

SMART PARTNERSHIP FOR HIGHER EDUCATION: EUROPEAN MINERAL MASTERS ENGINEERING COURSE

Европейские курсы инженеров-магистров в области минералогии (EMMEC) – это современная и привлекательная форма высшего образования европейского уровня, которая ориентирована на студентов следующих специализаций: горное дело, минералогия и геотехника (охрана окружающей среды). Эта образовательная программа возникла сравнительно недавно, но система взаимодействия университет – промышленность, на которой она основана, развивается уже на протяжении девяти лет. В настоящее время EMMEC напрямую включает девять университетов, расположенных в семи европейских странах, и координируется Федерацией европейских минеральных программ (FEMP), которая также объединяет университеты из стран третьего мира и 25 компаний. EMMEC пытается получить признание в рамках недавно запущенной программы «Erasmus Mundus», которая ставит своей целью поддержку лучших европейских магистерских курсов и повышение привлекательности европейского высшего образования в странах третьего мира.

The European Mineral Masters Engineering Course (EMMEC) is a modern and attractive form of higher education on the European level, which addresses students of the three following disciplines: mining, minerals engineering and geotechnical/environmental engineering. This educational program came into existence only recently but the University and Industry Network it is based on, has been built over the past nine years. At present the EMMEC involves directly nine universities located in seven European countries. It is coordinated by the Federation of European Minerals Programs (FEMP) which also associates universities from third countries and 25 companies. The EMMEC has applied for recognition under the newly launched EU program «Erasmus Mundus» which aims to support European top-quality Masters Courses and enhance the attractiveness of European higher education in third countries.

INTRODUCTION

In course of the previous decade many of the European technical universities, offering education for mining, mineral processing and metallurgy students, observed two main contrasting tendencies. A rapid decrease in a number of freshmen willing to study disciplines related to mining and metallurgy was accompanied by a growing demand of the Industry for high educated graduates of the mineral engineering studies, which should also be prepared for mobility due to the omnipresent globalisation. At the same time it was noticed that although the large mining and manufacturing companies moved to the expansion and investments outside Europe, their great significance for the EU members stayed undeniable. Therefore it was vital to assure mainte-

nance of the very high level of knowledge and skill base in mining engineering and mineral technologies.

The answer to this critical situation was developing well-balanced and attractive educational programs: the European Mining Course (EMC – 1996), the European Mineral Engineering Course (EMEC – 1998) and the European Geotechnical and Environmental Course (EGEC – 2003). Experience gained over the past nine years and the network built for the mentioned programs have served as a base for bringing into being the joint European Mineral Masters Engineering Course (EMMEC) with its three areas of education: in mining, minerals engineering (including mineral processing, metallurgy and recycling) and geotechnical/environmental engineering.

Table 1

The modular programmes of the EMMEC and their locations

	NAME OF THE MODULAR PROGRAMME	PARTNER UNIVERSITIES
1.	European Mining Course (EMC)	RWTH Aachen, Germany Delft University of Technology, The Netherlands Helsinki University of Technology, Finland University of Exeter, Camborne School of Mines, UK
2.	European Mineral Engineering Course (EMEC)	RWTH Aachen, Germany Delft University of Technology, The Netherlands Helsinki University of Technology, Finland
3.	European Geotechnical and Environmental Course (EGEC)	TU Berlin, Germany TU Bergakademie Freiberg, Germany Kosice University of Technology, Slovakia Miskolc University of Technology, Hungary Wrocław University of Technology, Poland

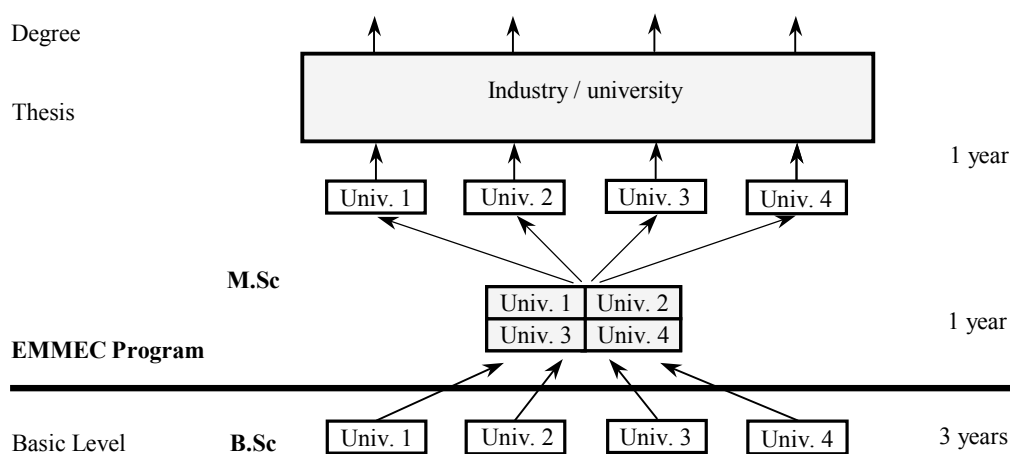


Figure 1. The structure of the EMMEC programmes

EMMEC ARRANGEMENTS

The EMMEC is based on experience with joint curriculum programmes in which, since 1996, 270 students from 14 countries participated. It is organised as a fully integrated multiple location course lasting two years and structured around the three modular programmes (EMC, EMEC and EGEC) offered by nine partner universities (table 1).

The co-operation is based on the belief that the linked universities offer a similar standard of knowledge and cover the same basic courses of study. Each of the participating universities has areas of expertise (complementary to each other) in which it is quite outstanding, and therefore can be considered to be a centre of excellence.

The concept of the educational pathway with the EMMEC as a Master Course is presented at the figure 1.

Before taking part in the EMMEC, students spend the bulk of their university studies at their home university, where they obtain the basic engineering skills and a fundamental understanding of mineral resources science leading to the first degree (B.Sc.). At this stage the students may register for one of the three programmes under the EMMEC.

The course lasts two years and consists of two parts:

1st year of the coursework offered as modules at 3-5 different universities engaged in the partnership (60 ECTS points); the enrolled students as a group spend 2-3 months at each of the universities to study the various specialisations;

2nd year including the thesis project at one of the partner universities (60 ECTS points). During this part of the course the students choose to develop special expertise in one as-

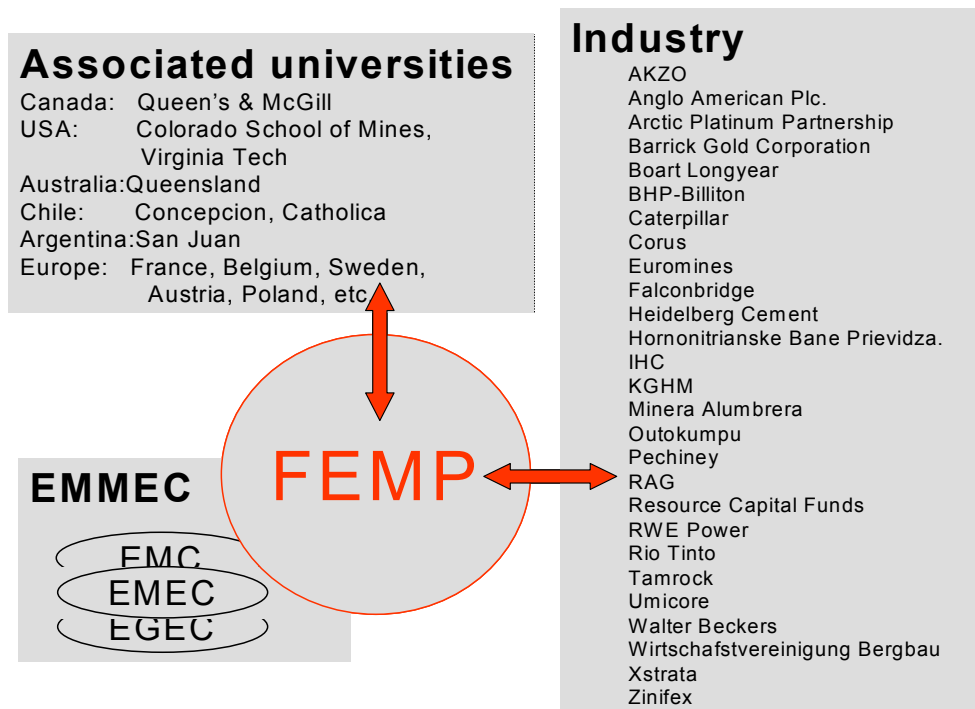


Figure 2. The Structure of the Federation of European Mineral Programs (FEMP)

pect of Minerals Engineering. They carry out the (masters) thesis work under guidance of one or more of the universities (not necessarily in their home country), which are most specialised in that particular field. Also at this stage industry may be involved with student theses. The student gets M.Sc. awarded by those universities at which he/she spends at least 30 % of the total time.

Upon completion of the EMMEC course the student has acquired a good general understanding of the various processes involved in the exploration, exploitation, extraction and/or recycling of mineral resources at an advanced academic level.

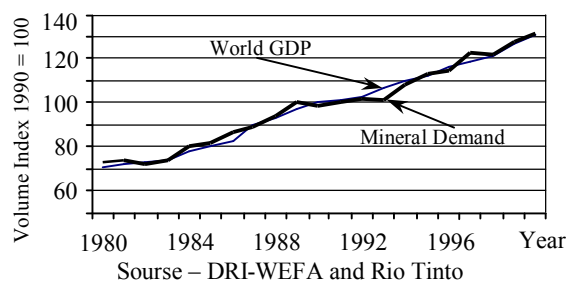
In order to facilitate contacts between students, teachers and alumni a «virtual learning environment» called BlackBoard is in use. BlackBoard improves the efficiency of the organisation. All 9 universities can access the system and put for instance: course materials, information about internships offered by the Industry, grades, etc. on it. The system contains all 47 modules/subjects as well as general programme information for EMC, EMEC, EGEC and FEMP and for the alumni. The BlackBoard site can be reached at: <http://blackboard.tudelft.nl>. One of

the future developments is to use the organization, infrastructure and e-learning techniques (BlackBoard) already in place with the programmes as a base for developing online courses offered by the consortium of organising universities.

Maintaining contacts between the alumni and the Industry is considered as one of the strong features of the EMMEC. For that purpose each year a reunion is organised at a central location in Europe. All current year students are participating, as well as alumni and representatives of Industry and Academia.

FEDERATION OF EUROPEAN MINERAL PROGRAMS

In order to formalise the relations between the participating universities in 1999 the Federation of European Mineral Programs (FEMP) was established. This led ultimately to a full scale integrated European network of mineral programmes offered by a number of universities and with assistance of the industry. It has become a first in the world on that scale incorporating: 9 European universities directly involved in organising the EMMEC courses, a number of associated universities from all over the world and above 25 companies (figure 2).



Graph 1. World GDP versus Mineral Demand

The FEMP's main goals include: (1) straightening ties between the partners and opening up possibilities for other (European) universities, (2) getting a formal involvement in the programme through participating students, exchange of staff and other actions, (3) setting up the formal contact between industry and the European universities.

EMMEC TOWARDS INDUSTRY DEMAND

In 2004 the four major mining companies with offices in London (Rio Tinto, Anglo American, BHP-Billiton and Xstrata) joined forces in the Minerals Industry Education Project, setting up a Working Group on global university education. These companies are very concerned about the future supply of good graduates and are actively supporting the organisation of FEMP with targeted funding. This group also carried out the global survey to get a good picture of the future supply and demand for mineral engineers [1]. According to this survey during the next decade the demand for mining, minerals processing and metallurgical engineers will be significantly higher than the supply, also because many of the professionals in industry are about to retire within the next 5 years. Meanwhile mining is a growth industry; minerals demand continues to increase in line with the growth in World GDP, as illustrated in the Graph 1.

The importance of opportunities for students to carry out internships is also becoming evident to the Industry. Each year Rio Tinto and Anglo American offer over 30 fully funded internships worldwide. The internships are crucial for the students, but also for the companies, who see it as an ideal opportunity to spot potential candidates for positions while they carry out useful projects. Students go to a/o: USA, Chile, South Africa, Brazil, Ireland, Botswana, Poland, etc.

ERASMUS MUNDUS – GREATER OPPORTUNITIES FOR OVERSEAS STUDENT

In 2004 the European Commission started the new Erasmus Mundus program. Erasmus Mundus is to stimulate the offering of joint Master Programs by European universities and offer students and teachers from outside the EU a greater opportunity for mobility. The duration of the programme is five years (2004-2008) with a planned financial envelope of 230 million Euro for the whole period. Around 250 Erasmus Mundus Master Courses will be established. They will receive funding from the Community and an «EU» seal.

The operating practises of the Erasmus Mundus program are in consonance with existing joint European Minerals Engineering Courses therefore the nine European universities have proposed to offer their programmes as an Erasmus Mundus Master Course. In the EMMEC practice, universities that have an exchange agreement with one of the organizing universities are considered to be associates. There is exchange taking place between students of the organizing universities and the associated universities. However Erasmus Mundus program offers greater opportunities for further developments through the enhanced mobility of students and scholars from third countries.

CONCLUSIONS

Based on the nine year experience of the European Mineral Programs it can be concluded that:

- GLOBAL INDUSTRY LOOKS FOR GLOBAL EDUCATION
- If nothing is done to join forces in education, *extinction* will follow.
- Things don't happen automatically.
- Initiative has to come from universities.
- Co-operation of universities is essential!!
- Many benefits for students.
- Industry is more than willing but wants to see initiatives first.

LITERATURE

1. Private communication by the Working Group of the Minerals Industry Education Project, December 2004.
2. Ruiter H., de. *Die Internationalen Studienangebote EMC, EMEC und EGEC*, Geotechnologie a Environment Medzinárodný Seminár, Banská Štiavnica / Košice 13 November 2003.
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