

## **ENHANCED MOBILITY, A KEY TO EUROPEAN PROGRESS.**

### **TRAINING OF THE FUTURE EUROPEAN SHOTFIRER AS PART OF EUROPEAN DEVELOPMENT.**

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#### **1. INTRODUCTION**

European progress and development is closely linked to enhanced mobility, improved quality and the development of infrastructure.

Infrastructure in this context has many aspects.

- On the software side, efficient and reliable governing systems, education and research, health, safety, social welfare and more.
- On the hardware side technical infrastructure like energy supply, communications, water supply, city and rural development etc.

The construction industry is one of the key factors in the development. Direct and indirect are millions of us engaged. Today we are focusing on quality and competence for one group within this sector – the European shotfirer. We are about to present the output of a European development project aimed at standard education for enhanced mobility.

The team that has prepared the ESSEEM documents is abundantly qualified, in theory and practical experience. One problem is to establish cut-off lines between necessary to know and better to know in the context of knowledge and competence.

The team has not yet drawn the lines and we certainly need some outside advice. We are unable to present the full output of the project, the lecturers through their presentations will give a résumé of the actual work package. We do hope sufficient to release valuable comments and suggestions from the audience. During this introduction to the presentations we have to start with EFEE

#### **2. EFEE, THE EUROPEAN FEDERATION OF EXPLOSIVES ENGINEERS.**

This is a federation where the core group of members is national societies from more than twenty European countries aiming at improved safety, technology, mobility in the use of explosives in Europe. EFEE believes in competence, efficiency and equal opportunities with European focus.

During a number of years EFEE has questioned the rational reasons behind the fact that, in spite of the European openness, companies face problems when crossing national borders using own shotfirers and blasting staff.

Whether rock blasting or demolition of outdated structures, the physical laws governing the blasting operation are the same, independent of country, independent of borderlines, without national preferences . Rock quality, geology, steel or concrete quality may be different from one project to another, however, not governed by nationalities.

EFEE appreciates that governmental systems are different, that language problems exist, that laws and regulations have national peculiarities and that the overall security situation must be taken into consideration. We do not appreciate that training requirements, technical competence and certification should be different from one country to another in matter blasting operations.

EFEE has in mind to contribute positively to European development. Through a period of five years and numerous meetings the training requirements for European Shotfirers were developed. The Federation observed that this work had to be followed up by assisting in the development of training means. That is what the ESSEEM project is designed to undertake.

### **3. ESSEEM, A DEVELOPMENT PROJECT SUPPORTED BY EU**

Some of you may be well acquainted with the EU programmes supporting European development. “Sokrates” now “Lifelong Learning Program (LLP); Erasmus and Leonardo da Vinci are some of the labels.

Some years ago EFEE was included as partner in the EUExcert- project, a project for defining the necessary competencies and training of staff producing explosive materials. Through this project and by KCEM, the EUExcert project coordinator, we were advised to organize a Leonardo project and apply for support. The application procedure is reasonable and well prepared, however for first-timers not easy and rather time consuming.

The ESSEEM application submitted to the National Agent, SIU, is dated 14. March 2008. The approval letter is dated 19. August same year, some budget modifications to satisfy the Leonardo authorities were submitted during the following month. The contract was signed by SIU on 24. November 08 and partner contracts with the 11 partners were prepared during the following two months. A project kick-off meeting took place in Berlin 27.-28 November 2008. From this time onwards, each of the partners has been working on the assigned part called work package.

We are now in the closing stage, the contract period ends on 14. November 2010.

*The EU- programmes are now open to 31 European countries, these are the 27 EU-countries, 3 European Economic Zone countries and 1 EU-candidate country (Further 6 countries may be included in the near future.)*

#### 4. THE ESSEEM PROJECT PARTNERS

The Leonardo da Vinci representative and Contract partner is the National Agent (NA) in Norway “**The Norwegian Centre for International Cooperation in Higher Education**” (SIU). SIU is a public agency that promotes international cooperation in education and research. Ms Anne Kloster Holst and Ms Trude Engebretsen are the-daily-base SIU representatives.

- **NFF Project.** NFF is a society of individuals, companies, institutes and agencies working with blasting and rock engineering. The society is the contract counterpart and promoter of the project. Official NFF representative is Ms Ruth G. Haug (also a lady and the active President of NFF at the time of contract signing. Most of the work though is covered by the undersigned. (Previous consumer of explosives for heavy construction projects)
- **KCEM, Sweden.** KCEM stands for Competence Centre for Energetic Materials. KCEM is a network and a meeting centre for companies, universities, authorities and all persons within the Energetic Materials sector. KCEM’s objectives are: to support education and training of personnel from all levels and backgrounds, not at least within the energetic materials segment. In the ESSEEM project Erik Nilsson, head of KCEM has played an important role being responsible for project dissemination. Today he is the conference moderator.
- **Kure Rock Blasting Technique, Norway.** This is an expert company, usually called upon by insurance companies and contractors when blasting problems pop up. They are undertaking advisory services, specialising in difficult blasting. Frequently retained for judging incidents, risk analysis and expert advice on compensation disagreements. Head of the company, Mr. Karl Kure contributes to the project on the section cautious blasting in sensitive areas.
- **Werner Sprengtechnik, Germany.** This company is active within demolition using explosives rendering advisory services on demolition operations within and outside Germany. Walter Werner personally active in the ESSEEM project is a certified expert on blast planning and follow-up. It should be mentioned that he is active in the German Sprengverein and also initiator and founding member of EFEE that 2 years ago celebrated its 20<sup>th</sup> anniversary in his Stolberg home town.
- **Ledap-Laboratorio de Energetica e Detonica, Associação de Apoio.** This is an institute at the University of Coimbra, Portugal undertaking research and development within energetic materials. The Coimbra University, some 200 km north of Lisboa dates back to 1290 A.D., is one of the worlds oldest universities. Professor Juan Carlos Miranda Gois, PhD Mechanical Engineering, is the key person for section minerals and geology. He has been assisted by Celeste Gomes, PhD in geology and Helder I. Chaminé, Phd in Geology.
- **Dresdner Sprengschule.** This is an international acknowledged educational institution covering most aspects on the handling of explosives. There are faculties of blasting technology, explosive ordnance disposal, pyrotechnics, transport of dangerous goods and civil engineering activities. Jörg Rennert, well known in the blasting trade at least in the German-speaking part of Europe, is involved in several sections of the project.
- **SANDVIK Mining and Construction OY, Finland.** Modern blasting operations are based on highly developed technology. This includes first class machinery and equipment. Europe has several outstanding companies producing hardware for the markets worldwide. Some of these are

domiciled in Nordic countries; among these one will find Sandvik Mining and Construction producing systems for rock drilling, load and haul equipment, mining and tunnelling machinery. The ESSEEM project benefits of the competence of the Sandvik engineers and scientists Jouko Salonen and Arne Lislrud.

- **Orica Mining Services, Europe.** We are living in a volatile world with global economy. Industrial groups are continuously restructured, re-named, and taken-over. Most of us are familiar with Alfred Nobel, Bickford and so forth. Orica is a global company domiciled in Australia that some years ago bought DYNO Nobel, supplying hardware and soft services to the construction and mining industry. The people are mainly the same. Dr. Frank Hammelmann from Orica mining Services is an important member of the project, in this case focusing on initiating systems, but also contributing to other parts of the project.
- **isep – Instituto Superior de Engenharia do Porto.** The institute is one of the top schools of technology in Portugal. The faculties are, as common, to technical universities and include mathematics, physics, mechanical engineering, electro, geo-science and more. The institute is connected to international networks of first class universities. For the ESSEEM project we had the benefit of including António Vieira in our team covering commercial aspects and more.
- **University of Pardubice. Institute of Energetic Materials (IEM).** Pardubice is a city some 100 km east of Prague, on the river Elbe with close to 100.000 citizens and a university with 10.000 students, numerous programmes for under- and post-graduate studies. Participant in the ESSEEM project is the Department of Chemistry, Institute of Energetic Materials (IEM) represented by Milos Ferjencik, Jindrich Stiebitz, Marcela Jungova and Vojtech Pelikan.
- **European Federation of Explosives Engineers.** EFEE was established in Aachen 1988. The federation with national member associations from 22 European countries aiming at improved competence, technology, safety and environmental aspects within the construction sector utilising explosives. EFEE contributes as a semi-active partner in the project.
- **Rock Blasting Council, Norway.** This is a council initiated by the Ministry concerned through “DSB”, to handle the training of shotfirers. “DSB” is a short form and means The Directorate for Civil Protection and Emergency Planning. The duty is to maintain a full overview of risk and vulnerability for society in general, initiate regulations and implement control and certification systems. For the ESSEEM project key words would be information and harmonisation.. The representatives are Frode Andersen and Thor Skjeggedal.

## 5 THE FOUR FREEDOMS AND SOME LIMITATIONS.

Free movement within the European Economic Area (EEA) is a basis for development. The **Four Freedoms** is a common term for a set of provisions, protecting

- The free movement of goods;
- The free movement of capital;
- The free movement of services;
- The free movement of persons;

For several professions though, there still are problems. Reasons may be inadequate language command, local regulations, tradition or insufficient competence.

High level technical competence through harmonized training is our (EFEE & ESSEEM) challenge. Through training of Shotfirers in agreement with the EFEE training requirements using ESSEEM training means we try to establish the Certified Professional European Shotfirer of competence level 4, better or as good as the best qualified shotfirers in Europe to-day.

## 6 EUROPEAN COMPETENCE LEVELS.

The Shotfiring Committee of EFEE (European Federation of Explosives Engineers) has during several years worked on shotfirer training requirements with a view to enhance safety, efficiency and mobility of labour and staff dealing with blasting operations in the European civil sector. For the end-users of energetic materials the Shotfirer is a key person. The training requirements hence focus on the Shotfirer training where successful examination will qualify for the Professional European Shotfirer Certificate.

The word Shotfirer may easily be translated from one European language to another. The Shotfiring Committee learned, however, that Shotfirer not necessarily would mean the same in all countries. This concerns the hierarchical position, the technical competence, the authority, responsibility and working situation. Through a system of cross border recognised competence levels some of the existing problems will be reduced (hopefully disappear)

One definition of competence is: The ability to perform activities to the standards required in employment, using an appropriate mix of knowledge, skill and attitude.

Another definition says: Competence is a standardized requirement for an individual to properly perform a specific job. It encompasses knowledge, skills and behavior.

While working on shotfirer training requirements, EFEE established five levels of competence:

**Level 1. Beginner:** This is an individual without practical or theoretical training participating in a blast operation. The person may be a trainee during the two first years of 4 years as apprentice or a student during the first two years of vocational training. In a work situation he/she performs basic routines and predictable tasks the activity with significant supervision and guidance; has little or no responsibility or autonomy.

**Level 2. Skilled worker/operator** is defined as an individual having passed the first two years as trainee or an individual having passed two years of vocational training, now gaining on-the-job experience, still waiting for the testing to obtain his shotfirer certificate. In a work situation supervision is only required in more complex circumstances; some individual responsibility or autonomy.

**Level 3. Supervisor** is journeyman/skilled worker that has obtained his craft certificate and undertakes blasting operations. In a work situation he/she performs the activity in some complex and non routine contexts; significant responsibility and autonomy; can oversee the work of others.

**Level 4.** Manager is a master shotfirer that has obtained his certificate and the managerial skills to simultaneously manage several blasting operations. This person has the competence as required in the established “EFEE shotfiring requirements”. In a work situation he performs the activity in a wide range of complex and non-routine contexts; substantial personal autonomy. Can develop others in the activity

**Level 5.** Expert is a “Manager” that has obtained expertise – special knowledge or competence within one or more sectors of blasting. That could be within underground blasting or underwater blasting or the dealing with hot masses or concrete or metals or special demolition or other specialties. The field of expertise must be identified in the verification document. In a work situation he performs the activity in a wide range of complex and non-routine contexts within the sector(s) of expertise – special knowledge or competence; personal autonomy.

During a recent EFEE meeting in Switzerland it was discussed whether the levels should be reconsidered in view of the EQF (European Qualification Framework) using 8 levels leading to an interesting discussion on the terms learning outcome, knowledge, competence, skills and national qualification networks.

In conclusion, we find level 4 and level 5 to fit well to our intentions and to the EQF. To achieve certification as European shotfirer one must successfully pass the examination, be a bearer of a best class national certificate, have the required practical experience and impeccable civil life standing.

## 7. THE PROJECT OUTPUT

The output of the project is a complete set of information that meets the requirement of the EFEE required training for shotfirers that wish to qualify for the European Professional Shotfirer certificate. It is planned to present the final output in sections matching the main topics and subsections convenient for the use in teaching.

The project material is prepared in digital format on a powerpoint platform. It includes both information classified as compulsory and information classified as supplementary information.

- WP.1 Basic Geology with Introduction to Minerals
- WP.2 Drilling methods and commonly used machinery
- WP.3 Construction materials
- WP.4 Explosives and their main characteristics
- WP.5 Initiation systems
- WP.6 Blasting theory
- WP.7 Structures and Demolition
- WP.8 Suitable explosives and detonating systems for bench blasting
- WP.9 Blasting in sensitive areas
- WP.10 Safety aspects for Rock blasting and demolition work.
- WP.11 Commercial aspects - Cost estimation (Rock blasting and Demolition)
- WP.12 ESSEEM Project Management

It is planned to present the final output in sections matching the main topics and subsections convenient for use in teaching. The ESSEEM project aims at assisting teachers, training institutes in their efforts to train students to competence level for the Professional European Shotfirer.

## **8. THE FUTURE.**

The ESSEEM project output will in the end be one set of training material where text parts are written in the English language. Shotfirer training shall, however, take place in the domestic language. Translations to several languages must therefore take place. That work is beyond the capacity of the ESSEEM project. Cooperation with national societies, companies or interested training schools is the most likely option. It must be underlined that The ESSEEM project deals with technical competence. Most countries have domestic regulations for blasting operations concerning anything from security to politics. These aspects are not discussed in the project.

The certified Professional European Shotfirer has the required practical experience, has obtained his best class national shotfirer license and has successfully passed the final examination based on the EFEE requirements and the ESSEEM training material. In our view, qualified for safe and efficient blasting anywhere.

The training will include lecturing, practical exercise and testing requiring 80 to 150 hours, depending on the basic competence of the students. Training will take place in the existing facilities, by the existing schools and teachers subject to adequate approved teaching programmes. It will be up to the lecturer/the training facility to implement the training. To ease the work, The ESSEEM project will provide material prepared in sequences, each with 4-6 sections for normal 90 minutes lectures.

Lifelong learning and a volatile world cause training institutes to prepare for an inhomogeneous flock of students; young and not so young, experienced or less experienced. A variety of training will be expected; from full- day-studies, through sequential evening training, to remote training by means of e-mail or similar computer-aided training. The examination shall adequately confirm whether the student may or may not be accepted as a European professional Shotfirer.

Authorities are mainly concerned in matters dealing with safety, health and security. ESSEEM adds efficiency and development aspects. The ambition is to establish the European Shotfirer as the preferred shotfirer, eventually the required shotfirer.

A certification system will follow. One approach would be to certify training institutes which are offering student programmes that satisfies the given requirements. At one stage, maybe some few years ahead, one may expect intervention and participation by national authorities and/or EU-authorities.

Today the partners will present their work. Some will present a résumé; some may tend to train you as a new European Professional Shotfirer. Whatever, we appreciate your comments and advice.

Thank you!

Attached: EQF, European Quality Framework