

# The Results of Curricula Innovation of Faculty of Metallurgy and Material Engineering of VSB – Technical University of Ostrava

Jaroslav Kalousek<sup>1</sup>, Jana Dobrovská<sup>2</sup>, Hana Kulveitová<sup>3</sup> and Ludovít Dobrovský<sup>4</sup>

<sup>1</sup>Head of Department, Professor, VŠB – TU, Czech Republic, <http://www.vsb.cz>

Tel: (+420)69-6991529, FAX: (+420)69-6918592, 6910391, e-mail: [jaroslav.kalousek@vsb.cz](mailto:jaroslav.kalousek@vsb.cz)

<sup>2</sup>Associated Professor, VŠB – TU, Czech Republic, <http://www.vsb.cz>

Tel: (+420)69-6991220, FAX: (+420)69-6918592, 6910391, e-mail: [jana.dobrovska@vsb.cz](mailto:jana.dobrovska@vsb.cz)

<sup>3</sup>President of the Academic Senate, VŠB – TU, Czech Republic, <http://www.vsb.cz>

Tel: (+420)69-6994302, FAX: (+420)69-6918592, 6910391, e-mail: [hana.kulveitova@vsb.cz](mailto:hana.kulveitova@vsb.cz)

<sup>4</sup>Dean of Faculty, VŠB – TU, Czech Republic, <http://www.vsb.cz>

Tel: (+420)69-6995373, FAX: (+420)69-6918592, 6910391, e-mail: [ludovit.dobrovsky@vsb.cz](mailto:ludovit.dobrovsky@vsb.cz)

**Abstract:** The Faculty – part of VŠB – Technical University of Ostrava – is located in north-Moravia region of Czech Republic, which has since the beginning of 19<sup>th</sup> century developed as a basis of heavy industry, coal mines, metallurgy, chemistry and machinery production. In the years following after World War II the production of these branches had overdone due to apportionment of the state to the global soviet economics. After the political and economical changes following the year 1989 the necessity of evolutions, analogical in past for the similar industrial regions – Lothringen (France), Ruhrland (Germany), Pittsburgh (USA) has appeared.

The Faculty responded this evolution more systematic in the years 1993-1994 the intentions have been presented on the ICCE 98 conference in Rio de Janeiro.

A certain degree of curricula stabilisation has been reached at present: three main branches of engineer's education are performed: Material Engineering, Metallurgical Engineering, Process Engineering. The Technical University is a state university. The highest state educational authorities have approved all the programs, besides the Faculty has won an international approval of Euro-engineers.

The contemporaneous contribution is about to deal more the details of partial programs, emphasis on theoretical basis, results of education and interests of students in technical fields of activity.

**Keywords:** conference, education, curricula.

## 1. Introduction

Technical University of Mining and Metallurgy in Ostrava is the oldest educational institution of this type in the world. It has celebrated the 150<sup>th</sup> anniversary of establishing in the year 1999. At this occasion also the ICEE '99 conference took place in Ostrava.

The historical development of the University and Faculty of Metallurgy and Material Engineering has been presented on ICEE '98' conference in Rio de Janeiro [1].

## 2. Development and Results of Curricula [2, 3]

The last decade of development of the Faculty of Metallurgy and Material Engineering (FMMI) can be split in two stages. After November 1989 a general fall in interest in study of technical domains was evidenced which touched even the FMMI, when the minimum level in the number of students was registered in 1995 (some 967 students). The system changes in educational programs, curricula and organisation structure of the Faculty have been undertaken gradually since the year 1993.

By the present-day sector of the professional and educational activity the Faculty covers the trends applied in the scientific, technical and social development and covers the needs of restructuralization and the latest demands for the Czech industry as well as development of the Ostrava and North-Moravian region.

The educational process of the Faculty is going primarily out from the position of the engineer's study. The engineer's branches of education – associated with the branches of doctorand's study and with the bachelor's graduation – are considered to be conformity with the declared domain of the Faculty in three key/s branches such as: **The Metallurgical Engineering** (metallurgy of iron and steel and/or of non-ferrous metals, the foundry practice and metal forming) covers the qualitative displacement of the theoretical basis and the qualitative changes in the iron and steel production and in the useful parameters of such production.

**The Material Engineering** is focused on development, utilisation and the diagnostics of ferrous and non-ferrous metals, as well as on new technical materials such as glass plastics, ceramics incl. of materials with specific properties and/or the composite materials.

**The Process Engineering** includes both the chemical engineering and acquisition of the state-of-the-art knowledge in material testing routes, in the technology of fuels and in ecology of technological processes.

The other branches, already mentioned and foreseen in the previous paper [1], have been also introduced in life.

Concise specification of these branches, apart from the just mentioned three key domains, refers to the sphere of power engineering and heat-recovery facilities, utilization of the secondary raw materials and energy, the technological routes of waste treatment, the designing activity in the field of automatized control systems. The traditional technical and economical branch of the Faculty is focused now to the manufacturing economy, the logistics and management. The Faculty has met the actual demand of the practice by implementation of the new Quality management branch.

The structure of above mentioned educational programs is as follows: [4]

Physical and Material Engineering

Metallic materials  
Non-ferrous metals  
New technical materials

Metallurgical Engineering

Metallurgy of Iron and Steel  
Foundry  
Metal Forming  
Thermal technique  
Industrial Ceramics and High-Temperature Resistant Materials  
Automation and Computer Technique in Metallurgy  
Economics and Management in Metallurgy

Process Engineering

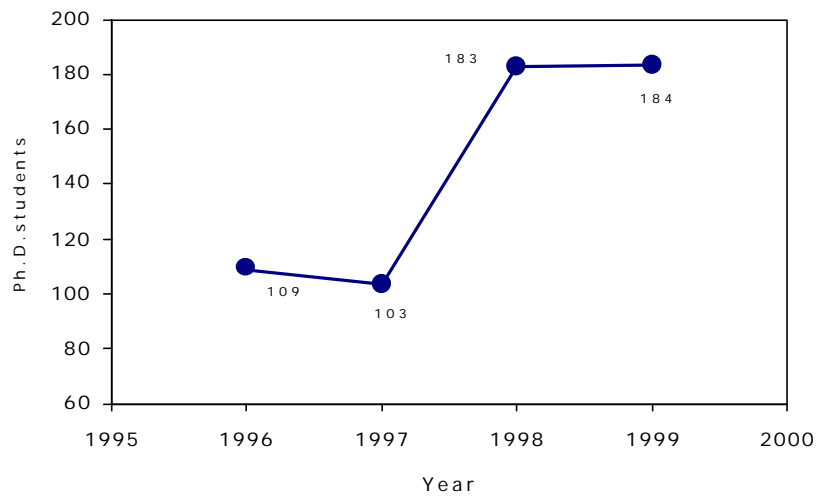
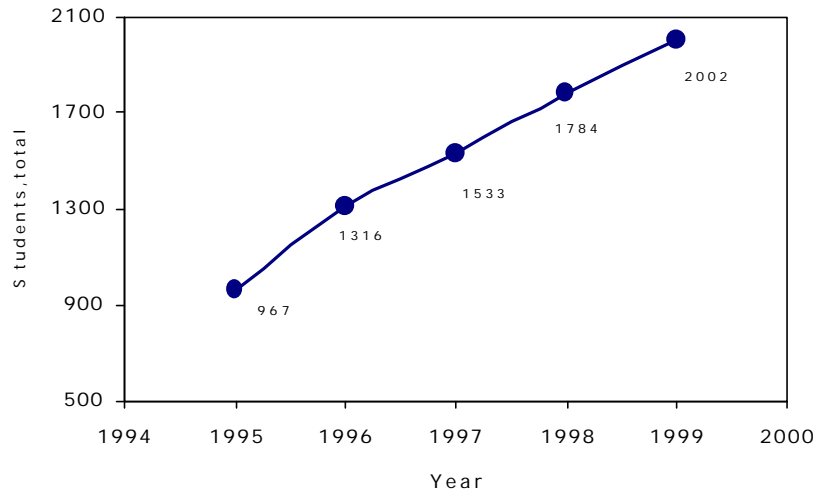
Chemical Engineering  
Chemistry and Technology of Fuels  
Chemical and Physical Methods of Material Testing  
Chemistry and Technology Environment Protection  
Quality Management

Principally these three domains have their evaluation in Ph.D. curricula. Also the three years bachelor's degree, mainly oriented on metallurgy, are provided for interested students. The Faculty offers also the possibility of external study.

The effort of Faculty management since the year 1993 in adaptation of curricula to the contemporaneous requirements have already brought the results in increasing number of students, as shown in following table and figures:

Table: Number of students

Year	1996	1997	1998	1999
Students, total	1316	1533	1784	2002
Ph.D. students	109	103	183	184



Compared with the year 1995, the number of students has doubled. The increasing number of Ph.D.- students can be considered also as the very positive factor.

The favourable trend continues also in the year 2000 in the three main faculty's domains of internal courses:

Metallurgical Engineering	604	students
Process Engineering	348	students
Physical and material Engineering	265	students

### 3. Research activities [2, 3]

For continuous improvement of quality in the educational process of the Faculty there is of utmost significance its scientific and research activity realized on the basis of an extensive **international cooperation**. The working sites of the Faculty belong to the leading centres of the scientific and research activity in branches to which the doctorand's study is bound. The chairs of the FMMI belong to the first bearers of significant grant projects at the Mining College – Technical University (VŠB-TU) as well as grant projects issued by the Ministry of Education of the Czech Republic; the chairs play significant role as the applicants – the participants of solution in the framework of international cooperation – in the grant programs such as TEMPUS, PHARE, COPERNICUS, SOKRATES, BARRANDE, LEONARDO, EUREKA, COST, ACTION. This refers to the basic and applied research – development in the field of metallurgy, in new materials and the state-of-the-art technological routes – as a mirror image of the urgent processes of restructuralization of the metallurgical, engineering and chemical industry of the Czech Republic and/or the Ostrava region.

Attention is devoted in especially to the manufacturing routes such as continuous casting of steel, metal forming and heat treatment of formed materials from one temperature, continuous casting of steel sections and of graphitization alloys; ever more stringent requirements are laid on the useful and custom-tailored properties of the structural materials (castings), the metal filtering, development of new metallic materials with formed memory and of ceramic materials (the „pure ceramics“) and manufacture of composites. The significant activities in this field resulted nowadays into two drafts of project of the institutional research that should rectify the scientific activity of the Faculty for the next five years. This refers to the projects such as „New Materials Produced by means of the Crystallization Processes“ and „The properties of intensively formed materials“. Solution of these projects will be associated with the crystallization processes and their effect on the quality parameters of metallic materials incl. of development of intensive and power-saving forming routes destined especially to forming of continuously-cast semiproducts immediately associated with the continuous-casting processes. In this connection FMMI got in extensive contacts with numerous foreign, European and overseas university institutions and research sites such as the TU Bratislava, Košice, Politechnika Katowice, Gliwice, Krakow, Opole, Ecole Central Paris, Ecole des Mines Nancy – Paris, TU Wien, Leoben, TU Clausthal, Aachen, Freiberg, TU Mons, Gent, TU Cordoba, TU Nottingham, Sheffield, Leeds, TU Stockholm, TU Roma Casino, South Illinois University Carbondale in the U.S.A.

The scientific and research activity of such a level provides the professional and educational reputation of the Faculty and the University, creates preconditions for permanent improvement of the educational process and the image of a graduate of the Faculty. It provides professional grow of the schoolmasters and educationalists, it produces encouraging effect on acquisition of reliable language knowledge for the schoolmasters and the students indispensable for realization of short-term professional stay abroad and provides permanent improvement of the technical facilities and instrumentation of the Faculty.

### 4. Conclusions

The paper evaluates the curricula innovations on the Faculty of Metallurgy and Material Engineering, VŠB-TU Ostrava. The effect has been demonstrated in increasing number of students and growing interest in technical domains. The result referred have been achieved in cooperation of Faculty management and Academic Senate, which according the Czech law represents all Academic community of Faculty.

### 5. References

- [1] Kalousek, J., Dobrovský, L., “The Influence of Industry Transformation in North-Moravian Region of the Czech Republic on Engineering Education of the Faculty of Metallurgy and Material Engineering”, Proceeding of ICEE '98', Rio de Janeiro, **1998**.
- [2] Dobrovský, L., “The 150<sup>th</sup> Anniversary of the VŠB – Technical University in Ostrava”, Acta Metallurgica Slovaca, No. 5, **1999**, p. 2.
- [3] Dobrovský, L., “150 výročí VŠB – Technické university v Ostravě”, Hutnické listy, No. 7-8, **1999**.
- [4] Annual report of VŠB – TU 1999, January **2000** (Internal Press)