mining and Geology, Faculty of Metallurgy and Materials Engineering, Faculty of Mechanical Engineering and Faculty of Economics. Later the new Faculty of Civil Engineering (1997) and the Faculty of Safety Engineering (2002) were established.

The Faculty is undergoing dynamic development. For example, the number of students enrolled into 1st year increased from 102 in 1989 to 894 bachelor students in academic year 2008/2009. This year the Faculty has 3161

students (bachelors, masters and post-graduate courses, full-time and combined form of study) and 151 lecturers. The offer of study courses has changed over the years, after completion of planned accreditation and ending of finishing courses we should be left with two main courses – Information and Communication Technologies, and Electrical Engineering. Courses are divided further into fields and offer education in all areas of electrical engineering and computer science. Also, the Faculty offers post-graduate study of electrical engineering and computer science.
In the science and research area, Faculty staff work on grant projects of the Czech Republic, participate in international projects and collaborate with certain institutions in Europe and the USA.

Cooperation of the Faculty with the Industry

The Faculty of Electrical Engineering and Computer Science is developing in line with the needs of restructuring of industry in the North Moravian region in the Czech Republic. Mutual active collaboration with industrial companies, as well as smaller private firms, is essential to the Faculty because:

- The Faculty receives up-to-date information on the need to train specialists and thanks to the credit training system, which is fully implemented at the Faculty, it can quickly (within 2 years) provide training of such specialists;
- The economic situation of universities does not enable quick technical equipping of new laboratories and renovation of older ones.
- Understanding of this situation and financial help from the industry well help solve this problem much faster.

No less important are other problems that can be solved in collaboration with industrial companies and private firms, e.g. financial support of socially weaker students, job offers for graduates, collaboration in solving grant research projects, etc. We also aware of the support of handicapped students at our University (particularly through financial support of necessary technical modifications on the University and hostel buildings) is very important.
Lately, job offers are a significant factor of collaboration between the Faculty and firms, because recent economic problems and the need to complete the restructuring of industry is leading to an increased unemployment rate in the North Moravian region and insufficient job vacancies are gradually starting to affect university graduates too.
Collaboration with companies has developed along with the development of the Faculty. The list of collaborating companies includes the branch offices of major international companies, like Siemens, ABB, as well as Texas Instruments, National Instruments and Bang and Olufsen. Recently we have seen a development of collaboration with companies from the IT industry. Quite obviously, the most intensive collaboration takes place with companies from the immediate vicinity of the University, i.e. North Moravian region. In terms of the development of the Faculty of Electrical Engineering and Computer Science, Northern-Moravian power Company has been and is a significant partner, with whom collaboration is running for a number of years, basically from the start of the Electrical Power course in 1970. Privatization of industry and power sectors after 1989 has also lead to the establishment of new private firms, of which numerous ones have gradually become significant Czech firms.
Contacting with these companies is supported by faculty management; practical implementation typically continues between individual departments and these companies.

Current ***forms of collaboration*** can be summarized as follows:

a) Pedagogical area

- Training of experts according to the needs of the industry at bachelors, masters and post-graduate levels (lately, electrical engineering students are required to extend their training in computer science, telecommunications, economics and law)
- Collaboration in preparing bachelors and diploma thesis (topics of most diploma thesis are given by external industry experts)
- Lectures by specialists at masters and post-graduate level, which brings a pleasant change to lectures and presentation of current industry needs
- Specialized lectures and courses held by the faculty for the industries

b) Science-technical area

- Collaboration of faculty experts during solution of technical industry problems
- Expert reviews of projects

- Cooperation in solving scientific grant projects.

IT4Innovations

Information technologies play a key role in industry in the Moravian-Silesian Region and in the development of the Czech Republic as a whole. The requirements of the application sphere and foreign investors are connected with the rapid growth of IT technologies, yet science and research have not responded adequately to this newly emerging situation. Research and development activities in IT are scattered and piecemeal, and there is no de facto unified platform for the support of these activities that could act as a high-quality partner for the application sphere and the IT industry, including its customers. Additionally, the growing complexity of the tasks solid in the application sphere – in industry and society – brings with it a growing need to create a modern computer infrastructure based on high-powered supercomputers, including the development of related scientific disciplines. The lack of a supercomputer center represents a key competitive disadvantage of the Czech Republic. The IT4Innovations Center of Excellence will solve this problem and respond to these needs, representing a tool for the integration and development of IT research. The infrastructure created by IT4Innovations will thus not only function as a high-quality partner for the application sphere, but will also motivate industry to develop new and innovative products and solutions based on the effective use of these modern technologies.
The basic goal of the project in activities related to the development of the information society (IT4People) is to carry out research and development of IT for the following three key areas:

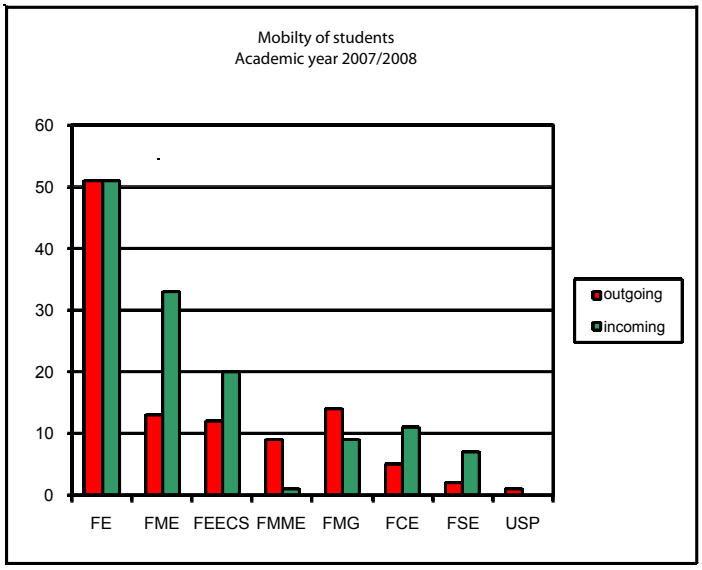
- IT4Disaster Management (Information Technology for Disaster Management): IT for modelling and management of crisis situations.
- IT4Traffic Management (Information Technology for Traffic Management): IT for monitoring and intelligent management of traffic.
- IT4Economy (Information Technology for Economy): IT for financial simulations and agile logistical computations.

Participants of the projects are V_B – Technical University of Ostrava, University of Ostrava, Silesian University of Opava, and the Institute of Geonics AS CR. The main solver of this project is the Dean of our faculty, Prof. Vondrak. For more information on the project please visit http://www.it4i.eu/en_index.php.

The mobility of students and teachers

Also, the faculty accomplishes the mobility of students and teachers above all in the Erasmus programme, which sooner was included in the Socrates programme; from this year the Erasmus programme is included to the new Lifelong Learning Programme (LLP). Students have interest above all in English speaking countries (e.g. United Kingdom); we have a few contracts with universities in these countries. Again, foreign students, who want to study at our faculty, come generally from south countries (Italy, Greece, Spain, Portugal and Turkey).
Within the frame of Erasmus programme under the academical year 2005/2006 13 students were sent for foreign educational studentship and we received 7 foreign students. In the academical year 2006/2007 13 students were sent for foreign educational studentship and the number of received foreign students grown to 17. In the academic year 2007/2008 we had 12 outgoing and 20 incoming students, but in the academic year 2008/2009 we have 28 outgoing and 25 incoming students. The biggest branch interest of foreign students is in technical subjects from Department of computer science, Department of telecommunications and Department of measurement and control. Following Figure 1 shows number of student's mobility in the academical year 2007/2008 in singles faculties. More information you can find on http://en.vsb.cz/information-about/study/mobilities.

Figure 1: Mobility of Students



FE - Faculty of Economics, FME - Faculty of Mechanical Engineering, FEECS - Faculty of Electrical Engineering and Computer Science, FMME - Faculty of Metallurgy and Materials Engineering, FMG - Faculty of Mining and Geology, FCE - Faculty of Civil Engineering, FSE - Faculty of Safety Engineering, USP – University Study Programmes.

The table below shows the total numbers of outgoing students and pedagogues from the entire university in individual academic years. As regards the mobility of pedagogues, a growing interest in these activities can be seen.

Academical year	**98/99**	**99/00**	**00/01**	**01/02**	**02/03**	**03/04**	**04/05**	**05/06**	**06/07**	**07/08**
Number of students	38	46	64	74	90	90	97	119	95	107
Number of pedagogues	9	27	39	30	52	63	63	73	75	65

The mobility of employees need not be a benefit only in the pedagogical field, but it can lead, for example, to joint projects. The result of this long-term collaboration is the joint project of the Technical University of Ostrava and the Technical University of Opole on rationalization of power usage (reg. No 21711C5027) under the close-border collaboration programme INTERREG IIIA, which was prepared and approved in 2005 (see attached Figure 1). Collaboration between these universities continues; a project of the EU operational programme has been adopted for the years 2008 – 2011.

Figure 2: Border Line Between Czech Republic and Poland

Current forms of collaboration can be summarized as follows:

a) Pedagogical area
- Exchange of lecturing professors
- Contacts between students through specialized excursions

b) Science-technical area
- Creation of joint research workgroups
- Creation of a research laboratory for optimal power usage
- Joint measurement, particularly measuring of parameters of quality of supplied electricity
- Exchange of research staff and post-graduate students

c) Promotion and information activities
- Joint hosting of specialized seminars

- Joint hosting of international conference “Power Forum” in Poland with the participation of experts from Poland and Czech Republic

Students’ Practice

Besides engineers the labour market is also seeing the assertion of bachelor course graduates, who, however, lack the possibility of gaining practical experience, particularly in full-time courses. Therefore, the Faculty of Electrical Engineering and Computer Science decided to offer students, as of the 2008/2009 academic year, the option of undertaking practice at companies as a substitute for a classical bachelor thesis. The interest of students and companies is immense. The faculty will also support practice in other countries, ideally in combination with a study residence abroad.

We have introduced individual professional practice as a form of studentship which students arrange on their own and the guarantor of the study field approves suitability of the selected workplace that the student has chosen for this practice. Students arrange all particulars and related activities individually. Concluding an employment contract and the amount of remuneration are fully in the employer’s competence.

The student must attend practice with a company at least 50 days during winter and summer terms. The student must prove the attendance of practice by the appropriate confirmation. Practice is completed by drawing up a final report by the student and its assessment by the employer. Similarly to the bachelor thesis, the final report is defended before a commission as part of state final examinations.

Although these practices were only introduced in the second half of last year, there is a great interest of both students and companies. Within a short time, nearly 200 positions could be offered in collaboration with companies and about 130 students have made use of these offers.

Conclusions

The Faculty of Electrical Engineering and Computer Science is developing in line with the needs of restructuring of industry in the North Moravian region of the Czech Republic. A mutual active collaboration with large industrial and power companies and smaller private firms, as well as foreign partners is essential for the faculty in terms of education and also science and research.

The Faculty of Electrical Engineering and Computer Science decided to offer students, as of the 2008/2009 academic year, the option of undertaking practice at companies as a substitute for a classical bachelor thesis.

Also, the faculty provides the mobility of students and teachers in the Erasmus programme. Students have interest, above all, in English speaking countries (e.g. United Kingdom and Ireland). Again, foreign students, who want to study at our faculty, generally come from southern countries (Italy, Greece, Spain, Portugal and Turkey).