

MINING & CONSTRUCTION

MECHANIZED ROCK EXCAVATION WITH ATLAS COPCO – NO 1 / 2010

ON SHOW AT BAUMA
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Atlas Copco



There's been a lot of debate over the state of the world economy. Are we still in recession? Is the worst behind us? How fast will the recovery be? What if it slides back? These are important issues, of course. But at Atlas Copco we have kept our minds on what matters most – the long-term success of our customers.

Instead of making drastic cutbacks, we have made planned and sensible adjustments that have allowed us to continue producing innovative products – solutions that will enable our customers to do things faster, easier and more efficiently than ever.

We think this approach is so important that we have even given it a name – Sustainable Productivity. Throughout our history we have been dedicated to increasing our customers' productivity, so that's nothing new. The key word now is 'sustainable'.

In today's world, it is relatively easy to increase productivity. Advanced technology enables us to drive tunnels, build roads and bridges and excavate mines at an amazing speed, compared with just a few years ago. The difficult part is to make sure that these productivity gains can be sustained over time.

That's why, for example, we have made great efforts during the recent down-period to develop operator training programmes and maintenance and service packages, because we are convinced that equipment that is correctly used and properly maintained is the key to sustainability. That's our brand promise, and if you plan to visit us at Bauma, you'll see how we intend to put that promise into action.

HENK BROUWER
President, Atlas Copco Construction Tools.

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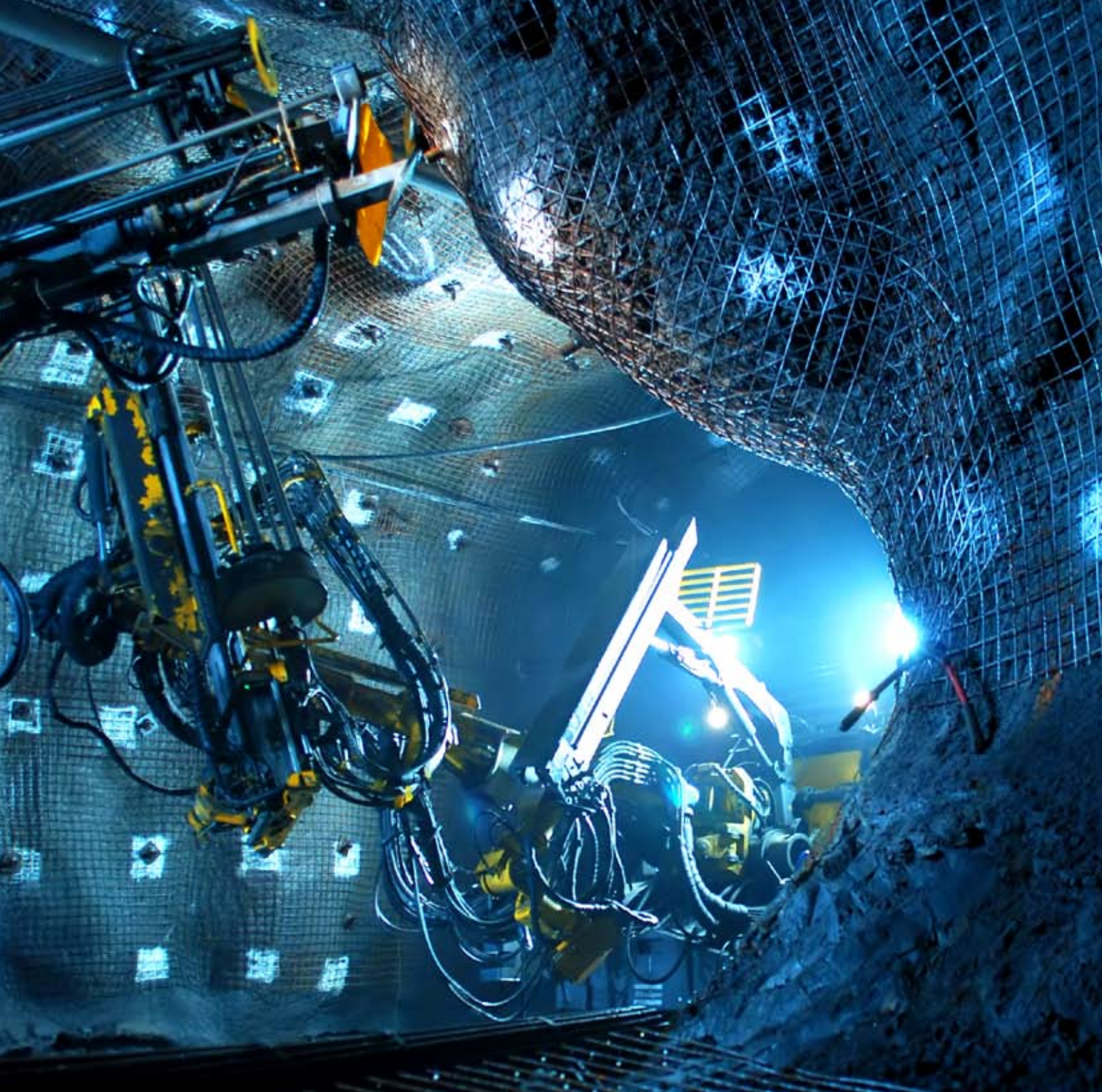
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BETTER BOLTING in the heart of Lapland

At the LKAB mine in Kiruna, northern Sweden, the latest bolting technology is making rapid progress on a massive reinforcement project. Careful planning, effective tools and a comprehensive training programme got the project up-and-running with remarkable efficiency. M&C reports on the progress so far.





» **A** major rock reinforcement programme is under way at LKAB's Kiruna iron ore mine that lies within the Arctic Circle in the far north of Sweden. The work is divided into three main projects; reinforcement of new drifts, reinforcement of a new haulage route at the 1365 level and complementary support work for the mine's older drifts and tunnels.

Referring to the complementary support project, Nils Stenberg, Project Manager, LKAB says: "So far, in just one year, we have installed more than 40 000 bolts. And we expect to put a further 100 000 in place before we finish. After that the only bolts being installed will be for newly constructed drifts."

Given the significant amount of bolts to be installed, ease and speed of installation were key factors in selecting both the type of bolts to use and the equipment and manpower to install them. In this regard, LKAB has taken an holistic approach, not only in the selection of effective equipment, but also in planning the training of operators to make sure the work could be done according to schedule.

Dedicated fleet

To meet the requirements of the programme, a range of Atlas Copco products were chosen including 10 Boltec LC fully mechanized bolting rigs, a Cabletec cable bolting rig, a Boomer E2 C rig for bolthole drilling and Swellex bolts.

The Boltec rigs feature two booms; one for drilling, injecting and bolt installation and one for handling and holding wire mesh in place during installation. The drilling boom features a ten-bolt carousel and can install a wide range of bolts including Swellex, rebar and split set types.

Before the bolts and mesh screens are installed, scaling is performed followed by the application of shotcrete that is reinforced with metal or plastic strips.

At Kiruna, the bolt of choice is the Atlas Copco Swellex coated bolt. Both the 3- and 2.4 m variant of this inflatable rock bolt – designed to provide instant loading capacity along its entire length – are used. The variant used here is the Mn24 Manganese



A major project: Two of LKAB's fully-mechanized Boltec LC bolting rigs at work on the mine's complementary reinforcement project. Here, 3 m coated Swellex bolts are being installed along with wire mesh.



“ In just one year, we have installed more than 40 000 bolts and will put in a further 100 000 on this part of the project.

Nils Stenberg Project Manager, LKAB

Swellex bolt that has a breaking load of 240 kN.

The size of the bolt used is determined by the cross section of the tunnel, with 2.4 m bolts used in the smaller drifts (where the tunnel's height and width is under 5 m). At the end of each bolt there is a face plate that holds the wire mesh in place and evenly distributes the pressure from the lower section of the bolt to the rock face.

The LC version of the Boltec rig series is designed to install bolts of between 1.5- and 6 m in length in roof heights of up to 12 m. It features heavy-duty booms for fast and accurate positioning between holes, which at Kiruna are placed every 1–1.5 metres apart depending on the expected load on the rock »



Reviewing progress: Roger Jatko, Trainer, LKAB (left) and Boltec operator Tom Grundell survey the newly reinforced tunnel roof.

Top left: 3 m Swellex bolts line the drift, ready for installation. Above: The drilling boom of the Boltec LC rig with its ten-bolt carousel.

» being reinforced. The mesh and bolts are normally placed from 1 metre above the floor.

Although the cementing capability is not required for the Swellex bolts, the rigs feature an automatic cement handling system. The ratio of water to cement in the mix can be controlled via the Rig Control System. The cement handling system provides quality assurance through statistics logging and features a cement silo with agitators.

In other parts of the mine, the Boltec installs Kiruna bolts. The changeover from Swellex bolts to the Kiruna bolt requires an adjustment of the magazine to accommodate the new bolt length.

Target for production

“The productivity target we are aiming for is 1 600 bolts per Boltec per month,” says Nils Stenberg, “but we are achieving an average of around 1 200 today. This is mainly due to time lost adjusting the boom when we change over from one bolt size to another. In the best months however, we have installed 4 000 bolts using one rig, so we know what the rig and operators are capable of.” The operators work in two shifts covering 06.00 to 22.00.

Boltec operator Tom Grundell is work-

ing on the complementary rock programme and says he is pleased with performance of the rig and the Swellex bolts: “I am really satisfied with the rig’s performance – the cabin is comfortable and the air quality is good. In my eight-hour shift I can usually install 40 bolts including the drilling and net installation. The Swellex bolts are easy and fast to install and give instant support.”

After the bolt hole has been drilled by the Boltec rig, the unexpanded bolt is transferred from the boom’s carousel to the hole. Once in place, the boom’s water injector connects to the protruding end of the bolt and water is injected at 300 bar. This pressure forces the bolt to expand into the walls of the hole providing instant support.

The bolts can withstand high levels of deformation and so are able to accommodate ground movements and are not sensitive to blasting vibrations. Further benefits include chemical and grout-free installation and the fact that the Swellex bolt is not to be affected by voids, water or joints in the host rock. Although LKAB is using standard 2.4 and 3 m bolts, connectable Swellex bolts are available to create longer lengths.

LKAB operates its own comprehensive training programme, the goal of which is to

ensure that well trained operators are ready to use equipment whenever and wherever needed.

The programme is divided into modules and begins with safety and underground orientation training before moving on to drilling, bolting, explosives handling, shotcreting and scaling. The training programme is intensive, with one trainer conducting one-on-one or one-on-two training sessions. It also benefits from having one Boltec rig reserved purely for training purposes.


Effective training

The operators chosen for the rock reinforcement programme were drawn from KGS, a subsidiary of LKAB and were new to operating the bolting rigs. “Since the new rigs started to arrive in spring 2009, some 90 people have been trained to operate Atlas Copco rigs including the Boltec, Cabletec and Boomer rigs,” says Roger Jatko, Trainer, LKAB.

“Some of these people had never worked in the mine before and were new to operating rigs. Atlas Copco supplied comprehensive training material, delivered in time before the arrival of each rig. After training, the operators are assessed and well educated.

“The collaboration with Atlas Copco has worked very well in terms of commissioning the new equipment when it arrived. In fact, when they arrived, the rigs worked ‘straight out of the box.’”

Service and maintenance of the fleet is provided around-the-clock by an Atlas Copco technician and there is an underground workshop stocked with spares. To date, the overall availability of the fleet is estimated to be 80–85 percent.

When the programme is complete, LKAB will have achieved its goal, with all the currently-used areas of the mine benefitting from the latest rock reinforcement technology and products. 



Sunrise for Sustainable

Atlas Copco will be making a strong appearance at this year's Bauma trade fair in Munich, Germany, with an impressive display of equipment and services dedicated to achieving sustainable productivity.

For the first time in decades, multinational companies around the world, including Atlas Copco, did not participate in last year's Intermat trade show in Paris, one of the biggest events for the construction industry.

It was a clear sign that the global recession was beginning to bite. Now, as the

world economy begins to recover, Atlas Copco is ready to present one of its biggest and best showcases ever at Bauma 2010.

Bauma will run from 19 to 25 April. It will have an exhibition area of 540 000 square metres and is expected to attract more than 500 000 visitors, not only from the world of construction and demolition, but also from the mining community.

In the open air exhibition area Atlas Copco will be in pole position in Area F, Section 10 on one of the main aisles and among the big players.

Easy-to-locate and with an attractive, spacious design, the Atlas Copco booth will

offer a 1 400 sq m display with the common theme "Sustainable Productivity".

Henk Brouwer, President of Atlas Copco's Construction Tools Division explains: "At Atlas Copco we have always focused on developing products that improve our customers' productivity. However, sustainability is now more important than ever and that's what we intend to demonstrate for the visitors to our booth at the Bauma show."

Sneak preview

The Atlas Copco booth promises to be a favourite destination and some 2 000 visitors

“Sustainability is more important than ever – and that's what we intend to demonstrate at Bauma.”

Henk Brouwer President, Atlas Copco Construction Tools



Dawn breaks over the Bauma international exhibition outside Munich, Germany.

Productivity!

Atlas Copco gears up for biggest and best display ever

per day are expected to pass through. Here, M&C presents an exclusive preview of some of the most exciting elements of the show.

Breakers for all reasons

There will be an extensive array of hydraulic breakers – both handheld and heavy duty units for carrier mounting. On the handheld side, a new generation consisting of vibro-reduced hammers, breakers and drills will be launched, all with significantly improved vibration dampening. This is thanks to new design elements which dampen the handles without reducing the breaker's performance.

These include breakers for concrete, asphalt and frozen ground applications, as well as for trenching, tie-tamping, spike driving and general demolition jobs.

Moving up the weight scale, visitors will find the latest heavy duty hydraulic breakers ranging from 450 kg to 10 tonnes, incorporating unique features which can only be found on Atlas Copco breakers such as PowerAdapt, VibroSilenced System, AutoControl, ContiLube, StartSelect and the optional DustProtector.

While in the heavy breaker section, visitors will also see two new units in the heavy range which, until open day on April 19, will be a closely guarded secret.

The cutting edge

New Combi-cutters are also bound to attract the crowds and the new CC 6000 will be no exception. With its service weight of 6 500 kg it is the heaviest combi-cutter in the range. It is designed for carriers of 58 to 85-tonnes which meets the trend towards larger demolition excavators.

The CC 6000 is in line with the design of the entire range of Atlas Copco hydraulic CombiCutters; two movable jaws, two lifting cylinders and a constant, high crushing force throughout the entire closing process. And the combination of a single- and double-blade jaw arm provides maximum stability even under extreme loads.

In addition to the CC 6000, visitors to »



The HB 3100 heavy duty breaker – just part of the breaker line up at Bauma that covers everything from concrete breaking to demolition.



Ergonomic: Atlas Copco's latest handheld tool features new vibration-reducing technology.



A cut above: A range of CombiCutters, with service weights of up to 6 500 kg will be on display at the Bauma show.

» Bauma will see the launch of the CombiCutter CC 650 which has a hydraulic rotation device allowing endless 360° rotation of the attachment and quick and easy positioning. It also has a crushing force of 45 tonnes and knives that can be turned around and replaced on site. The service weight of 630 kg makes the CC 650 ideally suited for light demolition work and carriers of 6–14 tonnes.

Two new drill rigs

When it comes to drilling, Bauma will be the launch pad for two new Atlas Copco rigs – the ROC T20 for construction, and the SmartRig ROC D65 for mining.

ROC T20 is the second model in the four-wheel hydraulic rig range and confidence is high that it will achieve the same level of success as the smaller ROC T15.

With its approximate weight of five tonnes and compact size, this rig is well suited for drilling applications in urban environments. Its large coverage area and optional, hydraulic roll-over boom also makes it ideal for rock reinforcement work.

ROC T20 is intended for 38–64 mm holes and is equipped with an on-board 82 kW Cummins diesel engine and a 50 l/s free air delivery capacity compressor. The rig's new generation rock drill, COP 1132, is double-

dampened, has a highly efficient percussion mechanism and requires less energy to generate the maximum output of 11 kW.

The new SmartRig ROC D65, on the other hand is big news for miners. This rig combines all the strength and power of the highly successful ROC L8 down-the-hole drill rig, with the intelligent, automated functionality of the SmartRig range. The result is a unique rig which makes surface mining smarter. (See page 21)

Visitors involved in underground tunneling will be interested in the Atlas Copco concept of High Precision Drilling (HPT), or, simply, how to get as close as possible to the original design of a tunnel profile. This will be represented by the computerized, two-boom drill rig Boomer E2 C, which, coupled with a wide range of innovative software, makes Atlas Copco the world leader in this technology. (See page 12)

All eyes on the ground

As usual at Bauma, Atlas Copco's geotechnical engineering equipment and rock reinforcement tools will play a central role. This time the display will feature three new products – the Elemex overburden drilling system for flushing control, the SDA T111 self-drilling micropile and the Terracore

range of site investigation tools.

Elemex is a drilling and casing advancing system that provides all the benefits of DTH drilling such as high productivity and straight, deep holes, without the risk of air leakage or over-drilling that can cause damage to surrounding structures. (See page 25).

SDA T111 is the latest technology in micropiling – a self-drilling micropile that drills and reinforces a hole in one single process. T111 can drill through anything from sand to rock. It is ideal for sites with limited access and has a low impact on the surrounding environment.

Terracore geotechnical core drilling tools includes bits and In-The-Hole equipment for applications such as soft core sampling, ground investigation and foundation definition. The range is also suitable for other geotechnical applications such as drilling holes for grouting, drainage, ventilation and pilot holes for raise boring.

For the mining industry, there will be Roofex rock bolts and monitor tools for mining in difficult ground and connectable Swellex Pm24C bolts for deep anchoring. Added to this will be a Unigrout grouting platform and the CE certified range of Self Drilling Anchors for soil nailing.



Bauma debut: The new ROC T20 for a wide range of construction applications drilling 38–64 mm holes.



Drill and reinforce in one process: The innovative SDAT111 self-drilling micropile with sacrificial drill bits.



Powerful combination: The SmartRig ROC D65 offers down-the-hole drilling with SmartRig functionality.



Terracore geotechnical core drilling tools for site investigation.



Introducing Elemex: A new system for installing casings in sensitive environments and challenging ground.

Major breakthrough

The mining industry will also witness what amounts to a major breakthrough in the field of drill cuttings analysis; a new scanning device which enables ore content to be constantly measured while drilling. The result from the online analysis will be provided as a digital block model, giving a clear view of the orebody.

The scanner can be fitted to all Atlas Copco drilling equipment. The system reduces lead times for analyses as there is no need for the preparation of samples, improves sampling accuracy, gives detailed ore grade and location information and cuts sampling costs. In addition, the possibility to scan while drilling will enable mines to optimize downstream excavations and mineral processing.

The power of air

A range of Atlas Copco compressors will also be displayed at Bauma this year and among the highlights will be the latest developments in the DrillAir, XAHS and XAMS ranges as well as the QAS range of generators.

The Open Unit compressors from the DrillAir range deliver an airflow of up to 727 litres per second for drilling applications. They feature the FuelXpert system

which is designed to optimize fuel consumption and enhance component life thanks to Oiltroxic technology.

The XAHS 237 12 bar and XAMS 287 8.6 bar compressors, powered by Deutz Tier 3 engines, are also currently available with FuelXpert as part of the standard package. The XAS 87, specifically designed for the European construction and rental industries will also be on show. Weighing in at less than 750 kg, this highly portable unit can easily be relocated between worksites.

Last but not least, the full range of QAS generators will be on show for the first time to an international public. With power ratings from 14–571 KVA, the range is designed for fast, safe and easy transportation and can be used on virtually any unprepared surface. The flagship of the range is the QAS 500 gen-set which is ideal for a wide range of applications including industrial, rental, construction as well as public utilities powering.

Training and service

Atlas Copco advocates that sustainable productivity can only be achieved by optimizing the products and solutions used. This includes making sure that equipment is used correctly, that it is regularly ser-

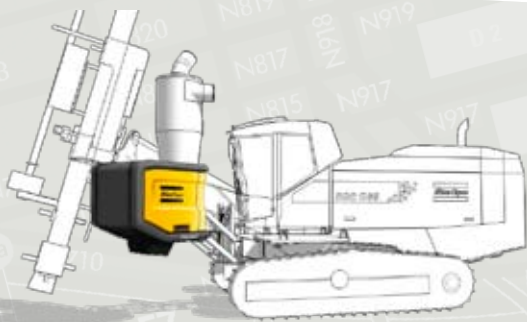
vised and maintained and also that operators are properly trained.

At Bauma, several simulators will be available to give operators the chance to put their skills to the test. For example, excavator operators will be able to manoeuvre several different attachments – breakers, Combi-Cutters, pulverizers and grapples on a carrier and compete for points.

The crowd outside the simulator enclosure will be able to follow the progress of the operator on a screen and the best score will be shown at the end of each day. For each top score achieved, Atlas Copco will make a donation to the Haiti restoration fund. For drillers, there will also be an opportunity to try out simulators for the SmartRig and Boomer E2 C and learn all about the new Atlas Copco Master Driller training programme.

In all, Atlas Copco intends to send a clear message at Bauma: operator training and preventive service and maintenance go hand-in-hand with precision, efficiency, safety and comfort in the quest for Sustainable Productivity.

For more details on the Atlas Copco display, go to www.atlascopco.com/bauma



A great new innovation for miners: This drill rig mounted scanning device enables cuttings to be analysed for ore content during drilling.



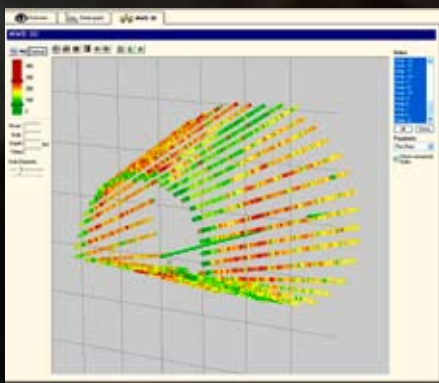
Virtual experience: Equipment simulators will be available at the Atlas Copco stand, offering visitors the chance to display their skills at operating a drill rig or heavy breaker carrier.



Impressive line-up: The full QAS generator range consisting of a wide variety of models rated between 14-571 kVA for easy transportation and set-up on practically any unprepared surface.



Open air: This new portable air compressor, the Open Unit from the DrillAir range, delivers a flow of up to 727 l/s (1550 cfm) at 25 bar.



One of five technologies in the High Precision Tunnelling concept: Atlas Copco's Tunnel Manager displays a 3D rendering of Measurement While Drilling data.

HPT puts money in the bank

It costs money to drive a tunnel. Manpower, know-how, heavy equipment, materials... it all adds up. But whatever the project, large or small, straightforward or complex, there are always savings to be made if the right method is used. At Atlas Copco, we call it HPT (High Precision Tunnelling).

BY MATHIAS EDHAMMAR

As every tunnelling engineer knows, there are almost as many ways of driving a tunnel as the number of rock formations that exists around the world. Technology has come a long way in the past decade, but even the most proven tunnelling methods often fail to live up to demands, resulting in time-consuming remedial work and extra costs that break budgets along with each new blast.

Insist on total precision

The answer, in my view, is simple: insist on the one thing upon which everything else depends: total precision. Quite simply, the closer a tunnel is blasted to match its planned profile, the more you save in terms of less shotcreting, extra rock bolting and other corrective work.

A better quality tunnel is the road to a better overall economy and today Atlas Copco's HPT concept makes it possible to

achieve that goal in every type of tunnelling project.

The concept consists of five advanced technologies, working in harmony with Boomer drill rigs – Tunnel Manager, Rig Remote Access, Total Station Navigation and Tunnel Profiler.

- **TUNNEL MANAGER IS PC-SOFTWARE** that enables the worksite office to provide operational support to Atlas Copco Boomer rigs equipped with the Rig Control System (RCS). The software is used to plan, store and evaluate data for the drilling process, and makes it possible to optimize the tunnelling cycle.
- **RIG REMOTE ACCESS (RRA)** ensures rapid and secure transfer of the latest data to and from the drill rig – as well as secure data storage. With the drill rig online, the whole organization has constant access to the lat-

est information – the production planning department can initiate immediate analyses of the incoming data. Automatic updates eliminate the need to manually collect new drill plans for the rig operator, and service personnel can conduct online diagnoses and order appropriate replacement parts prior to service calls.

- **TOTAL STATION NAVIGATION (TSN)**, enables the rig to be rapidly navigated to precisely the right position every time. Navigation is accurate to within 1 cm compared to the more normal 10 cm and takes no more than five minutes compared to the 10–30 minutes for manual methods. With a 2 000 metre long tunnel, savings of about EUR 100 000 can be achieved. Navigation is conducted by the rig operator, using a tripod-mounted Total Station, in combination with prisms mounted on the rig and tunnel walls.



The system that has been reducing costs since 1998



Atlas Copco introduced its Rig Control System (RCS) – a computerized control system for drill rigs – as early as 1998.

It was an innovation that revolutionized the industry. Since then, the company has led the development in computerized and automated rock drilling. Today, more than a thousand RCS rigs are in operation the world over.

This long experience and ongoing dialogue with customers has resulted in increasingly sophisticated functions, culminating in the concept of High Precision Tunnelling.

A wide range of benefits

Computerized drilling is all about creating more productive conditions for rock excavation. Computerized automation improves drilling rates and drill steel economy. But there are many more benefits such as faster fault detection, lower maintenance costs and enhanced rig availability. A recent study confirms that fully automated drilling will, on average, reduce time at the face by 6 %, increase advance rates per face by 3% and reduce overbreak by 7 cm.

Today's Atlas Copco rigs feature fourth generation RCS automation. This latest system offers even more refined functions for planning, conducting and analyzing the drilling process, including wireless online data transmission between rig and site office. And it doesn't stop there. The RCS system and its range of functions is also utilized in many other Atlas Copco products and applications.

- **TUNNEL PROFILER IS A 3D-SCANNING SYSTEM** for rapid and high-precision tunnel profiling. A section can be scanned immediately prior to drilling each round, requiring very little extra time. The data is processed and the rig operator is informed about any over or underbreak in a matter of minutes. As a result, drill plans can be corrected quickly, which can save up to 5 cm in overbreak. In a tunnel with a 40 m² profile, this can yield savings in overbreak-costs of about EUR 125 000 per kilometre (shotcrete and man-hours).

- **MEASUREMENT WHILE DRILLING (MWD)** is a rig option offering rapid acquisition of vital drilling data, such as penetration rate, feed force, rotation speed and more. With Tunnel Manager MWD, the data can also be used to analyze rock hardness, crack zones and other relevant rock mass characteristics. Thorough know-

ledge of the rock's characteristics allows the tunnelling process to be adjusted during drilling.

Used together with our tunnelling rigs, and also our rock bolting rigs, these technologies optimize the tunnelling process right from the start, thereby reducing unnecessary extra work, optimizing tunnel quality and keeping project costs under control.

We developed the RCS system in the mid-nineties and have been refining it ever since, in close co-operation with our many customers around the world. That's why Atlas Copco is the undisputed leader in high precision tunnelling.

According to Konstantin Spinou, Director of Underground Operations at Veidekke, the Scandinavian building contractor and property developer, the HPT concept has helped the company to raise accuracy to levels that were previously unattainable.

“Every tunneller strives for perfection but knows that in reality it is impossible to achieve. The HPT functions developed by Atlas Copco in co-operation with companies like us at Veidekke, help us to get as close as possible to that perfection, whatever the conditions. It makes no sense to spend money on correcting excessive over and underbreak, so by using HPT we optimize our ability to maintain the original tunnel contour and, as a result, also keep our costs to a minimum.”



Mathias Edhammer is Product Manager, Atlas Copco Rock Drills, Sweden and a key member of the team behind the development of computerized drilling.
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First choice at Jelsa

*How Norway found
the COPROD key to
better drilling*



Straighter blast holes, longer-lasting bits and fuel efficiency. These are just some of the variables that contribute to productivity in blast-hole drilling. M&C reports from Norway's remote Jelsa quarry, north of Stavanger, where one drill and blast contractor has found the key to achieving all three.

Norwegian contracting company, Bertelsen & Garpestad (B&G) was founded in 1959 by Kjell Garpestad and Arne Bertelsen – two carpenters that met in the autumn of that year and decided to start their own business. It turned out to be a good decision.

Since it was founded, the company has steadily grown from providing drilling and

blasting, excavation and transport services in Norway's Rogaland county and around the south and west coasts, to being one of the largest drilling and blasting contractors in the country. Today this family-owned company employs 80 people.

B&G has used Atlas Copco drill rigs from the start and currently operates a fleet of 17 surface crawlers including ROC D3,

ROC D7, ROC D9, ROC F9 and ROC L7 rigs. This flexible fleet can drill holes in the range of 35-165 mm – enough to cover most drilling in quarrying and construction applications.

The company has a drill and blast team at the Jelsa quarry, owned by Norsk Stein, 90 km north of Stavanger on Norway's west coast. This is one of the largest aggregates quarries in Europe (annual production: approx. 6 million tonnes) and supplies different grades of aggregate to more than 40 European ports including those in the UK, Germany and as far south as Spain.

Looking for an economical drilling technique that could offer optimum results in



A key supplier of aggregates to Europe: Atlas Copco ROC F9 C and ROC L7 40 CR drill rigs at work on the bench at Jelsa, Norway, one of Europe's largest aggregates quarries. Above: Rune Støle, drill rig operator, B&G (left) discusses the performance of the COPROD drilling system with Atlas Copco's sales and service representatives.



difficult overburden, B&G attended the 2008 MinExpo exhibition in Las Vegas – and discovered the Atlas Copco Secoroc COPROD drilling system. Atlas Copco then invited B&G to see the technology in action at the Glensanda aggregates quarry in Scotland and in Silinjaarvi, Finland.

Perfect combination

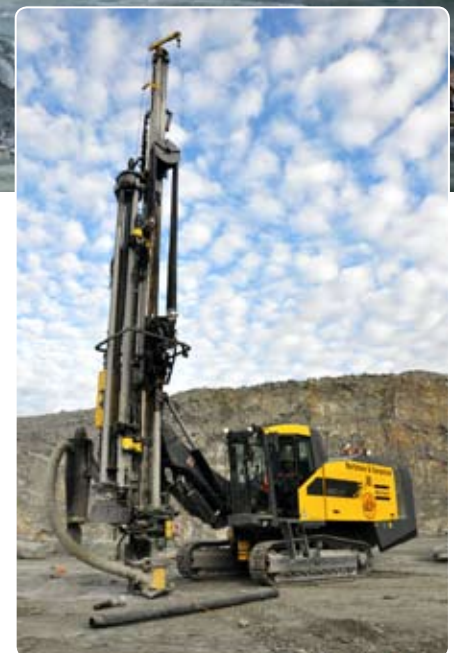
The Secoroc COPROD is a top hammer drilling system that offers the straightness and accuracy of down-the-hole drilling with the speed of hydraulic top-hammer drilling. The technology also benefits from having the long service life of the down-the-hole method.

A key element of the system is that in-

side each rigid COPROD pipe, there is an impact rod that transmits the energy from the rock drill to the bit. The result is more impact power and minimal wear on the pipe thread. As the outer pipes are flush along the entire length of the drill string, it is almost impossible for jamming to occur.

Impressed by what they saw at Glensanda and Silinjaarvi, B&G decided to try the COPROD system and in December 2008, a new ROC L7 40 CR drill rig, fitted with the COPROD system and a COP 4050HE-CR rock drill, arrived at the Jelsa site.

Rune Støle, drill rig operator at B&G, has been operating the new ROC L7 40 CR at Jelsa since it arrived. With 11 years' drilling



Impressive performance: The ROC L7 40 CR fitted with the COPROD drilling system has impressed operators at the quarry with its ability to produce straight, clean holes through the challenging overburden.

“ the best feature of the system is its ability to produce very straight holes – they are totally straight.

Rune Støle drill rig operator, B&G



» experience gained on a range of drill rigs, Støle was keen to try the COPROD system to see how it would cope with the challenging overburden at the site. “The overburden at Jelsa can be a couple of metres deep and it’s not always easy to produce clean holes through to the rock. I was interested to see how COPROD would cope with it,” says Støle.

The drilling pattern at the quarry is 5.6 m by 4.2 with blast holes drilled 15–18 m deep including two metres of sub-drilling using a Secoroc 165 mm diameter bit. The rock (granodiorite) is close to granite in its composition and features abrasive quartz.

Asked about the performance of the

COPROD system, Støle replies that it is providing more than just good drilling through the overburden. “I think the COPROD’s performance is excellent,” he says.

“It copes very well with the overburden and the holes don’t collapse when you retract the drill string. The overall quality of the hole is also very good, but the best feature of the system is its ability to produce very straight holes – they are totally straight.

Excellent economy

“Another benefit is economy. The bits are reground every 30 metres and can be reground 20 or 30 times so I get a lot of drilled metres from each bit.” Drilling an

18 metre hole takes around 18 minutes, during which time Støle simply monitors the drilling parameters from the cabin of the ROC L7 40 CR which, he points out, is ergonomically designed and warm, even in Norway’s challenging winter climate.

“The rig is extremely comfortable with fingertip controls placed within reach of the arm rest and the combination of the rig and the COPROD system makes for a good working environment: the dust from the drilling is deposited at the front of the rig, not dispersed in the air.”

The dust control is achieved thanks to a pre-separator and a dust filter built into the boom arm and a dust hood that can be



Left: Rune Støle, drill rig operator, B&G says the COPROD system copes well with the challenging overburden at the Jelsa quarry. Above, examining the drill bit with Trygve Djuvsland, Regional Sales Representative, Atlas Copco.


retracted while collaring to aid the operator's view. The boom also features an adjustable double centralizer and rod gripper arms that ensure minimum wear of the drill string threads for increase service life.

Although the drill rig's control system can automate many of the drilling functions, as an experienced driller, Støle chooses to use the manual hydraulic controls saying that he prefers to control each of the drilling parameters himself.

Sven Harbo, Quarry Division Manager, B&G says that the quarry has invested in a new crusher line and will install a fine crusher next year, and will increase production from 6 to 10M tonnes during 2010. "The increased production target means that we will need to increase our presence at the site to meet the demand for drilling services," comments Harbo.

"We will do that by adding to our fleet and looking at the technology we use, and that includes the COPROD system which has proven to be very effective. I have been particularly impressed with the COPROD's performance in the overburden at the Jelsa open-pit, which can be difficult to get through.

"Using the most effective technology, along with the great crews we have, ensures we can deliver the production required."

B&G has also selected Atlas Copco's ROC Care and COP Care agreements to provide service and maintenance for its rock drills and rigs. "We have four ROC Care agreements and five RIG Care agreements," adds Harbo. "The big advantage for us is that we have fixed costs for maintenance as well as extended warranties – and it is working very well." 



“Using the most effective technology, along with the great crews we have, ensures we can deliver.”

Sven Harbo Quarry Division Manager, B&G

THIRD GENERATION COPROD

The Atlas Copco Secoroc COPROD system is designed for high capacity bench drilling in demanding rock. It combines the hole straightness and hole quality of DTH drilling equipment with the high penetration rate of the topammer system.

The system is available for two basic types of drill rigs with five drill string options. ROC F9 CR is the smaller of the two rigs offering CR76 or CR89 drill strings for blast-holes ranging from 90–127 mm in diameter. Up to 8+1 sections can be loaded into the rig's carousel depending on the diameter of the COPROD selected.

ROC L740CR, a second-generation COPROD drill rig, can be equipped with CR89, CR102, CR127 or CR 140 drill strings. Translated into hole sizes, it means L740 CR can drill holes from 105 mm to 180 mm in diameter.

The ROCF9CR drill rig is capable of maximum hole depths of 30 m while the ROCL7CR can reach 36 m. Section lengths (consisting of tube and striking rod) are 12- or 20 ft (3.6- or 6 m) long depending on hole diameters.

The third generation COPROD drill strings offer improved hole straightness and reduced noise emission. The welded centre guides in the drill tubes have been replaced with a full-length specially-designed inner tube. This patented plastic stabilizer with its unique geometry acts as an inner lining, reducing vibrations in the COPROD tube and dramatically reducing noise levels.

Field tests have shown that this reduction in noise has not only made the operator's environment more pleasant, it also allows COPROD rigs to operate without causing unnecessary noise pollution.

The third generation COPROD 102 and 127 drill strings will be available in the first quarter of 2010, while the rest of the range will be launched during the second half of 2010.



KAZAKHSTAN

gears up for GROWTH



Kazakhstan, that vast country south of Russia between the Caspian Sea and China, is on the move. Its infrastructure is being improved and its mining industries are being reborn with new methods and modern equipment. It will take time, but the aim is clear: to become a prime example of Central Asia's growing prosperity.

Few countries have such expansive reserves of coal, oil, uranium, methane and natural gas as Kazakhstan. And in this land, characterized by vast open plains, Atlas Copco drill rigs have become the rigs of choice among coal producers.

Beneath the surface of the Kazakh Steppe in the north of the country, there are massive coal reserves. Here, Atlas Copco has been working with a number of mining companies to upgrade their drilling technology to meet productivity targets and lower their costs.

Two such operations are Bogatyr Komir and Borly Coal that both operate a mix of Atlas Copco DML and DM45 blasthole drill rigs. Bogatyr, located in the Ekibastuz coal basin, has total reserves of 4.5 billion tonnes and produces nearly 40 percent of the country's coal (46 Mt mined in 2008).

The mine has a fleet of five drill rigs on site, three DML and two DM45. Each DML drills around 14 000 m per month while the DM45 achieves about 20 000 m per month, both types operating on 25 m benches. The DML rigs use 228 mm tricone bits while the DM45 uses 171 mm tricone bits and all of the rigs are capable of producing more drillmetres if required.

With a 7 m burden and 5 m spacing, each blast consists of 400 holes to produce more than 100 000 tonnes of coal and 60 000 cubic metres of waste per day.

Borly, located in the Karaganda region, produces about 7 Mt per year from the Molodezhniy and Kulchek mines. It uses both DML and DM45 rigs on 45 m benches, drilling around 17 000 m per month per rig, although the rigs have the capacity to operate at 20 000 to 25 000 m per month.



Productivity partners: Above, from left, Atlas Copco's John Stinson and Kamshat Galiyeva with Chief Engineer Valeriy Kim and Chief Mechanic Khमित Omarov of the Borly Molodezhniy coal mine, owned by Kazakhmys Copper Corporation.

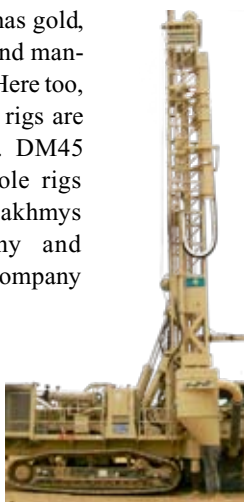


At Borly Coal Mine Atlas Copco DML and DM45 rigs work on 45 m benches. Above, the new electric-powered DML rig with hydraulic tophead drive.

The DML drills a 228 mm hole, while the DM45 drills a 200 mm hole using Secoroc Epsilon bits lasting 15 000 to 18 000 m. Borly also has the distinction of having received the world's first electric DML drill rig. Meanwhile, the recent delivery of the country's first Atlas Copco RD20 drill rig for oil and gas, has paved the way for exploration of the huge Karaganda methane field.

Rich reserves

Kazakhstan also has gold, copper, iron ore and manganese open pits. Here too, Atlas Copco drill rigs are well represented. DM45 and DML blasthole rigs are used by Kazakhmys Copper Company and Aktobe Copper Company



Superior productivity: The Pit Viper 275 at Kazzinc's VasGold Mine.

in the country's western copper region.

The multi-pass DM30 for hole diameters of 127 mm to 171 mm, is the rig of choice for Polymetal's Varvarinskoye Mine, whereas the single-pass Pit Viper 275, for hole diameters up to 270 mm, is used by Kazzinc's VasGold mine.

"We have introduced blasthole drilling equipment to Kazakhstan that can increase productivity and lower operating costs," explains John Stinson, Global Business Manager, Atlas Copco, "but it was not a straightforward task."

From the start, Atlas Copco advanced new ideas into Kazakhstan. The region traditionally used a common hole diameter, bench height and annual meterage using electric-powered rotary drilling methods.

Atlas Copco converted the country to diesel-powered hydraulic drills, as well as high-pressure Down-The-Hole hammer drilling. Today, the time-tested technology of DTH drilling has proven itself at Varvarinskoye Gold as well at the Aktobe Copper Company's "50 Years October" copper mine. This change-over to DTH drill-

ing was not always initially successful, but with time and co-operation, the full benefit was realized.

Progress in "October"

Production was started at the "50 Years October" deposit, located some 200 km from Aktobe, in 2006. During the initial planning stages, rotary drilling was used to produce a 215 mm blasthole for the overburden. Once the overburden was removed, the use of down-the-hole (DTH) drilling was studied for use on harder rock formations.

Following these studies, the mine selected eight Atlas Copco rigs – six DML and two DM45 high pressure blasthole rigs for DTH drilling using Secoroc QL60 and DHD 360 hammers for drilling 171 mm holes on a 12 m bench with a 5 m burden and 6 m spacing. The central pit has a 14-year life and satellite pits are under development.

While the owner, Aktobe Copper Company, was impressed with the penetration rate, overall production levels had not reached expectations and the company turned to Atlas Copco for a way to increase the rigs' productivity. GRT, a sister

Golden touch: On site at the Vararvarinskoye Mine, owned by OJSC Polymetal of Russia, where five Atlas Copco DM 30 rigs and one T3W are used for mining gold.



Vararinskoye is a good example of Kazakhstan's developing metals industry: Drill Master Pavel Bobylev (left) with Atlas Copco's Kamshat Galiyeva.

» company of Atlas Copco's distributor Ken Group, an experienced contractor, had been getting good results with rotary drilling at other copper mines and wanted to duplicate that success by employing DTH drilling at the "50 Years October" site.

The company operated a DM45HP rig during a four-month test period and of the total metres drilled the rig achieved 60 per cent of the total productivity rate of the three rigs in operation at the site.

According to Alexander Merzlikin, Deputy General Director, Special Projects, Ken Group, there were no technical problems and the drill rigs all achieved the same penetration rate. Ken Group/GRT also coordinated all supplies and service to keep the rigs running at maximum efficiency, including all lubricants, drilling consumables, parts, maintenance and repairs.

Merzlikin continues: "When you manage the bench, you need to plan for up to three months. Our success comes from teaming experienced operators with an equivalent service organization and supply chain. Ken Group/GRT has a single focus and that is to provide the maximum metres at the lowest possible cost."

Moving forward, Ken Group/GRT will either expand the contract drilling or offer a structured training and drilling programme for Aktobe Copper's operators.

Developing metals

Vararinskoye Gold Mine in Varvarinka, was developed in the 1990s when European Minerals conducted exploration, followed by pit work with overburden removal in 2006. Gold production began in December 2007 with copper-gold concentrate following in March 2008.


Vararinskoye is located on the north-western plains close to the Russian border. Recently acquired by OJSC Polymetal of St. Petersburg, Russia, the mine is a good example of the equipment used for mining development in Kazakhstan. To date, the mine has been moving 3 Mt per year. It operates five Atlas Copco DM30 and one T3W high pressure blasthole drill for DTH drilling. Three DM30s were acquired when the mine opened, and two more were recently purchased, expanding the fleet to meet ore demands.

The mine will be developed to produce 4.2 Mt of ore per year for the processing

facility over the projected 15-year life span of the mine. Each rig is expected to drill 20 m per hour to produce 10 000 drillmetres per month. The drilling pattern consists of a 4 m burden with 3.5 m spacing (or 4.5 m x 3.7 m depending on the rock) with a bench height of 5 m and sub-drilling of up to 1 m. The rigs operate at 24 bar, each applying 55 bar of pull down with 70 bar rotation.

The mine uses 152 mm hammers with the 165 mm bits averaging 1 000–1 200 m per bit and 10 000 m on the hammers before they are rebuilt.

Vladimir Sterlyagov, Mine Manager at Vararinskoye Gold, is satisfied with the overall success of the DM30 blasthole rigs. One of these is nearing 12 000 hours. Sterlyagov credits drill supervisor Pavel Bobylev for keeping the rigs at a high rate of productivity. It is Bobylev's working and drilling knowledge, gained in many different environments, that has allowed this team to get the most out of the DM30 and make them successful.

Vararinskoye has proven and probable resources of 3.1 million ounces of gold and 313 million pounds of copper. 

Getting to grips with ARCTIC IRON

SYDVARANGER MINE REOPENS AFTER 14 YEARS

The first new iron mining operation to be launched in Europe in the 21st century is now under way on the northern tip of Norway. Sydvaranger Mine, which was closed in 1996, has been reopened with new management, refurbished facilities and a comprehensive support agreement with Atlas Copco.

At 400 km above the Arctic Circle, the Sydvaranger Mine, in the community of Kirkenes, is about as far north as you can get. Here, in the region known as Finnmark, close to the Russian border, production of iron ore has just been restarted following a major rehabilitation programme.

The new owner, Northern Iron of Australia, believes that there's plenty of life – and profits – left in the old orebody which has an average grade of approximately 32% Fe.

Challenging project

Since August 2008 the venture has focused on reviving the huge open cast pit in paral-

ments should allow ore to be produced at the rate of 7Mt/y, yielding 2.9 Mt/y of iron ore concentrate over the next 30 years.

That plan has been slightly scaled back and production is now expected to rise to two million tonnes of concentrate by July this year and is then most likely to remain at that level for the next two years.

For John Sanderson, CEO of Sydvaranger Mine, an Australian, the revival project has been the most challenging of his career, characterized by management changes, setbacks in the refurbishment programme, changing equipment specifications, bit life issues and delays caused by the global financial crisis.

“There's been no shortage of challenges but now we are moving forward and service plays a major role.”

John Sanderson CEO, Sydvaranger Mine



lled with refurbishing the existing processing plant, including the installation of a new pelletization unit.

According to pre-studies, these improve-

However, Sanderson, previously mine manager at one of Rio Tinto's Pilbara mines in Western Australia, is optimistic. “We've been working very hard to get this on the

road for about 13 months now and there's been no shortage of challenges, much of which has had to do with the refurbishment of the processing plant,” he says. “But now I'm pleased to say that everything is beginning to fall into place. We are moving forward, the mine is up and running and we can say that we are now into our first year of full production.”

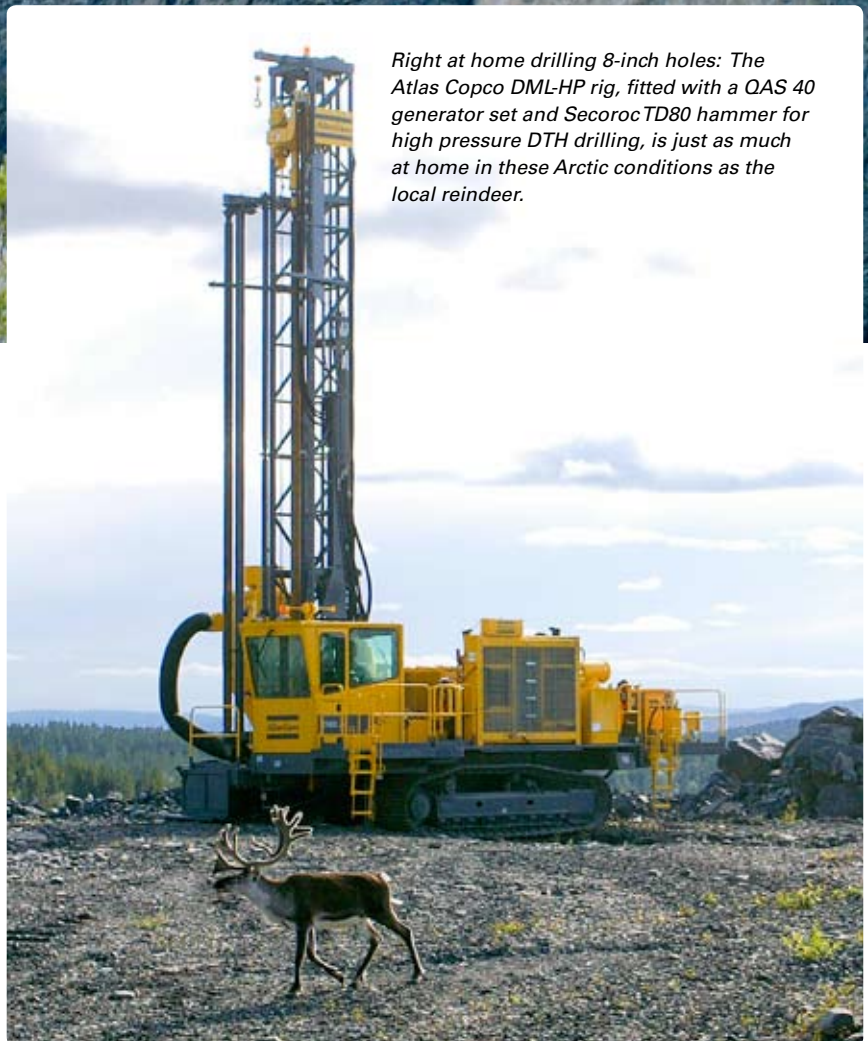
Supporting the operation

Sydvaranger relies on Atlas Copco for all of its drill rigs and rock drilling tools as well as compressors, lighting towers, hydraulic breakers and other auxiliary equipment. But perhaps most importantly, the mine also relies on a comprehensive Atlas Copco service and maintenance programme to support the whole operation.





Right at home drilling 8-inch holes: The Atlas Copco DML-HP rig, fitted with a QAS 40 generator set and Secoroc TD80 hammer for high pressure DTH drilling, is just as much at home in these Arctic conditions as the local reindeer.



Three DML drill rigs have been chosen for drilling the 20 cm (8-inch) diameter production holes. Here, their ability to economically drill large vertical blastholes contributes to overall productivity. There are also four ROC L8 (DTH) units, capable of drilling in the 110–203 mm hole range which will also be used as primary production rigs, depending on the size of the pit. In addition, a ROC D9 is on site for bench preparation.

The benches are 14 m high and the blastholes are vertical. One of the four ROC L8 rigs is equipped with a RC (Reverse Circulation) drilling kit for grade control.

The DML rigs were selected for the larger benches at the Bjornevatn site and are fitted with the HP (High Pressure-24 bar) option so that they can be used for drilling >>

A complete package



In the bit grinding workshop: New Secoroc button bits and worn bits in the background waiting for regrinding with the Secoroc GrindMatic grinding machine.



Good breaking: The HB 4200 hydraulic breaker in action. Mounted on a Cat 345 hydraulic excavator, the breaker is used either for breaking oversize blasted rock or for clearing rock-jams in the crusher.



Northern lights: Eight QAS lighting towers provide light and power even during the summer months when the sun can shine at midnight.

» the 203 mm holes using the Secoroc TD 80 down-the-hole hammer.

The ROC L8, with its Secoroc COP 54 Gold DTH hammer, is using 140 mm bits while the ROC D9, fitted with an Atlas Copco COP 2560 top hammer, is using 76 mm bits and T45 Speedrods.

All the drill rigs have been fitted with a water mist system for dust suppression and all fluid tanks and piping are heated for use in Arctic conditions.

Round-the-clock service

The equipment is taken care of by a team of Atlas Copco service and maintenance technicians who strive to provide round-the-clock coverage, 365 days a year.

Anders Berglund, Atlas Copco's Business Line Manager, Parts and Services, based in Oslo, explains: "Our service contract at Sydvaranger includes everything from equipment maintenance to extensive operator training. Right now we have eighteen guys on site and more will be needed as we move ahead.

"We've set up a hammer maintenance shop, a drill bit grinding shop, stores, offices and other facilities and these are shared by Pon Equipment, the local representative of Caterpillar. We've been co-operating with Pon from day one and this has proven to be a very good arrangement."

A big advantage, explains Berglund, is the use of Promaint software which enables the crew to predict the service needs of each drill rig and to plan the maintenance schedules accordingly.

The MARC agreement (maintenance and repair contract) is divided into three parts:

- a monthly management fee (MMF) for management, manpower and investments

- Service Measuring Unit (SMU) – the cost of maintenance per engine hour
- rock tools supply, on site delivery, maintenance and management


Performance is measured according to equipment availability, the mean time between breakdowns, mean time to repair, maintenance backlog management and lost time injuries frequency rate.

Hard as iron

There are three iron deposits at Sydvaranger – Hyttemalmen, Kjellmannsåsen and Bjørnevattn – and this quartz banded magnetite ore is notoriously hard to drill. Although it fragments well when blasted, it is extremely abrasive, or as Berglund says, "hard as iron". As a result, the mine has made 'pessimistic' calculations for wear on consumables.

However, CEO Sanderson says he is confident that the operation is sufficiently "manned-up and geared-up" to meet the challenge. Three to five engineers work in the bit-grinding shop, using a Secoroc GrindMatic BQ2 grinding machine to regrind the worn Secoroc bits round-the-clock, five days a week. It is estimated that 10 000 to 14 000 regrinds will be performed per year with each regrind taking 20 minutes to complete.

The miners will work two 10-hour shifts with a blasting break from 16.00 to 20.00 hours, while the MARC service crews will work two, 12-hour shifts.

Sanderson concludes: "Despite some issues relating to the performance of some of the rigs in this Arctic climate, we are confident that we have made the right choices. Overall we are happy with the set-up and the service at this point and we are confident that it will get even better." 

A NEW LEASE OF LIFE

The town of Kirkenes (pop. 9 000) lies at the very northern tip of Norway and borders Finland and Russia.

The mining concession of Sydvaranger Gruve covers an area of 35 km² south of Bjørnevattn, 4 km south of Kirkenes. In addition, there are a further 23 prospects with known mineralization over a 12 km, north-south strike.

The processing facility is situated on a cliff-top at Kirkenes and the railway that carries the pellets to the port (which is surprisingly ice-free throughout the year) is the northernmost railway in the world.

Mining is now under way at Hyttemalmen and Kjellmannsåsen. Hyttemalmen is expected to be worked for two years, Kjellmannsåsen for four to five years and production will start at Bjørnevattn in two to three years' time.

There are about 350 people on site consisting of 250 mine employees and 100 contractor employ-

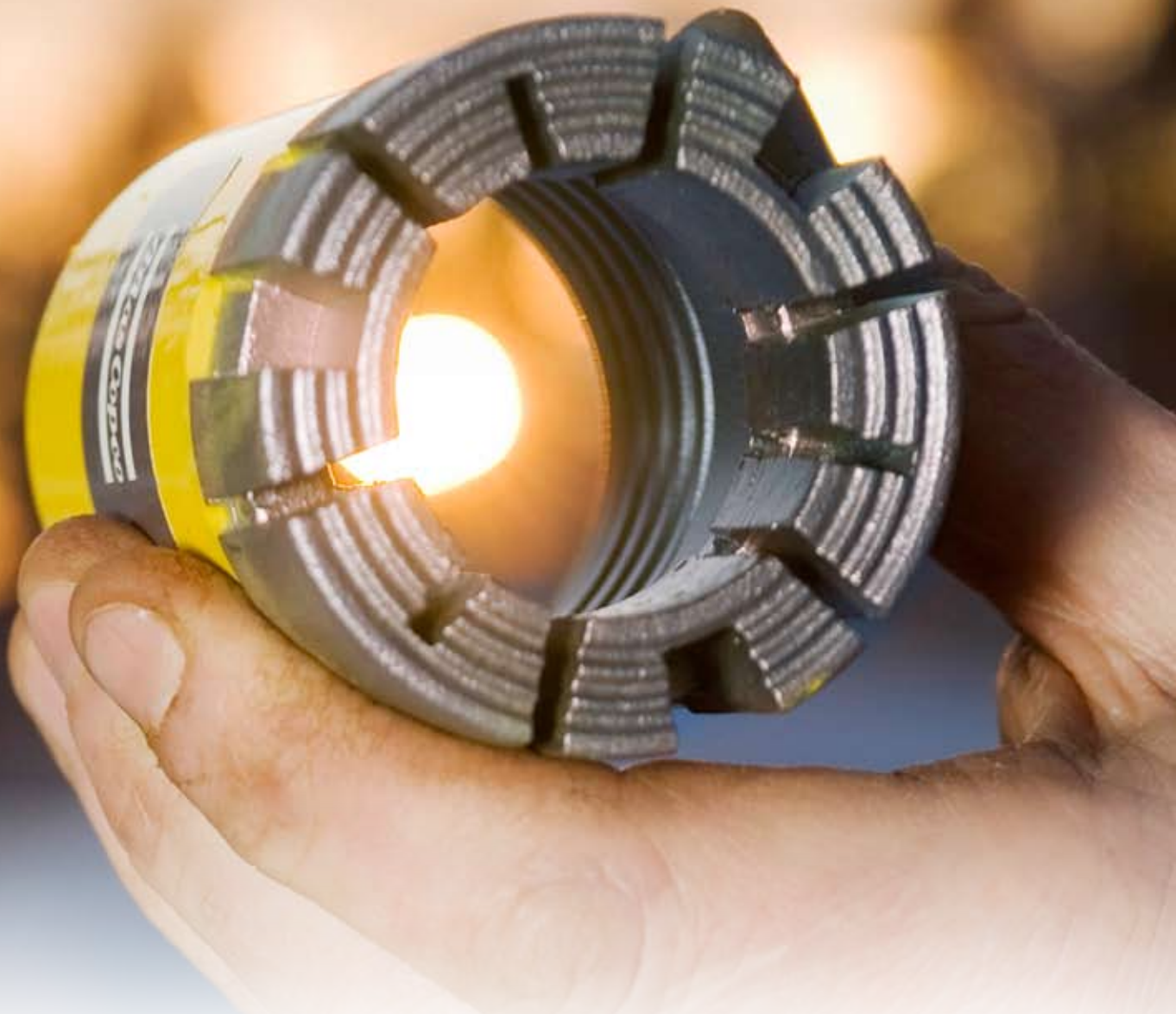


ees, including 12 full-time drillers. The majority are Norwegians with about 20 percent coming from other Scandinavian and European countries.

From its opening in 1906 to its closure in 1996, Sydvaranger had produced more than 200 million tonnes of iron ore for markets in Western Europe. The project to revive the mine is expected to provide it with a further 19 years of life.

Excure sets the diamond standard

Excure is a new generation of diamond drill bits from Atlas Copco that offers superior bit life and penetration rates. The product range covers soft to hard rock formations and offers a number of crown designs optimized for different drilling scenarios. The product can be used in various rock formations, reducing inventory size while its longer life means fewer bit changes and consequently less time lost to rod pulling. Trials in six countries including Sweden and South Africa, have demonstrated the new bit's capabilities.



SWEDEN

Productivity up, rod handling down

At 1 300 m deep, Boliden's Renströmsgruvan mine around 120 km north-west of Skellefteå, Sweden, is one of the country's deepest mines. Its complex orebody produces zinc, copper, lead, gold and silver. Using cut-and-fill stoping,

production for 2008 was 260 000 tonnes of ore.

Core drilling is currently under way at the 850 m level on behalf of Boliden by the contractor Protek Norr AB. The company specialises in diamond core

drilling and has an experienced workforce with excellent knowledge of diamond core drilling.

One of the drillers is Jerry Hedman who has many years' experience of both surface and underground projects. Hedman »

» started his career as a diamond core driller 25 years ago and has been working with underground core drilling at Renströmsgruvan since 1995.

For about a year he has been drilling in an area of the mine where the geological formations vary. In this formation, the diamond drill bits he was previously used had a life of 100 m. When drilling a 900 m deep hole he ran the drill rods out of, and into the drill hole 8 times in order to change the drill bits.

This operation is known as rod running or rod handling and is a heavy, time consuming, unproductive operation, during which drilling time is lost, leading to less core in the box.

“It’s the metres of core in the core box that matters to us. Rod running is just a waste of time and it leads to a lot of unnecessary and heavy work,” says Hedman. In order

to increase the productivity it became clear that a new drill bit was needed. Ingemar Larsson, Atlas Copco’s sales engineer in the mine, introduced the new diamond drill bit – Excore 7–9. “When Ingemar suggested this new drill bit I hoped that it would perhaps last 150 – 200 metres,” says Hedman.

Better than expected

The first Excore drill bit used at the site lasted 326 m and the best Excore bit in the test had a life length of 347.5 m. This means that only two rod running operations are required versus eight. The result is less time spent on rod running, less fatigue on the drilling equipment, driller and helper, and an increase in productivity.

Commenting on the performance of the Excore bits, Hedman concludes: “They are easy to work with and they cut the rock very smoothly even when the rock gets harder.

It’s just a question of increasing the feed force slightly. They are free-cutting and very well balanced. I did not have to sharpen the bits manually in the drill hole by temporarily decreasing the amount of flushing water, which is good since manually sharpening the bit considerably decreases its life.”

Comparison of Excore/previous bit under the same drilling conditions. Calculation based on a 900 m hole:

	PREVIOUS BIT	EXCORE BIT
Bit life (m):	100	324
No of bits needed:	9	3
No of bit changes:	8	2
Bit changing (hrs):	16	4

SOUTH AFRICA

Excore excels in South Africa trials

Drillcorp is a South Africa-based drilling contractor with operations in several countries in southern Africa and Brazil. The company’s fleet includes more than 40 drill rigs, which are moved between sites after each contract is completed.

Recently, Drillcorp completed a five-month contract for 20,000 m of core drilling to define gold values for a mine at

Orkney, 250 km west of Johannesburg. To meet the deadline for the contract, Drillcorp operated two drill rigs to define the values of the ore 400–500 m below the surface.

With a total of 46 holes to be drilled, each rig first drilled a 500-m pilot hole and then employed the wedge technique. At depths ranging from 350–400 m a wedge was placed which deflected the bit, increasing the area of exploration via a single pilot hole.

Challenging ground

When the project started, Drillcorp used the same drill bits they had used at other sites, but soon discovered that the ground posed some challenges: The bits did not cut the hard rock as expected when more pressure was applied. Instead of cutting harder, the drill rig lifted. In the toughest spots, the drill bit merely polished, instead of the rock being cut, and in fractured rock it was difficult to drill without getting stuck.

The operators managed to drill about 30 m per shift with a bit life of 60–70 m, but only 10,000 m were drilled in three months. Unless more drill rigs were brought on site, the current production rate would not allow Drillcorp to complete the contract on time. For Willie Smit, a Drillcorp site manager with 17 years’

experience of core drilling, it was clear a new solution was needed.

Excore solution

Jimmy Erasmus, Sales Engineer, Atlas Copco Exploration Products suggested that Drillcorp test the Excore, Atlas Copco’s newly developed bit that had yet to be released to the market. Drillcorp agreed.

When the company put the first Excore bit into action, there were 250 m left of the current hole. Typically, Drillcorp would expect to change the bit at least three more times, spending at least six hours pulling rods on the remaining part of the hole.

The new Excore bit finished the hole and still had some productive life left so was used to drill another 52 m in the next hole. In total, the life of the Excore bit on the first test was 302 m compared the 60–70 m that Drillcorp had achieved on the first 10,000 m of the contract where the penetration rate was 30 m per shift.

The last 10,000 m, drilled with Excore, saw an average bit life of 280–300 m at a penetration rate of 54 m per shift. Excore achieved an 80 percent higher penetration rate and more than four times longer bit life. During the drilling operations with Excore, Drillcorp did not change any settings on the rigs and used both the most and least experienced operators to get a fair result.



Discussing the new Excore bits: Willie Smit, Site Manager, Drillcorp (left) with Bertie Zaïman, Atlas Copco’s Sales Manager and Charl Sommers, Buyer and Store Supervisor, Drillcorp, in the background.

Excove proves successful at Renströmsgruvan, Sweden: Jerry Hedman, Core Driller, Protek Norr AB, (right) with Ingemar Larsson, Sales Engineer, Atlas Copco.



Comparative performance on a 500 m hole:

	PREVIOUS BITS	EXCORE BITS
Bit life	65 m	290 m
No. of bits needed	8	2
No. of pulls to replace bit	7	1
Time to pull rods	14 hrs	2 hrs
Capacity	30 m/shift	54 m/shift
Total time to drill	118 hrs	74 hrs
Total time per hole	132 hrs	76 hrs

The fact that one Excove bit type could handle all the challenges Drillcorp faced also made a big difference. “The new bit replaces six other bits needed in stock,” says Charl Sommers, store supervisor and buyer for Drillcorp. “This makes our operation much more efficient.”

This is not only important from an inventory perspective, but also for the operation. As rock conditions change, there may be a need to pull the rods to change bit type – if only for a few centimeters of drilling.

With Excove the same bit type could be used throughout the operation as the bit cuts through all of the formations encountered.

Multiple benefits

“We need bits for hard and soft rock, but we don’t know which until we are in the formation,” Smit explains. “If we need to pull rods to change a bit, it might be to get through just a small amount of rock. It saves us a lot if we don’t need to do this.” Because of the successful test results, Drillcorp immediately

ordered 20 new Excove bits to complete the contract on schedule.

“Even if we only gain small advantages in bit life and penetration rate, we will always gain with the flexibility and

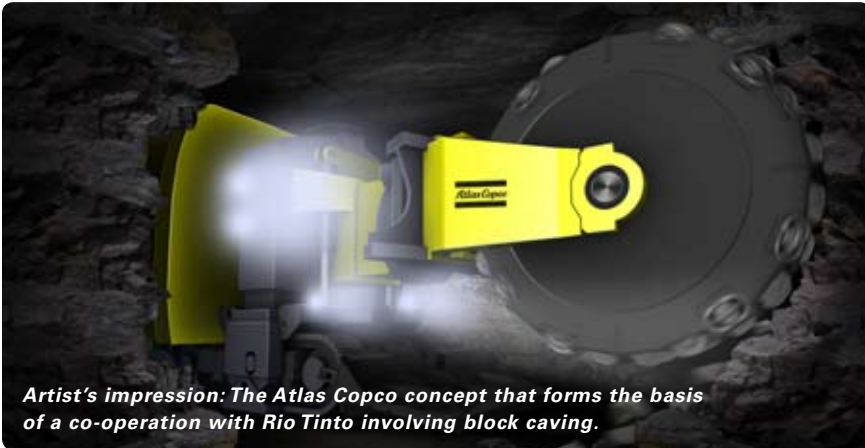
simplicity with Excove,” concludes Smit.

“This is an excellent bit; I would recommend it to anyone, especially for the type of ground conditions we have experienced.”

Happy with performance: Drillcorp’s operators quickly saw the benefits of the new diamond core drilling bits.



Atlas Copco concept for Rio Tinto



Artist's impression: The Atlas Copco concept that forms the basis of a co-operation with Rio Tinto involving block caving.

USA Atlas Copco has been selected by the international mining company Rio Tinto to develop one of two rapid tunnelling concepts for underground block caving projects.

Rio Tinto's development of mines such as Resolution Copper in Arizona and Oyu Tolgoi in Mongolia require significant underground infrastructure work prior to ore production using the block caving method.

Atlas Copco's Modular Mining Machine concept is a mechanical rock excavation system that is expected to

achieve more than twice the performance of normal tunnelling methods in the ground conditions anticipated, enabling rapid and cost-effective development.

John McGagh, Head of Innovation at Rio Tinto, says: "The proposed machine is a very promising new concept based on a combination of well proven methods and components.

"This innovative combination is a key reason for selecting Atlas Copco as one of the two suppliers to work with on new tunnelling methods for our future block caving operations."



Smooth and quick response: The ROC T35 at the famous Folsom Dam in California.

New ROC T35 at Folsom Dam

USA Atlas Copco's recently launched surface crawler, ROC T35M is performing well at the Folsom Dam improvement site, north of Sacramento, California. The rig is part of a fleet of Atlas Copco crawlers on the site including ECM rigs and the ROC D7.

Designed for hole diameters of 64–115 mm, the new rig benefits from COP Logic technology, an optional automatic hydraulic sensing system that offers better response to the operator's controls as well as straighter holes, higher penetration and longer consumable life.

And the reaction from drillers is positive. With 33 years of drilling experience, Boyd Pollard of Foxfire Drilling Company says: "The auto-drilling, anti-jamming feature makes this drill better than any drill I ever ran."

The ROC T35M can drill to 25 m. In addition, the well-proven COP 1840, 18 kW rock drill offers more drilling power from less energy input resulting in lower fuel consumption. The onboard compressor offers 7.64 m³/min and maintenance is simplified thanks to easy access points and effective hose management.



The new drill rig arrives on site: From left: Chamnan Nimnual, Glenn McNamara, Apivat Tienpolkrang and Surachai Piriyaawedchai.

DM45 boosts mining at Phu Kham

LAOS Australian mining company PanAust is operating a mining project at Phu Kham, Laos, for the production of copper, gold and silver. The estimated production for 2010 is expected to be around 60 000 tonnes of copper concentrate, 55-65 000 oz of gold and 600-700 000 oz of silver.

The project received a boost early this year with the arrival of an Atlas Copco DM45 drill rig. This crawler mounted, multi-pass, rotary blasthole drill is specifically designed for production blasthole drilling and was chosen for service at Phu Kham by PanAust. With an operating height of just over 13 metres, the rig is the largest ever to be used for mining in Laos.






SHANGHAI SURPRISE

CHINA “The Spirit of Innovation” will be the theme of the Swedish contribution at the 2010 Shanghai World Expo to be held from May 1 to October 31. And in keeping with this theme, Atlas Copco, an official sponsor of the Swedish pavilion, has a surprise in store for the thousands of expected visitors.

The company’s Surface Drilling Equipment division will reveal its vision of a surface drill rig that will offer greatly increased productivity, high mobility, silenced operation and environmental friendliness. The model rig will be on display for the duration of the exhibition. During the week of May 5–10, an 800 m² VIP area will be used exclusively to host Atlas Copco customers and contacts.

The overall theme of the Shanghai World Expo – expected to attract some 70 million visitors – is “Better City – Better Life.” This event, also known as the World Fair, is one of the largest events in the world together with the FIFA World Cup and the Olympic Games and was first held in London in 1851. 

IN BRIEF



New Exploration Drilling book

Atlas Copco has just released a new reference book for Exploration Drilling. The 96 page book includes technical articles, case stories and product information relating to all areas of exploration drilling. To receive a copy, contact your local Atlas Copco Customer Center.

M&C online relaunched

Mining & Construction Online, the Atlas Copco website containing searchable articles from worksites around the world, has been revamped and relaunched. The site has been upgraded with a new technical platform and a broader focus. Besides the main theme of drilling and mechanized rock excavation, the site now also carries articles on the use of construction tools and air compressors which also form a large part of the Atlas Copco product portfolio. There are also technical articles, news items, eye-catching photos and illustrations, and much more. Bookmark www.miningandconstruction.com



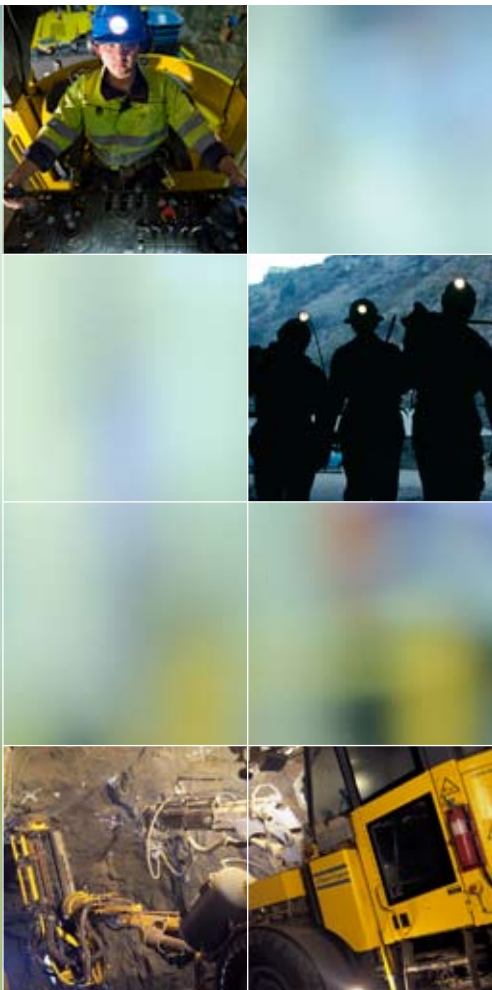
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Precision for everyday safety



By integrating precision into our mining solutions, initiating global training programs and establishing international certifications, we ensure safety throughout your operations. Every day. We bring together experience and innovation to contribute to performance that withstands the test of time. This is what we call – Sustainable Productivity.

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Sustainable Productivity

