NEWSLETTER

March 2015

This Newsletter contains the above articles (Click on the headings to jump to the article)

We in EFEE hope you will enjoy the present EFEE-Newsletter. The next edition will be published in summer 2015. Please feel free to contact the EFEE secretariat in case:

- You have a story you want to bring in the newsletter.
- You have a future event for the next EFEE-newsletter upcoming events list.
- You want to advertise in a future newsletter.

Or any other matter.

Igor Kopal, Chairman of the Newsletter Committee and the Vice President of EFEE

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EFEE Secretariat,
Roger Holmberg Coniston Court Fl8, St Elija Street,
St Julians, STJ1122, MALTA

NEWSLETTER

March 2015

Dear EFEE members, the president's voice

From the 26th to the 28th of April 2015 EFEE holds its 8th world conference on explosives and blasting, for 15 years EFEE has had the conferences in its present form. In 2000 the first conference was held in Munich followed by Prague, Brighton, Vienna, Budapest, Lisbon and Moscow. The conferences have become an important part of EFEEs work, and a well-respected venue for the business to meet.

This year the conference welcomes leading experts in Lyon, France. As the present president of EFEE I will have the honor of opening the 8th EFEE World Conference on Explosives and Blasting. This will be done together with leading representatives of our business in France.

There is a great number of delegates, speakers and exhibitors who have already signed up to attend the conference and there is still room to sign up in the coming time. I am looking forward to welcome you all in Lyon and on behalf of the EFEE board and council I wish you all an interesting and successful conference. Please make use of all the many opportunities to exchange experiences, meet new partners and make new business contacts. For the many exhibitors who are soon preparing to go to Lyon, we hope you will have just the success you anticipated and gain just what you expected from this unique opportunity. Last but not least I would like to thank all our sponsors for supporting the Lyon conference.

I wish us all a great stay at our conference in Lyon. The city not only holds the 8th EFEE world conference on explosives and blasting, but also happens to be French capital of gastronomy.

I have a good feeling that we are heading for a memorable event.

Johan Finsteen Gjodvad, President of EFEE

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EFEE Secretariat,
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The Northern Link

The Stockholm Northern Link project is a SEK 14-billion (USD 2 billion) scheme to build a 5-km, mostly underground expressway, which will become the third completed quadrant of the city's long-planned inner orbital expressway, locally called "The Ring". Consisting of twin, parallel 3-lane main tunnels and a complex of junctions, inlets and exits, it includes a total of 11 km of tunnels, 9 km of which are in rock. Excavated by drill-and-blast, they have cross-sections of 70, 90, 120 and 260 m2 for 1, 2, 3 and 4-lane tunnels respectively. Including ramps and other surface cuts, over one million m3 of rock have been blasted in this project. Scheduled to open to traffic in 2015, the Northern Link's tunnels run beneath a variety of urban environments, including public institutions, residential and commercial properties, and an important city-state park.

Stockholm inner orbital expressway per 1992 Dennis Agreement

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In addition to serving the Stockholm region, the Northern Link will connect European highways E20 and E4 with the Värtan-Frihamn port, Sweden's most important port for passenger traffic to Finland, the Baltic States and Russia. In doing so, it will also become the eastern extremity of the Swedish leg of the E20, which, interspersed by 3 seas, runs from Shannon Airport in the west of Ireland to St Petersburg in Russia via England, Denmark, Sweden and Estonia.

The Northern Link is the eastern extremity of the Swedish leg of the E20, which runs through seven countries.

Vibration dampers, extreme caution and 100 active measuring points daily

Much of the blasting work has had to be carried out with extreme caution. For example, five of the tunnels pass directly under (or very close to) the AlbaNova University Center, at one point just 7 m below it. As Stockholm's main research and education center for physics, astronomy and biotechnology, the AlbaNova center contains expensive, extremely sensitive instruments whose resistance to vibration is measured in m/s. A short distance away, six of the tunnels cross just a few meters under or over the existing tunnels in Stockholm metro. Moreover, at certain places on the route, there was little or no rock cover, so the rock there had to be reinforced before tunnel excavation.

Throughout the works, the safety of passengers on the metro, which has continued to operate, has had to be guaranteed, while disturbance of researchers, residents, workers and road traffic has had to be kept to a minimum. To prevent blast-induced vibration from damaging vibration-sensitive equipment that works at nano-precision, Nitro Consult also devised and installed vibration isolators where needed. This enabled research activities to proceed normally during the rock excavation phase. Together, these circumstances have presented great technical and organizational challenges. Added to this, project economics have required blasting to be carried out every day in five or six tunnels simultaneously in order to maintain high productivity with minimal disturbance. All these demands have been met through a combination of knowledge, experience, digital technology and advanced mathematics.

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Consulting and construction management

Nitro Consult assisted with ground investigations and helped to solve design issues and draft construction documents for the rock tunnels. We also conducted a series of test blasts to obtain basic data about vibration transmission through the rock, which contractors were then able to use during the bidding stage. We posted construction managers on six of the Northern-Link (NL) contracts.

In all NL contracts, we have been responsible for measuring vibration, airblast, noise and structure-born sound in buildings, objects, equipment and the underground railways. Approximately 100 measuring points have been active daily. All measured values are reported via GSM links to NCVIB, the online reporting, monitoring and evaluation system developed by Nitro Consult. With the aid of NCVIB, events such as vibration, airblast, noise, pore pressure and crack extension can be analyzed, evaluated and compared with instantaneous charge weights.

We have been taking the structure-borne and airborne sound-level measurements 24 hours a day. The client, contractors and other authorized parties can read these measurements continually online via the NCVIB portal. The portal has also been used by contractors to post the scheduled blasting times every morning, which has enabled researchers in the AlbaNova University Center and Royal Institute of Technology (KTH) to plan their vibration-sensitive activities accordingly.
Before the vibration-generating works began, we surveyed about 200 objects, which we are now resurveying to inspect for any related damage.

Introduction of electronic blast initiation

The complex geological, geotechnical, environmental, constructional and logistical relationships in the Northern Link project induced some interesting insights and developments regarding the current integration statuses of the various digital design, control and reporting technologies used in drilling and blasting operations.

Of particular interest was the decision in Contract NL35 – where tunnel cross-sections ranged from 15 to 320 m2 – to use a fully programmable electronic blast initiation (EBI) system to try to raise productivity in difficult areas without exceeding prescribed PPVs. The aim was to use EBI to get better control over PPVs and maximize the advance per round.

The attraction of EBI – in this case the Orica i-kon™ VS system – was its programmability and its capacity to give each hole in the round a unique and precisely effected delay time of up to 8000 ms. Another attraction was that Orica SHOTPlus-T, the blast design software in use, had a degree of integration with the i-kon VS system and could also interface with the NCVIB vibration reporting and evaluation system. This gave significant benefits, for it was possible not only to read quickly online each blast's PPV values but also to identify in the recorded waveforms the individual shotholes detonating.

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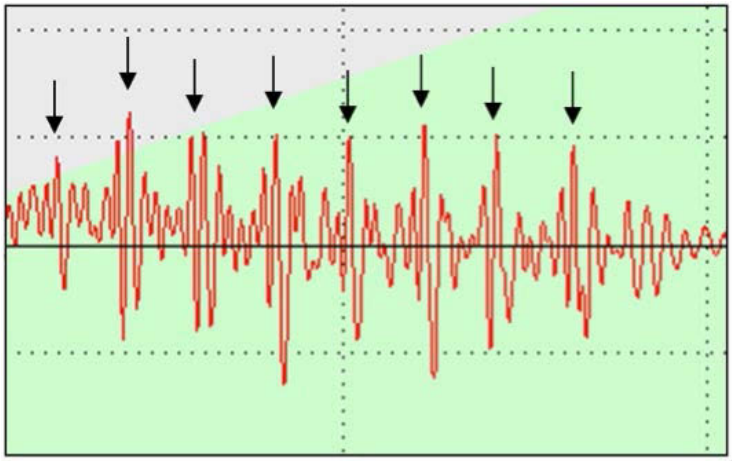
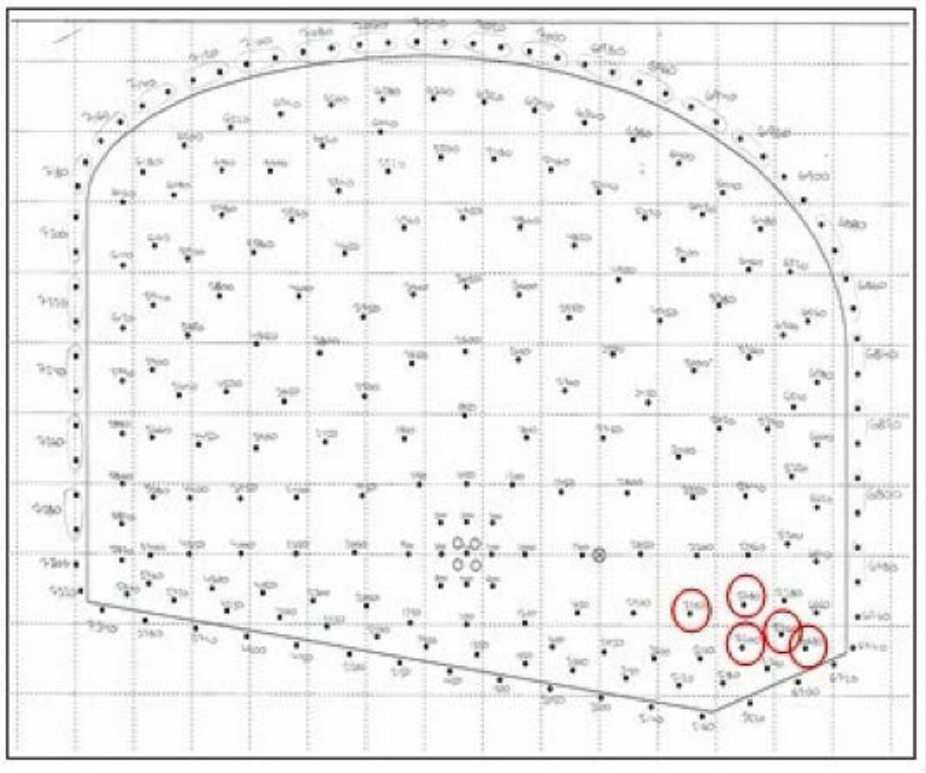


Waveform showing individual shotholes detonating

Additionally it was possible to match each PPV with its correlate shothole in the initiation plan and to view in the recorded charging data the hole's explosive-charge weight. This made it easier to control PPV by quickly adapting the drilling pattern, charging plan and/or initiation sequence to give compliantly the maximum advance per round.



Correlating PPVs with shotholes the blast plan

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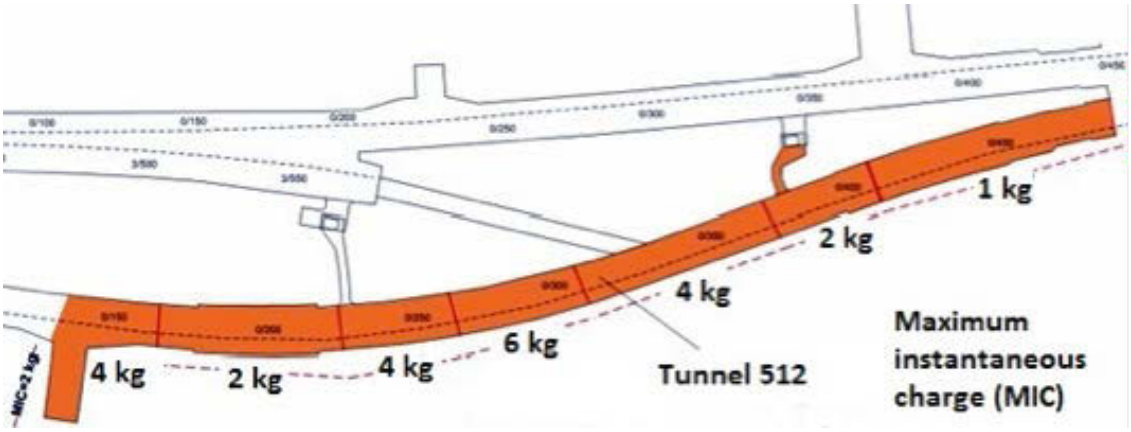
EBI was, for example, used along a project-time-critical 250-m section of a 110-125 m2 tunnel that had to be driven parallel to and 10 m distant from an existing heating-supply tunnel, which was subject to a PPV limit of 100 mm/s in any direction. This value had been prescribed in the tender documents, which also gave guideline values for maximum instantaneous charge weights (MICs) in various sections of the tunnel. (These values had been determined on the basis of earlier test blasting done by Nitro Consult.)



Instantaneous charge weight restrictions in tunnel 512

To achieve PPV compliance by resorting to traditional solutions like reducing the MICs or segmenting the face would never have given the target advance rate of 6 m/blast. Another solution – extending the pyrotechnic detonator delay range using surface offset (blocking) delays – was tested and found to be effective, but still could not guarantee single hole firing. Moreover, its deployment over >250 holes was both complex and labor-intensive.

By introducing the i-kon VS EBI system and exploiting what interactive possibilities there were with the SHOTPlus-T blast design software, drill-rig navigation system and NCVIB, the contractor, JV Hochtief-Oden Tunnelling, was able to both maintain the desired full-face advance rate of 6 m/blast and comply with the prescribed PPV limit. As a result, the tunnels were completed 2 months ahead of schedule.

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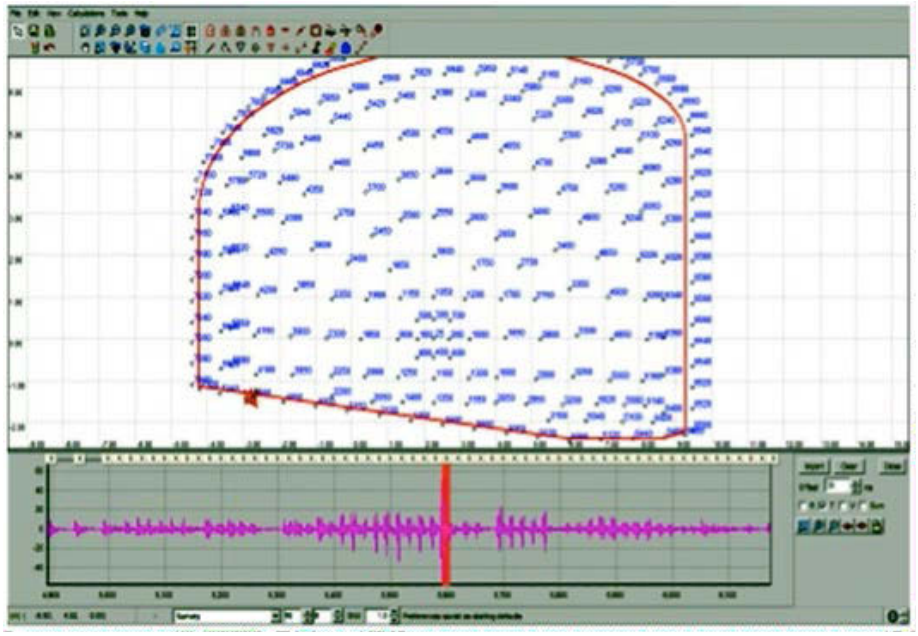

Using SHOTPlus-T and the NCVIB system to compare the recorded waveform with the initiation sequence

In spite of this success, the experience in Contract NL35 exposed the need for more integration between the various digital technologies used in drilling and blasting. Both Orica and Nitro Consult believe development in this area should be prioritized, since it contains many possibilities to further optimize the efficiency of the drill-and-blast tunneling method, especially in more complex environments. Add to this the ever-safer and more eco-friendly bulk emulsion systems we use today, and the method's applicability will continue to grow.

The Northern Link was stopped between February 1997 to 2006 because of environmental reasons, passing 250 m under the National Park. So after 10 years, when they had to change the law, redesign, make new investigations, discussions with environmental parties etc Vägverket (today Trafikverket) could start again.

Nitro Consult have been involved in the design, risk analysis, trial blasting, construction management, house inspections, vibration- and airshock- and noise monitoring, third party contacts, claims etc etc.

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Northern Link was partly open 31th of November 2014 for special invited in present of the King of Sweden Carl XVI Gustav and the Crown Princess Victoria.

15th of March 2015 they will open the whole Northern Link to south through the new coming city Hagastaden and connect the Link with Essingeleden. That will save my time from Lidingö to my working place in Hägersten with half the time and will just take 15 minutes.

By Donald Jonson

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Meeting with Federico Musso, Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs

Our organization's 29th board meeting took place on the 27th February 2015 in Brussels. This location was selected for its possibility to organize a meeting with Federico Musso from the Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROW). Last year Federico Musso took over from Mike Schmahl as policy officer responsible for the EU legislation on explosives and pyrotechnics in the Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs. During the regular conference of the Explosives Working Group last November, a first meeting took place between Federico Musso and Jörg Rennert, chairman of the EU Directive working group.

The meeting took place on the 27th February 2015 at the premises of DG GROW. Federico Musso as well as Johanna Bernsel and Sophie Weisswange attended the meeting on behalf of DG GROW. Our organization was represented by the board members Johan Finsteen Gjodvad, Igor Kopal, Donald Jonson, Heinz Berger, Jörg Rennert and our EFEE Secretary General Roger Holmberg.

The meeting was very pleasurable and constructive covering the following topics:

- Introduction of EFEE
- Aims/goals of our organization
- EFEE history, especially training and education for the blasting industry
- The cooperation between the EU commission (Explosives Working Group) and EFEE in all questions of creation and redesign of regulations and laws
- A common standard for shot blasters in the EU, harmonizing but still respecting the regional differences, enhancing free movement and trade in EU
- Is it realistic in the future?
- Will it be accepted by all EU member states of the?
- AOB?

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The talks held in the run-up to the meeting as well as Federico Musso's commitment made it possible to discuss specific questions concerning a common EU standard for shot blasters with Sophie Weisswange as representative of the Unit responsible for the mutual recognition of professional qualifications. As a result Sophie Weisswange presented some new and promising ways and possibilities which we will definitely include into our further considerations. We would like to express our heartfelt gratitude to her for that.

The meeting also provided further stimulation for refining the cooperation between the EU and the EFEE, e.g. that EFEE will take part at the meetings of the Forum of Notified Bodies for Explosives as anobserver. These organizations are responsible for CE certification of all explosives as well as, since 4th January 2010, all pyrotechnic articles. All attendants to the meeting stressed the fact that the cooperation between the EU and the EFEE is essential for both sides and that it must be intensified. At this point we would like to thank Federico Musso and his colleagues Johanna Bernsel and Sophie Weisswange again for the very constructive meeting which took place in a very friendly atmosphere.

Jörg Rennert, Member of the Board, EFEE

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This is the Federation of European Explosive Manufacturers

Objectives

The objective of the Federation shall be the advancement of the commercial explosives industry in the widest sense with particular regard to safety, quality, security and legal concerns.

The Federation is voluntary and is not organised for pecuniary profit.

The Federation provides a forum for debating questions, problems, facts and topics arising prior to and during manufacture, storage, transport and use and disposal of civil explosives.

The Federation takes any action necessary for the attainment of its principal objectives and in particular to acquire the facilities necessary to carry on its activity.

The Federation has determined that the most effective way of pursuing the above objectives is through association with CEFIC (Conseil Europeen de L'Industrie Chimique – European Chemical Industry Council).

General background

Nearly 700.000 tonnes of explosives and 100.000.000 detonators are being manufactured in Europe. From these volumes approximately 600.000 tons of explosives and 60.000.000 electric, non-electric and electronic detonators are detonated every year in EU-Europe (Norway and Switzerland included) for civil purposes. Almost all of these explosives are manufactured, transported, stored and used without causing any major incident or alarm to the general public. It is certainly true that, from time to time, accidents occur with civil explosives in which the general public are involved, but this happens at very infrequent intervals and the safety record of the explosives industry is considerably higher than almost any other industry of a similar nature.

Having said that, however, the public perception of explosives is still seriously tainted by the use of high explosives and military propellants in modern warfare and the "merchants of death" syndrome still persists.

This is in spite of the fact that, without the use of high explosives for civil purposes, it is difficult to see how civilisation could have advanced to such a state as it has done today. The general public seem to be unaware that explosives enable the production of aggregate for road building, for concrete: they enable the production of limestone for the manufacture of cement: they enable the production of gypsum for the manufacture of plaster, and almost all other minerals are extracted with the use of civil explosives.

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Their use as a tool for the modern mining and civil engineer goes largely unheralded and unsung.

As a result of this, explosives companies have also tended to adopt a "low profile image" and, in spite of an often-stated dedication to overall safety, have frequently suffered at the hands of over-zealous legislators.
When Alfred Nobel first invented dynamite he ensured that his invention was exploited in every country in Europe (some of them still today use the Nobel name) and, as might be expected, each Nation State in Europe developed its own legislative programme.

The formation of the European Economic Community under the Treaty of Rome required that, as far as possible, the National Regulations that affect trade between Member States should be harmonised to a common base. On 5 April 1993 Council Directive 93/15/EEC on the harmonization of the provisions relating to the placing on the market, conformity assessment procedures and supervision of explosives for civil uses became European and National legislation. Other important European Directives regulating explosives followed such as Directive 2008/43/EC of 4 April 2008 setting up a system for the identification and traceability of explosives for civil uses, i.e. the Track & Trace Directive which requires that every explosive product must bear a unique identification which can be traced over a period of 10 years.

This task was mandated from the European Parliament to the European Commission, who sought expert advice, not from the industry itself but from the national legislative bodies. Thus, in the early stages of European legislation which affected the explosives business, industry had little or no say in the matters concerning them.

It was for this reason that a meeting of major European manufacturers was called and held in Amsterdam on the 11th September 1975, at which it was formally proposed that the Federation of European Explosives Manufacturers (FEEM) be formed as a Sector Group of the European Council of Chemical Manufacturers Federation (CEFIC), and Articles of Constitution to this effect be drawn up.

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Mission

The objectives of the Federation are embodied in the Articles of the Constitution.

"The object of the Federation is the advancement of matters aiding the improvement and development in methods of manufacture of explosives to the benefit of its members: To improve the safety and security and working conditions of the manufacturer of explosives: To improve the safety and security of explosives during transport, handling, storage and use: In addition, FEEM undertakes to maintain high quality standards in its products and to advance the welfare and standing of the explosives industry."

The prime function of the Federation is to ensure proper and adequate representation of the European explosives industry with both International and National regulating bodies and at conferences where matters concerning the regulation of this trade are discussed. The purpose of this representation is to ensure that these bodies are fully and properly advised on the expert opinion within the industry, and that due consideration is given to the effect that any proposed recommendation or regulation may have on the conduct of the trade.

Modus operandi

FEEM recognises that "self-regulation" is the most effective method of ensuring proper order within the industry.

The proper provision of such internal discipline is effective not only in reducing the practical hazards involved but also in displaying to any legislative authorities the model on which legislation should be based.

To this end the Federation has formed a series of Working Groups in specialist areas of the explosives industry and these produce Codes of Good Practice and Technical Bulletins to which all members of FEEM aspire.

The Working Groups concerned are;

- The Blasting Practice Working Group
- The Health and Safety of Operators in Manufacture Working Group
- Safety in Transport and Storage Working Group
- Security Working Group (ad hoc)
- Track & Trace IT Experts Working Group (ad hoc)
- Lead Azide Working Group / REACH (ad hoc)

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At the time of writing, some 40 Codes of Good Practice, Technical Guidance Notes and other Technical Recommendations have been issued and these Documents are accepted by industry and by National Authorities alike as authoritative expert opinion on minimum standards within the industry.

Membership

There are two types of full membership:

a) Individual Company members or Associated Companies of Multinational Groups where the main shareholder holds 50% or less of the shares are considered as Category A members

b) Group members such as Multinational Holding Companies, acting on behalf of any subsidiaries in which they hold a shareholding in excess of 50% are considered as Category B members.

Organisation

The affairs of the Federation are conducted by an Executive Committee consisting of a minimum of 7 members elected to that position by the Annual General Meeting. The Executive Committee meets three times a year.

The Executive Committee consists of:

- President
- Vice president
- 5 Executive Members

In 2015 the Executive Committee members are:

PRESIDENT:	BERTRAND POUGNY	(EPC GROUP)
VICE PRESIDENT:	ULF SJÖBLOM	(FORCIT GROUP)
PAST PRESIDENT:	DANIELLE ANTILLE	(SSE GROUP)
MEMBERS:	GIANNI FACCHINETTI	(PRAVISANI)
	OTTA GREBEN	(AUSTIN DETONATORS)
	JEFF COURTS	(ORICA Group)
	VICENTE HUELAMO	(MAXAM Group)

In addition, they are served by: Secretary General (At present Hans Meyer)

Basically, the Executive Committee decide policy and this is executed by the Secretary General.

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Working groups

It was previously indicated that the core work of FEEM is to produce Codes of Good Practice. This work is undertaken by the Working Groups who draw on the expertise of each of the member companies in the specialist areas of Blasting Practice, Transport, Safety in Operations, and Occupational Hygiene. The working groups meet twice a year.

LIST OF MEMBERS (as in 2015)

11 INDIVIDUAL COMPANIES

1. DAVEY BICKFORD, FRANCE
2. DYNAENERGETICS, GERMANY
3. EURENCO, SWEDEN
4. YARA, FINLAND
5. KIMIT AB, SWEDEN
6. NITROERG SA, POLAND
7. MSW CHEMIE, GERMANY
8. POUDRERIE D'AUBONNE, SWITZERLAND
9. PRAVISANI SPA, ITALY
10. SPREWA, GERMANY
11. TITANOBEL, FRANCE

6 MULTINATIONAL COMPANIES

1. AUSTIN POWDER
2. EXPLOSIFS ET PRODUITS CHIMIQUES GROUPE
3. ORICA GROUP
4. MAXAM GROUP
5. SSE GROUP
6. OY FORCIT GROUP

Affiliate Member
E.A.S.S.P. (The European Association for the Study of Safety Problems in the Production and Use of Propellant Powders, Switzerland)

Associate Member
INSTITUTE OF MAKERS OF EXPLOSIVES - USA
SAFEX

Hans H. Meyer Secretary General FEEM

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Special exactly sequential timed charges for solving critical problems

Introduction

Accumulated layers of ice floes in water flows that originate in winter periods, usually during sudden thaws, worsen flow rates of these flows and cause local flooding in many cases. Several procedures are used to remove these barriers depending on local conditions. For example, ice is broken and removed from water flows by mobile construction excavators or it is broken by heavy duty floating equipment and gradually released in order to flow away on its own. Another method is the use of commercial explosives. In such case the water barrier is removed by controlled blast.

Removal of ice barriers using sequentially timed attached charges is a modified method of controlled blasting.

Origination of an Ice Barrier

Ice barriers can occur in several ways and have different characters. However, in principle there are just two basic types of obstacles that affect behavior of a water stream. It is either a continuous frozen area or a barrier created by accumulation of ice floes.
Spontaneous breaking of continuous ice area usually happens during the period of quick and significant temperature increase accompanied by rain precipitations and increased water flow rates. This causes increase of water flow level, ice covering breaks along its banks and its connection with the banks weakens. At the same time water speed increases and with it the carry force that interacts with the bottom surface of the ice layer. Simultaneously the strength of ice layer decreases by thawing. This is the moment when the continuous frozen ice layer cracks and it is carried away in the form of ice floes down the stream. Stopping of ice floes and creation of a barrier often occurs at places where change of a profile or shape of the stream causes a change in the speed of flow rate.

Ice Barrier removal procedures

Suitable procedures to remove ice barriers are proposed with regard to specific conditions and characters of water flows. A significant aspect in selection of proper technique is evaluation of flow width and expected behavior of released ice further down the stream.
In case of smaller streams and creeks for the breakage of ice layers mobile construction machines are used to advantage. In these cases mobile excavator move along the stream bed or, if possible depending on the terrain, they remove the ice from the banks. Also heavy duty floating rescue equipment is used for breaking of continuous ice layer and its gradual floating away.

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Breaking of ice barriers by a floating rescue tank or a mobile excavator

Another, very often used method of ice barrier removal is the use of commercial explosives. It is possible, by using controlled blast of relatively small amounts of explosives, to release exactly defined volume of ice mass in a short time. The charges are usually placed under the ice. Water takes care of the transfer of seismic waves in this environment and suppresses sound effects in the surroundings. The disadvantage of this procedure is that there is scatter of broken ice and possibly deposits frozen in the ice to the surrounding area after explosion.

Breaking of the ice barrier by explosion

a) Preparation of holes for charge placement

b) Placing of charges under the ice

c) explosion

d) water stream situation after the explosion

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The System of Sequentially Timed Charges

The system of sequentially timed charges is an alternative method when explosives are used for breaking of ice barriers. Its advantage lies in minimizing of negative effects of debris spread in the surroundings. The system is being developed within the CR safety research program focused on quality of techniques, processes and procedures of crisis management. Research groups working on this task are Explosia Pardubice and VVUU Ostrava. The wider research team also includes representatives of the Fire Rescue Service of Hodonin, The State Mining Administration, dept. of ore raw materials and management of explosives and also manufacturers of detonators and textile products for industrial use.

Technical solution

The technical solution proposal originates from the use of exactly timed charges placed on the ice layer. In order to increase explosive effects on ice the charges are confined by water bags placed above the charges. The main advantage of the developed process is that water bags absorb part of explosion energy and limit flying of crushed pieces of ice and possible alluvia frozen in the ice to the surrounding area. By exact timing delay of small charges of explosives and their optimum placement in the ice surface we can achieve assumed effect on ice layer. This way we can also regulate the amount of broken and released ice mass. Due to minimum impact to its surroundings the system can be used in the vicinity of industrial or urban development or construction related to the water stream, primarily in the vicinity of bridges, weirs, landing stages or vessels frozen in the ice.

The system is designed so the maximum of preparation work can be done away from the water stream, and to minimize the time that members of fire rescue system unit spend on the frozen surface of the water stream. Thus the preparation and adjustment of charges is done away from the water stream. Bags with the charges are placed on the ice layer in previously determined position depending on the situation. After the bags are filled with water, usually pumped directly from the water stream, and attached on pre-tensioned flexible ropes, the system is ready to be fired. The attachment of the bags to pre-tensioned ropes is important, so they are not carried away by released water mass floating downstream. After firing the bags are spontaneously pulled on the water surface or away from released ice mass and they do not become obstacles in the stream.

System Development

Explosives

Comparatively wide range of explosives can be used for removal of ice barriers. Higher brisance contributes to finer fragmentation of the ice, and the higher work capacity increases the total volume of released ice mass. Also the explosive must be water resistant and capable of initiation and detonation in small diameters (up to 30 mm). As far as commonly used standard charges of small diameter dynamites meet these requirements. Another alternative can be sheet explosives prepared in the form of comparatively thin strips made of PETN, for example.

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The following two types of explosives made by Explosia were selected for the tests. Namely, the sheet Semtex PL SE M (7200 m/s) and Perunit E (5000 m/s). Both of these explosives are water resistant and therefore suitable for expected conditions of use.

The PERUNIT E charge, Ø 28 mm

The sheet SEMTEX Pl SE M

The bags

The bags were designed with regard to their sufficient strength during manipulation and resistivity against explosion. Their construction allows placement of adjusted charge to the pocket located on the outside of bag bottom and securing of detonator against tearing out of the charge using attachment eyelet (for example during placement of the bags in the area or during their filling). All bag parts including filling sleeve are made of soft materials. Thus there is no flying of solid parts during explosion and rupture of the bag. Bags can be mutually connected using attachments in their corners. These attachments are also used to attach the bags to flexible ropes and for pulling them out of released ice mass after the explosion. The filling sleeve in the middle of bag upper side can be tied up after filling and the bag can be thus closed. At least one other bag can be placed on the bag closed this way, which increases the height of water column above the charge. The bags are made in standard volumes of 250 l or 500 l with the square footprint of about 1 m2.

The 250 l bag

The 500 l bag

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Examples of possible utilization of bags.

250 l bags hanging on pre-tensioned flexible ropes

Two layers of 250 l bags – in a row

Two layers of 250 l bags (top) and 500 l bags (bottom) -The square base

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The 3 x 3 bag layout – side by side arrangement

The 3 x 3 bag layout – 1 m spacing between the bags

Initiation

The system has been designed for electric and non-electric detonators and for electronic initiation systems. From the point of view of the possibility to set any delay times with accuracy 1 ms the system of electronic timing was used to advantage (timing of 1 ms to 20 ms). The electric detonators were tested for longer delays of 25 ms to 75 ms with worse timing accuracy.

The initiation times were selected and tested with the goal to achieve the maximum seismic effect during the use of small defined charges with predetermined spacing. The effect of seismic wave was measured by seismograph.

Conclusion

The development of sequentially timed charge system will be finished at the end of 2015. All up to date performed tests were done on substitution underbed made of compacted soil on stone base. The effects of ice charges were only simulated during the tests performed on reinforced concrete floors of a multistory building. The tests of the system under real conditions on a frozen ice layer will be done in Finland in co-operation with company FORCITE in December 2015. All test knowledge gathered so far will be utilized during these tests. Further, the effectivity of the system will be verified for a specific ice thickness, effectivity of timing on seismic effects and behavior of the ice layer, and function tests of the whole system will be performed.

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The bag test on a concrete floor – 10 cm thick reinforced concrete

a) The bag arrangement before the test

b) The floor perforation

The test of the bags on a concrete floor – bag placement on a reinforced concrete girder

a) The arrangement of the bags before the test

b) The bottom view of the girder before the test

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c) The torn off girder after the test,

d) The crushed floor reinforced concrete and girder after the test

The detail of torn/cut off girder after the test

Tomas Dorazil (VVUU, a.s.), Radovan Skacel and Ladislav Riha (Explosia, a.s.) and Martin Cervenka (Fire Rescue Service of Hodonin)

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Well Abandonment

After a well for the production of oil/natural gas is exhausted or can no longer be operated with economic rewarding, it must be dismantled in the last stage, or be abandoned. When dismantling the wells, regulated aspects need to be considered, such as the economic, technical safety and the environment. The economic aspects are to understand the fact that the license holder of the well needs to decommission/abandon the same, this cost cannot be recovered by the production of raw materials, subsidies or the like, but this is an absolute cost point. For this coming alone in Texas, USA, there are 7,869 wells were left alone by the license holder, and cannot be found or existing, yet someone could be held liable for these costs (in sgn. "Orphan Wells). These costs would in this case will be ultimately borne by the Community. Since 1984 about 274 million US dollars were issued by the State of Texas to these "adoptable wells" to put wells out of service. In addition, there are still about 5,445 wells in Texas that are inactive and the license holder has failed to decommission as regulated. The current techniques used do not guarantee that with the well abandonment actually the goal is achieved as required for safety and the environment.

The aim of well abandonment is the permanent isolation of groundwater formations of different salinities outside the casing from each other and from hydrocarbon formations, porous hydrocarbon formations within and outside of the casing, each other and to the surface. This is done by several means, including the insertion of a bridge plug, permanent packer, remedies by cementing operations and cement plugs. At the surface, the tubing must be cut off and sealed below the ground level with steel plates in a way that a pressure build-up and not allowing access according to local regulations. When dismantling wells these are divided into different categories to: Open Hole, Cased Hole, routinely and non-routinely. These include specific potential topics to be considered.

For example: groundwater protection, gas leaks, gas sustained pressure/flow in/from the annulus (potential leak of gas to the surface), gas migration and isolation porosity. For the decommissioning of a well without piping, the licensee shall put in sufficient cement plug length and number to; all non-saline groundwater layers to cover by the ground-water protection regulations. All porous zones are covered to eliminate possible cross-flow. Each completion must be processed separately according to the decommissioning of a borehole with casing; with the guarantee that covers the upper cement plugs porous intervals and groundwater. If not possible, remedial measures are necessary to porous intervals, groundwater and other necessary intervals as required by individual cementation. A routine decommissioning is "Normal" and corresponds to all criteria and regulations; Type of the well, general location, impact on other wells/intervals that are in operation and show no downhole problems. Non-routine decommissioning consist of work not covered under the routine, for example, wellbore problems such as; a lost tool covers the two porous zones, plug leaking, a ("ghost") hole across 2 or more zones, a renewed well abandonment is required as the seal was not successful, etc.

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The protection of groundwater is an important aspect of well abandonment. Groundwater is defined as water layers with a dissolved salt content of less than 4000 mg/liter. All usable groundwater-holding layers or other proprietary intervals that are above the upper cement plug require corrective action by cementing in order to isolate them from hydrocarbon sources. These may be defined as a continuous gas leakage, flow in or from the annulus, and thus, the possible leakage of gas/liquid or combinations to the surface of the inside/ outside of the casing/annulus. These are monitored in the decommissioning process and a failed test can be as low as a single bubble of gas/10 minutes. Gas migration is the provable escape of gas at the surface, outside the outermost casing. The remedial action by cementation, formation access elimination, perforation, milling or slotting may include the casing. Here the cementing to surface, or if full circulation when cementing cannot be reached, separate perforations and milling needs to be done without exceeding the formation pressure. Here, the licensee is obliged to evaluate the well to make sure that all the intervals are isolated from each other above the groundwater. When cementing, it should be noted that gas migration through the cement slurry is possible since it loses the ability to keep the hydrostatic pressure at the mud to gel conversion. Relief can be accomplished by monitoring the placement of cement and not releasing the pressure, using retainers, or the application of artificial hydrostatic pressure after the compression. This allows the gas to channel itself.

The perforation methods currently used are the classic used in the exploration for oil/gas. It should be noted that the Perforation phasing has an influence on the connectivity of the cement and the formation. The shaped charge types used have an influence on the geometry of the Perforation channels i.e. DP, BH or reactive liner. Alternative methods, such as "Abraza jetting" (grinding by chemicals) can reach 480 °, but within 1 m. Another method is to mill the entire section, but this removes the casing material completely.

In order to provide a method for the market that corresponds to the requirements of the perforations, DYNAenergetics developed an alternative perforation system. In the first tests with existing linear shaped charges where used to create a slot in the casing/wellbore. This test series showed results that these are not suitable for this application because the results were not sufficient or not useful. A rectangular shaped charge was developed wherein the initiation point, the design of the liner material and the integration have been considered in existing perforation hardware. In a single firing test of a 30g HMX-St Slotted Charge in a 86mm (3 3/8”) carrier gun in a 4 ½ inch to 5 ½ inch casing, the results found where acceptable. This system would provide the opportunity for zone isolation with a 360 ° circumferential access to the annulus between the casing and the wellbore and allows access to cavities from previous cementation and formations.

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With dual or multiple casings the perforation is limited to the inner casing and creates rectangular slots without damaging the outer casing. To test this scenario a loaded gun system in the earlier mentioned configuration 4 ½" (11.6 lbs/ft) casing inside a 7" (32 lbs/ft) casing was shot again. There was no evidence found of damages to the inside of the 7" casing and the swell (OD after firing) of the 86mm (3 3/8") was not more than 94mm (3.70"). A total of 18 shots giving a 360° helix where required to give also an overlap of 50% from slot to slot along the 4.5ft/1,3 meters in the 4 ½" casing. The slot width is 35 to 38mm (1.37" to 1.49").

The characteristics and condition of the casing (4 1/2 "(11.6 lbs / ft) after the test confirming tensile and yield strength was also determined by testing. The test resulted in a visible widening of slots, a loss of tensile strength of ~ 11% and loss of yield strength ~ 15% of the casing. These then where further trialed in field tests. These confirmed the findings.

Having established that for this application, this is a good if not better alternative to the existing perforation systems this has been provided for further tests and evaluations during the year 2013 for the market and resulted in the release to market. A system is developed with different rectangular shaped charges for use in 4 ½" and 7"perforation systems. Expected beginning 2015, the development will be completed, and bound for release to market.

Frank Preiss, DYNAenergetics; Rick Peterson, Pure Energy Services; Roland Peeters, DYNAenergetics

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ESSEEM became PECCS

On a sunny day, the 16th of January, all ESSEEM partners gathered for a meeting in Amsterdam. The subject was the project for the shotfirer certification, previuosly called ESSEEM – European Shotfirer Certification System for Enhanced Mobility under the European education programme Erasmus plus.

As the last grant application for the project got a negative answer, the project coordinator Viive Tuuna from Voglers Eesti with all the partners worked through the reasons why the application did not get the funding in 2014. As the reaction within the Erasmus plus specialists for the project was mostly a confusion about the certification system itself and the reasons why authorities in different countries do not accept foreign certificates for workers, we decided to change the name in order to simplify the meaning of our goals and the idea behind the project for those who are not familiar with the background. The new name will be PECCS- Pan–European Competency Certificate for Shotfirers/Blast designers, by European Federation of Explosive Engineers.

Besides the decision for a new name, the project partners worked through several subjects from the new 2015 Erasmus plus grant application form on the meeting. For a whole day, the work was intensive and very productive. The new project will last for two years and there will also be half the money we asked in 2014 as we decided to separate the courses and the materials into two separate projects. There are also less partners, 8 altogether with the coordinating organisation – Estonia, Czech, Portugal, Germany, France, Norway, Sweden and United Kingdom.

The deadline to present the grant application is the end of March, and most of it has already been completed and sent for a preliminary evaluation to the Archimedes bureau in Estonia. We are hoping for the answer for the grant application in June/ July. The project coordinator is very thankful for the great support of the partners and the EFEE.

Viive Tuuna - Member of the Board, Voglers Eesti

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Strategy to develop EFEE marketing and membership

European Federation of Explosives Engineers (EFEE) was founded in 1988 and has national members, corporate members, individual as well as student members and associate members. The primary objectives of EFEE concern the development of good practise, harmonisation of rules and regulations in Europe for the use of explosives in civil sector. The training of staff and labour is of utmost importance with a view to required qualifications and training programmes of the short firer. The objectives of EFEE include:

- Promotion and standardisation and harmonisation of explosives training in Europe
- Promotion of explosives technology in all fields related to this technology
- Promotion of safety, health, environment and security in the field of explosives
- The fostering of the image of profession as well as good relations and cooperation with related associations
- Collaboration on the development of laws and regulations within the EFEE field of activities

Many new directives and regulations were introduced from EU related to using of explosives in civil sector which are affecting our daily work activities of producers, blasters and end users. Therefore the role and the goals of EFEE are aiming to reach also the targets as follows:

- Active cooperation with EU working bodies
- Transfer the response from EFEE members to EU working bodies how the new directives and regulations are operated
- Submit the initiatives, ideas and goals coming from EFEE members to EU working bodies

In order to improve the positon and attractiveness of EFEE and to accomplish its objectives and targets a strategy has been made up to develop EFEE marketing and membership. EFEE Council meeting in Dublin in May 2014 approved this strategy which aims to increase all membership and thus improve the position of our organization. In order to secure further development of the high standards of its operation and status, EFEE has decided in this strategy for:

- Having sufficient membership benefits for its members
- Offering good networking possibilities for members
- Offering important knowledge database for members
- Offering professional development

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The bases of the new strategy are obviously mainly new members who can contribute with its skills, initiatives, discussions and assistance to EFEE operation. Therefore EFEE introduced in relation to approved strategy active policy in marketing and membership and would like to welcome new members in its growing organization. Their efforts and contributions are really essential for success of our mutual work in the present as well as in the future of European field of explosives in civil sector.

Igor Kopal, Vice President of EFEE
Chairman of marketing and membership committee

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New EFEE members

EFEE likes to welcome the following Members who recently have joined EFEE

Company Members

Steinhauser Consulting Engineers ZT, Austria
http://www.stce.at

For more than 40 years Steinhauser Consulting Engineers ZT GmbH provides its clients with expertise and know how in the whole environmental and construction section.
Based on the core technology vibration all emission regions such as noise, air quality, climate, but also environmental impact assessment (EIA) as well as construction-related fields of activity such as building physics, site supervision, Safety & health, etc. have been developed over the years. Steinhauser Consulting Engineers ZT GmbH now offers a comprehensive range of services for the benefit of customers.

Individual Members

Stéphan Mencacci, EPC Innovation, France

Philippe Dozolme, Arthur & Mattew, France

Heinz Krätschmer, Maxam Österreich GmbH, Austria

Tomi Kouvonen, OY FORCIT AB, Finland

John Turner, Robinson &Birdsell Ltd, UK

Andre J. Murgatroyd, Landeskriminalamt Niedersachsen, Germany

Timo Kukkola, Finnish Safety and Chemicals Agency, Finland

Jari Puranen, Kallioteknikka Consulting Engineers Oy, Finland

Owen Gareth, Kaz Minerals LLC, UK

Pieter Halliday, SAFEX, South Africa

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Upcoming Events

8th EFEE World Conference on Explosives and Blasting
April 26-28, 2015
Lyon, France
www.efee2015.com

CIM Conference and Exhibition
May 11-14, 2015
Montreal, Quebec, Canada
www.cim.org

World Tunnel Congress 2015
May 22-18, 2015
Dubrovnik, Croatia
www.wtc15.com

FRAGBLAST 11
11th International Symposium on Rock Fragmentation by Blasting
August 24-25, 2015
Sydney, Australia
http://www.fragblast11.org/

ISEE 42nd Annual Conference on Explosives and Blasting Technique
January 31 –February 3, 2016
Las Vegas, USA
www.isee.org

World Tunnel Congress 2016
April 22-28, 2016
San Fransisco, USA
http://www.wtc2016.us/

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JOIN US AT OUR 25TH ANNIVERSARY!

The NITRO SIBIR GROUP is the largest (in the Russian market) manufacturer of industrial explosives and technological equipment for industrial explosives production and application. Moreover, it is the leader of the industry in development and application of the drilling-and-blasting technologies. The NITRO SIBIR's enterprises are represented in all major mining regions of Russia, as well as in Australia, Finland, Mongolia, Kazakhstan and Canada. Besides, we carry out some projects in North America and Africa.

The mother company – NITRO SIBIR ZAO – was founded in 1990. Currently, the Group includes more than 20 enterprises which are specialized on the following scopes of business:

- industrial explosives production;
- design, construction and maintenance of manufacturing complexes for industrial explosives production;
- development and construction of technological equipment for application of industrial explosives, including mixing-and-charging trucks and delivery equipment;
- conducting drilling-and-blasting operations on the basis of original methodology of calculation of rational parameters of drilling-and-blasting operations;
- supply of raw materials and spare parts for industrial explosives production complexes.

The NITRO SIBIR GROUP aims to be among the world's leading companies in mining industry complying with the highest safety standards, as well as with the environmental and health protection demands, by investing considerable funds in new technologies development and constantly improving them to increase productivity within best-safety and to achieve outstanding economic and environmental results.

Production facilities of the Group include different types of technological lines: stationary and mobile equipment for packaged emulsion, bulk emulsion and ANFO as well as manufacturing of over 100 types of mixing-and- charging and delivery equipment. The total volume of industrial explosives produced in 2014 exceeded 331 192 tons. The volume of blasted rock in drilling-and-blasting operations performed in 2014 was 130 113 m^3.

Nitro Sibir will in June 2015 celebrate its 25 year Anniversary and will be delighted if you or some of your colleagues will attend our Moscow conference June 11-12. The conference will in depth present our business and there will be papers presented from our customers as well as from our company representatives about products and their capabilities in quarrying and mining. Papers will be given from Russian enterprises as well as fromour Finnish and our recent Australian experience.

We would be happy if you could indicate your interest to participate before April 15, 2015.
Welcome to contact Anna Philippova at philippova@nitros.ru

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EFEE
8th WORLD CONFERENCE
ON EXPLOSIVES AND BLASTING
LYON, FRANCE 2015
26th – 28th April
On Sunday 26 April 2015 the European Federation of Explosive Engineers will present its 8th World Conference on Explosives and Blasting at the Lyon Convention Centre, France.
The World Conferences on Explosives and Blasting is an excellent platform for becoming familiar with the current developments in the blasting technology sector. It is also an excellent arena for blasting technology experts from all over the world to extensively exchange their experiences.
The conference includes:
- Large Industry Exhibition
- Latest Innovations and Technology
- Technical Presentations
- Partner Leisure Programme
- Industry Specific Workshops
For further details visit www.efee2015.com
or email: info@efee2015.com

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