The Connected Issue 01–2017

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Sharing knowledge
Successful partnership – the secret behind Mobile Miner.
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Out to optimize

Mine Manager Sunniva Haugen is changing routines at Boliden Kristineberg.

08–13
“Epiroc aims to serve you even better”

This has been an intensive 2017 for all of us. Earlier this year, we announced the proposed split of Atlas Copco into two companies, to ensure that both entities are given the best growth opportunities in their respective markets. One will keep the name Atlas Copco and will focus on industrial customers. The other – our part – will be fully focused on mining, civil engineering and natural resources. This is Epiroc.

A separate board and management team will be fully focused on mining, civil engineering and natural resources. This is Epiroc. A separate board and management team dedicated to the demands and market drivers of our industries will enable us to serve you, our customers, even better and respond faster to market requirements.

WE AIM TO BE on top of things, just like our name says. Epi is Latin for “on” or “at”, while Roc signals stability and, of course, rock – reflecting our core business. In many ways, this is the start of a new and exciting journey, together with you. As Business Area President, it is inspiring to work with all the motivated teams to make Epiroc into a success for all of us. And yes, we are proud of our history and values. Continued belief and investment in both innovation and social responsibility is part of what we will take with us from Atlas Copco into Epiroc.

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Together with you, we want to build the mining, infrastructure and natural resources industries of the future. We look forward to welcoming you on the journey.

The business area provides equipment for drilling and rock excavation, a complete range of related consumables and service through a global network.

The main product development units are located in Sweden, Germany, the USA, Canada, China and India.


10 911 employees (2016).

Other Atlas Copco business areas

- Compressor technique
  - Provides industrial compressors, vacuum solutions and related products, exhaust management systems, air and gas treatment equipment and air management systems.

- Vacuum technique
  - Provides vacuum products, exhaust management systems, valves and related products mainly under the Edwards, Leybold and Atlas Copco brands.

- Power technique
  - Provides air, power and flow solutions, industrial assembly solutions, quality assurance products, software and services through a global network.

Atlas Copco

- Founded in 1873 and based in Stockholm, Sweden.
- Sales in 180 countries.
- 44 695 employees (2016).
- 44 695 employees (2016).
- 44 695 employees (2016).
- 10 911 employees (2016).
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Enjoy!

Helena Hedblom
Business Area President, Mining and Rock Excavation Technique
People all over the world are already connected. By 2020, the majority of Atlas Copco’s machines will be too. How will this affect our way of working and doing business?

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Connectivity: Adapt or lose

Connected machines are the present and the future of industries worldwide. Are we entering the fourth industrial revolution? At any rate, there’s a new reality to adapt to — but how fast?
New COP W4 hammer saves time and money

When drilling holes for geothermal heating and water wells Säffle Brunnsborrning aims to work swiftly and with low fuel consumption, while never compromising on quality. The new Atlas Copco COP W4 hammer makes that job easier.

“This hammer is the best one we’ve used,” said Daniel Carlsson, owner and CEO, Säffle Brunnsborrning. “It saves us time and money thanks to its efficiency. Normally, we dedicate one day per job, and diesel is often a bigger cost than the driller’s salary. But it’s not just about the low fuel consumption. I would also say that the quality of our end product has improved.”

SÄFFLE BRUNNSBORRNING has six employees and operates mainly in Värmland County, located in western Sweden, on the border with Norway. The company used the COP W4 during a test year and provided feedback to Atlas Copco.

“I think that Atlas Copco hit the nail on the head with this one. The durability is fantastic and since the hammer is also easy to operate and service, we are more than satisfied,” said Daniel Carlsson.

THE NEW DTH HAMMER had a limited release on the Scandinavian market in 2016 after 250,000 test meters had been drilled. It is already a proven success; compared to competing hammers, productivity is up to 10 percent better, energy consumption is up to 20 percent lower, and the service life is up to 10 percent longer.

“The Secoroc COP W4 has a whole new design. The piston is smaller and lighter, and since the hammer weighs only 36.5 kilograms it can easily be handled by one man. The hammer can also be rebuilt without loss of productivity, thanks to improved materials in internal components and casing. This means that our customer can basically get a new hammer at half the cost by using economy kit,” said Pavel Vedeneev, Product Line Manager DTH.

DURING THE SECOND quarter of 2017, the COP W4 was released globally. “We will now focus on developing DTH hammers of different sizes, so that we can offer a full range of hammers,” said Pavel Vedeneev.

ELECTRIFICATION

IN 2018 Atlas Copco’s Mining and Rock Excavation Technique business area will form a new company, Epiroc.

“We have to take the chance to regroup after recruiting five new presidents and more than a dozen general and country managers. We have to do the right things when it comes to developing the next generations of leaders and managers. It’s important that we provide them with opportunities for learning and training, and also challenges to develop them in a good way.”

Jess Kindler
President
Mining and Rock Excavation Service division

“I trust the decision-making process will become faster, allowing us to concentrate our efforts on our customers. Epiroc’s strategy is ‘growth’ and it will be a great challenge for the supply chain to offer service to match. We are determined to establish logistics as a competitive advantage, with precision in our services and speed in what we do.”

Claudio Strobl
Vice President
Mining and Rock Drilling Tools division

“I hope that we see Epiroc positioned as an innovation and technology leader in the industry. We have the chance to introduce ourselves to the market as a fresh and innovative company that maintains the experience and knowledge from our many years as Atlas Copco. Developing some key projects, partnerships and acquisitions around technology and automation will help to set that tone.”

Jon Torpy
Vice President Marketing
Advanced Drilling Solutions division

What possibilities do you foresee?

in 2018, a new company will be launched as a fully-owned subsidiary of Atlas Copco AB. Provided shareholders agree, Atlas Copco will stay focused on industrial customers and Epiroc AB, the company to be dividend.

Out, will be a leading productivity partner for customers in mining, infrastructure and natural resources. The decision on whether to dividend out Epiroc will be taken at the Annual General Meeting in April 2018. Read more on page 2.

TOWARDS THE FUTURE as Epiroc

AS THE CHINESE government continues to reduce coal power, the country’s nuclear industry keeps expanding.

To drill for natural uranium the Geology and Mining Division (GMD) of China National Nuclear Corporation has purchased an Atlas Copco Boyles CBC exploration drilling rig. It has been used in multiple projects since 2015, greatly improving the exploration capacity of uranium mines in areas like Inner Mongolia.
For nearly 80 years Boliden has mined ore in the Kristineberg mine – and the challenges have grown as the working depth has increased. Geological conditions mean that half the time is spent reinforcing rock, rather than mining it. Together with Atlas Copco, Boliden has started on a journey to tighten up the bolting process.
OUR CUSTOMERS

MINING & CONSTRUCTION

View program. The screen shows him fixing his gaze on the screen in the cab-form a perfect fan, with a gap of 1.2 millimeters between the bolts in the rows of the drift, “zeros” the rig on them and exactly where to position the bolts to enter the preset bolt pattern in the Bolttec LC rock bolting rig. “The concrete’s now been hardened long enough for me to be able to start bolting,” says operator Magnus Linder, fixing his gaze on the screen in the cabin of the bolting rig.

He focuses the optical instruments on the last row of bolts in the wall of the drift, “zeros” the rig on them and enters the preset bolt pattern in the Bolt View program. The screen shows him exactly where to position the bolts to form a perfect fan, with a gap of 1.2 millimeters between the bolts in the rows and between each row. Magnus directs the boom towards the wall and drills with the drill steel, then changing over to the cement hose and filling the hole with cement. Finally, he uses the rig’s long rock bolt to drive home the 2.7 meter long rock bolt – a reinforcing bar with a threaded end and a plate at the far end. Another 39 bolts and the drift will have been sufficiently reinforced.

“Half of the drill-and-blast cycle time is spent on reinforcing the rock,” says Mine Manager Sunniva Haugen. “That’s a huge amount of time. Rock reinforcement is vital for safety, but generates no revenue. Bolting takes twice as long as blast hole drilling and is the bottleneck in the mine – in other words, the limiting factor on production capacity. The more bolts we can get in, the more rock we can mine!”

HE HEADLIGHTS OF the Boltec LC rock bolting rig light up the walls and roof of the concrete-covered drift. The last dark patches have almost completely disappeared.

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BOLIDEN HAS BEEN mining ore in the Kristineberg mine, situated in Lycksele municipality in northern Sweden, since 1940. Initially a large part of the production was from open-pit mines, but now all the ore is mined underground – right down to a depth of 3,500 meters. The high rock pressure and the weak nature of the rock mean that the rock has to be reinforced so that it does not collapse after blasting. Walls and roof are coated in sprayed concrete, and the drifts are then reinforced with long bolts.

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Initially, the search for new deposits in Kristineberg went more or less straight downwards, but over the years the tunnels and drifts have moved westwards – with the result that distances in the mine have increased. It is not uncommon for operators to travel several kilometers from one point to another during a shift. As regards transporting people it all comes down to the fact that the operator of the bolting rig is generally the one driving the vehicle, so is the last to get to his or her workplace – despite the fact that he or she has the most time-consuming task. The reason for this is that the Boltec operator spends nearly all his or her time in the same area. “Transporting people takes up a lot of time,” says André Lindholm. “One way to reduce this might be to have a transport vehicle, and that is a suggestion that we operators have made.”

Michael Andersson nods.

N 2016, BOLIDEN began working in partnership with Atlas Copco and ABB to streamline the bolting at Kristineberg. The Boltec Optimization (BoltOpt) project aims to reduce the time it takes to drive drifts by 20 percent. The work began by collecting a large amount of data, primarily through Atlas Copco’s telematics solution Certiq (that gathers, compares and communicates vital equipment information) and Boliden’s own systems, but also from field studies and by talking to operators, technicians and supervisors. Having compared this information with performance indicators, Atlas Copco – in dialog with the operators – came up with suggested improvements. The main conclusion was that the logistics down in the mine could be tightened up. “The aim was to find time thieves, and we got them in black-and-white thanks to Atlas Copco,” says Michael Andersson, Development Engineer at Boliden’s central technical department. “We were aware that a lot of time was being lost both through transporting people and replenishing stocks, but we didn’t realize how much.”

INITIALLY, THE SEARCH for new deposits in Kristineberg went more or less straight downwards, but over the years the tunnels and drifts have moved westwards – with the result that distances in the mine have increased. It is not uncommon for operators to travel several kilometers from one point to another during a shift. As regards transporting people it all comes down to the fact that the operator of the bolting rig is generally the one driving the vehicle, so is the last to get to his or her workplace – despite the fact that he or she has the most time-consuming task. The reason for this is that the Boltec operator spends nearly all his or her time in the same place (the others will move their machines to new drifts in the meantime), so he or she is always by the vehicle when it is time for a meal break or shift change.

Michael Andersson nods.
“Needless to say, being helped to get as much as possible out of our machines is a good thing – and we want to spread the knowledge.”

Michael Andersson  
Development Engineer, Boliden

“That has been up for discussion, but would require an extra person per shift. What we have done for now is tighten up the procedures so that we get the Boltec operator in position as quickly as possible.”

To reduce time spent on transporting bolts and cement, a new stockpile is being built up closer to the part of the mine where most mining is going on.

“It’ll save time, but in the longer term we may need to have a vehicle driving material out there. That’s also something we’ve discussed,” says Michael Andersson.

N TOTALING UP the first part of the BoltOpt project it became clear that the shift team’s effective working time had increased and that the number of bolts being positioned was up by around 10 percent. In terms of generating money for Boliden, this represents an extra drill-and-blast cycle per month.

“Since a round cycle is worth half a million kronor – or roughly 500,000 euros – it’s extremely important to be as efficient as possible,” says Sunniva Haugen. “So it’s great that the BoltOpt project is having such excellent results. To start with, Certiq provides very useful information. As soon as we identify a problem, Certiq helps us find out all of the details. What’s more, the fact that Atlas Copco has been able to have such close dialog with our employees and has gathered information in the field is of great value.”

The next step in tightening up the processes at Kristineberg will involve more shift teams as well as the Boomer E2 drilling rig.

“In the longer term, more of Boliden’s mines can definitely be involved,” says Michael Andersson. “Needless to say, being helped to get as much as possible out of our machines is a good thing – and we want to spread the knowledge.”

Kristineberg uses five rock bolting rigs (three Boltec LC rigs and two Boltec EC rigs) and three drill rigs (Boomer E2) from Atlas Copco, and has also had an underground loader (Scooptram ST18) for field tests. Atlas Copco has produced software to facilitate both bolting (Bolt View) and drill rig navigation. Since 2016 Kristineberg, Atlas Copco and ABB have been collaborating on BoltOpt, a project to streamline the bolting process.

Atlas Copco and Kristineberg

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Atlas Copco’s telematics solution Certiq connects all Kristineberg’s new machines from Atlas Copco, giving automatic access to accurate production data. This is then compared with performance indicators to identify possible efficiency improvements.

The mining takes place underground at depths down to 1,350 meters, using the cut-and-fill method.

The rock consists of complex sulphide ore containing zinc, copper, gold, silver and lead.

Producers around 650,000 metric tons of ore annually.
The automatic drilling function of the SmartROC T45 works smoother than anything Morten Natland has tried before. “It feels almost like sitting at home,” he says. Natland is one of the seasoned operators at Natland Graveservice, a local entrepreneur with 20 employees drilling all the blasting holes in the aggregate quarry in Jelsa, Western Norway. Striving for an annual capacity of 10 million tons of granodiorite, a highly sought after stone variety used in construction, the quality and regularity of Natland’s drilling is crucial.

Founder and owner of Natland Graveservice, Geir Natland, is making the investment calls. Currently, he has received three SmartROC T45 drill rigs and one SmartROC T40 drill rig. After two years of operation, Geir Natland has a firm grip on the SmartROC T45.

Why did you pick the SmartROC when acquiring new drilling rigs?
“I’ve basically got three reasons: Reliability in operation is number one; fuel consumption ranks second, due to substantial savings compared to former rigs. Reason number three is comfort of operation, which shouldn’t be underestimated.”

How do you assess the overall performance of the SmartROC T45?
“I’d have to say it’s one of the world’s best drilling rigs. I like the speed of the chain-driven feed, the noise is quite low, the operator’s cabin is really comfortable and the automatic drilling system runs smoothly. We have reached 5,000 hours of operation with practically no incidents at all. Even though we require every bit of the service contracts with Atlas Copco, it’s much more important that the base quality of the SmartROC T45 is optimal. Which clearly it is.”

Could you disclose some specific details from your evaluation of the rigs?
“Sure thing. Every hour of operation we save between 12 and 15 liters of fuel per machine, compared with the old rigs from a different supplier. The new chain-driven feed mechanism makes it more reliable and easier to repack than the old wire concept, adding a plus to the boys’ working situation.”

Tricky question: What improvements could make the SmartROC T45 even better than today?
“As your readers would know, the SmartROC rigs can be modified to suit almost any condition. That said, our extremely hard granite drilling in steep and untidy terrain requires maximum flexibility from rig and boom, as well as great mobility of the vehicle itself. Any improvement to that aspect would be welcome, no matter how great these rigs get. It’s the driller’s stairway to heaven, more flexibility and bigger hammers at the same time.”

Keeping the stones rolling from Northern Europe’s largest aggregate quarry requires top people with rugged motivation and a staggering portion of patience. Or less so, when operating a SmartROC T45 drill rig.
Back in 2012, Anglo American approached Atlas Copco to discuss their future challenges. Anglo American, a globally diversified mining business with operations and projects on five continents, wanted to move towards a continuous mining system based on mechanical rock cutting with a view to improving safety and productivity, initially within its Platinum business.

Five years later, after advanced trials at the company’s underground mining operation at Twickenham mine, South Africa, Atlas Copco is launching the Mobile Miner. It is a small and flexible machine that enables faster, safer and more predictable mining – using a technique that has never before been used for hard rock mining.

Mining & Construction brought together Anglo American’s Roland Berndt and Atlas Copco’s Mikael Ramström for a discussion on innovation and successful collaborations.

How did the collaboration between Anglo American and Atlas Copco begin?

Roland Berndt: “Anglo American wanted to look into new technological possibilities of mechanical mining. The intention was to apply Mechanical Rock Excavation, a technique we had developed with another miner. In the fall of 2012 we started work on the Rapid Mine Development System, or RMDS. Over time we started using the name Reef Miner. Atlas Copco has now launched the machine and it is called the Mobile Miner 22H.”

The Mobile Miner offers a new way of continuous hard rock mining with the potential to change the mining industry. It exists thanks to a successful partnership between Atlas Copco and Anglo American.
“It is very flat, and primarily excavates valuable reef instead of waste rock.”
Roland Berndt, Head of Transformative Technology, Mining, Anglo American

"We realised there wasn’t an off the shelf product already available. So we sought a development partner. Atlas Copco’s solution was interesting. There are tunnel boring machines that can do the same kind of tunneling, but they tend to be very large. For platinum, where the reef is quite narrow and thin, those machines are excavating a lot of waste material and the economics become a problem. The RMDS was designed for the excavation of low-profile tunnels in hard rock; it is very flat, and primarily excavates valuable reef instead of waste rock. Anglo American Platinum had a need for this kind of machine, and the Anglo American Group as a whole wanted to explore continuous hard rock cutting as a more general mining innovation as part of its FutureSmart Mining proposition."

Mikael, you have described the mining industry as conservative, but Anglo American as an open-minded operator. What do you mean by that?

"Anglo American is a truly global company, just like Atlas Copco. Their set-up at the Twickenham mine is more or less unique, and it is ideal for testing and R&D. We used an existing technology, commonly used in other types of tunneling and in civil engineering, and we packaged it in a smaller machine. The trick for us is not to develop the cutting method itself, but to adapt and package a proven and already existing technology for the mining industry."

Many mining companies adopt a ‘fast second’ or ‘fast follower’ technology strategy, so yes, the mining industry can be conservative. However, Anglo American has strategically chosen to be a technology leader in certain areas. We believe safety and sustainability go hand in hand and that the Mobile Miner will help the industry take a step in the right direction in achieving both.

This collaboration has been favorable, but what were the difficulties along the way?

"One concrete problem is that there’s a lot of activity at the mine. Many different projects mean that there is competition for time and space. We had to make the Anglo American underground site team available and had to make sure the infrastructure was robust. One of the classic difficulties is that you have the supplier sitting in Europe and the mining operations and project team in South Africa. Fortunately, Atlas Copco has good representation in Johannesburg. We communicate well and all parties have had an open approach to solving problems."

We are equal partners on this project, but sometimes you fall back into the more traditional roles of customer and supplier. For the ones who were working daily on the project this has never been an issue, but people who are involved intermittently can be confused because our way of working is so transparent. We share insights and knowledge, and that is quite rare between a customer and a supplier."

So is the Mobile Miner a new step in technology? Yes, and we are happy to have this product family and we want to share it. There is still testing going on, but we are confident the project will deliver. Yes. One of the real benefits of going mechanized is the productivity improvement, but it is also about safety. The cutting process doesn’t do as much damage to the surrounding rock, which leads to less risk of fall of ground. A more automated mining method improves safety by taking people away from the riskier areas. We want people to appreciate that this kind of modernization actually improves the performance of the mine and makes it more successful, so everyone benefits."

Will Atlas Copco and Anglo American maintain their partnership after this project?

"We think these machines could be incorporated at other Anglo American sites. In that case, we would go to Atlas Copco and buy a machine off the shelf, but with this development work we could never have reached that stage."

"We have another project running in parallel, the Slotborer Project, which is linked to the RMDS project. We will continue to work on that for at least another year, but we believe there is potential to work together in other areas as well."
**Exploring the asteroid belt**

For example, the company Moon Express plans to shortly begin surveying the Moon for, among other things, precious metals and rare metallic elements such as niobium, yttrium and dysprosium. Private exploration company SpaceIL has even more far-reaching plans, including building a sustainable lunar ecosystem and firmly establishing a space economy. Much of the focus on the Moon is on its vast reservoirs of water, which can be used to produce efficient rocket fuel.

**Why is the mining industry looking at automation and drones?**

“The mining industry has a vision of removing people from what is called Zero Entry Production Areas – that is, the harshest environments in the mines. To that end, we’re developing robotic solutions with high accuracy and efficiency that will allow the workers to remain in safer locations.”

**What solutions are your teams developing?**

“The area we’re mostly focusing on is drone technology – fully autonomous drones, with no human intervention beyond defining the mission. For example, drone can inspect volumes on site after blasts, or inspect shafts. They are faster and more accurate than other solutions.”

**How feasible is this drone technology?**

“We have a couple of obstacles to overcome. Firstly, the problem of localization – drones and robots need to know exactly where they and all their parts are in relation to the environment, with millimeter precision. To solve this, we’re developing software algorithms to combine and analyze a multitude of data from a variety of sensors, including stereo cameras, lidars, IMUs and UWB positioning. Secondly, we have to make the drones better protected from the harsh environment in mines. For instance, magnetic dust can cause motors to stop working after mere days or even hours of use in a mine.”

**How might drones change the business?**

**Into the abyss**

- Increased depletion of land resources compels many companies to look seaward, where there is a largely untapped potential for the mining and harvesting of minerals. Nautilus Minerals has stated plans to mine the seafloor outside Papua New Guinea for copper and gold deposits in a project called Solwara 1.
  - Material will be collected as slurry using an auxiliary cutter, a bulk cutter and a collecting machine, then pumped to a floating production ship. Residual slurry will be filtered and sent down to the original environment.

**Internet of Things number one priority**

- The Internet of Things (IoT) has become the leading technology for digital transformation and is the number one priority for 32 percent of organizations – including companies from the mining sector, according to global research findings published by London based Inmarsat. Improved service delivery capabilities (47 percent), better health and safety across the organization (46 percent), and greater workforce productivity (45 percent) were identified as the top three benefits to be gained from the deployment of IoT-based solutions.

**Solar power to reduce emissions at iron ore mine**

- Tata Steel recently inaugurated a 3-Megawatt solar photovoltaic power plant at the company’s Neelamindia mine, located in the state of Jharkhand in India. It is the country’s first solar project located at an iron ore mine and will help Tata Steel, the second largest steel maker in India, replace a part of the electricity it consumes from the grid and from diesel-based generators.
  - The installation covers 19 acres of land and is expected to help reduce CO₂ emissions by about 3,000 metric tons each year.

**The Quarry Life Award**

- HeidelbergCement has announced the fourth edition of the Quarry Life Award, which targets innovative approaches to studying and boosting biodiversity at quarry sites.
  - The award has been split into two main areas: Research, with scientific projects that increase knowledge of mining ecology and lead to improved biodiversity, landscape and water management; and Community, which focuses on engagement and outreach projects that help quarries to better connect with local stakeholders.
  - Project registration is now open and runs until November 20, 2017. Several prizes will be awarded, with the best overall project receiving 30,000 euros.

**George Nikolakopoulos**

Professor of Robotics and Automation, Luleå University of Technology, Sweden

How might drones change the business?

**LUNAR MINING SOUNDS**

Like a concept lifted straight out of the realm of science fiction, but the fact is that it could soon become real. In April 2017 the Elon Musk company SpaceX successfully reused a Falcon 9 first stage rocket booster, claiming that recycling launchers by a hundredfold. In that case, the fact is that it could soon become real. SpaceX successfully reused a Falcon 9 first stage rocket booster, claiming that recycling launchers by a hundredfold. In that case, the fact is that it could soon become real.

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**MINERS ON THE MOON**

No.01 | 2017

**Into the abyss**

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The drill bit is rotated by the outer tube. The percussion energy is transferred through the inner rods.

Smooth outer pipes means no jamming. Plastic stabilizer means low sound levels and low vibrations while drilling.

Energy is fully transferred to the bit, without loss of energy.

The SmartROC CL was heavily used in two shifts in production. It was then sent back to Sweden, with some feedback from the Finnish crew, for fine-tuning and software updates, after which E. Hartikainen Oy purchased the machine.

"The fuel consumption is significantly lower than that of the FlexiROC C65. We are also expecting longer life for the drilling tools," says Juhani Tiikkaja. "The rock types here at the Siilinjärvi mine are very different. For this particular environment, the SmartROC CL is the most cost-efficient for us. The new rig will also improve the..."
Siilinjärvi site facts

**Production volumes at Yara Siilinjärvi mine**

<table>
<thead>
<tr>
<th>Product</th>
<th>Volume (metric tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitric acid</td>
<td>10 000</td>
</tr>
<tr>
<td>Phosphoric acid</td>
<td>30 000</td>
</tr>
<tr>
<td>NPK-fertilizer</td>
<td>50 000</td>
</tr>
<tr>
<td>Sulphuric acid</td>
<td>70 000</td>
</tr>
<tr>
<td>Phosphate ore</td>
<td>1 000 000</td>
</tr>
</tbody>
</table>

*Improved air flow means less requires low air pressure (14 bar).*
It has been labelled the fourth industrial revolution. Whatever the term, the effects of increased connectivity are changing the game plan around the world. With new technologies fusing the physical, digital and biological worlds, the possibilities are almost endless. What is its potential for the mining industry – and what is Atlas Copco doing to enhance business for customers?
The term “fourth industrial revolution” was not totally new. But it was in January 2016, at the World Economic Forum’s meeting in Davos, Switzerland, that the concept became a catchphrase. In his opening speech, the forum’s founder and executive chairman Klaus Schwab said: “We must develop a comprehensive and globally shared view of how technology is affecting our lives and reshaping our economic, social, cultural and human environments. There has never been a time of greater promise, or greater peril.”

These were big words, optimistic and scary in equal measure, and the meaning was clear: We are standing on the brink of a revolution unlike any other. And it will affect all aspects of our daily life.

THE FIRST INDUSTRIAL REVOLUTION took place when the steam engine enabled mechanical production in late 18th century Britain. The second industrial revolution began when automation enabled mass production at assembly lines a hundred years later. The introduction of the microchip indicates the start of the digital age and the third industrial revolution.

And now, through artificial intelligence, advanced robotics, big data and extreme connectivity, we are entering a new phase. When machines are connected to each other, sharing data, time and distance are no longer a hurdle. Instead, instant communication will be possible globally and universally. In the best scenario, this will mean a democratization of the way we communicate. But it also poses challenges for industries and their workforces – not least for a traditional heavy industry like mining operations.

INDUSTRIES WILL BE digitalized and will need to find new business models, and the workforce will also be affected. There is a risk of job losses when it is highly skilled people that are needed for operation, but also an opportunity to educate and upskill people. Equally, there is an opening for a highly skilled maintenance crew when much higher reliability is required for automated, unmanned production systems.

As usual, those who are early adopters will prosper; those who are not are at risk at being left behind. Klaus Schwab describes the development of the fourth industrial revolution as “a tsunami”, which definitely sounds dramatic.

However, not everyone agrees. Yes, a lot of things are happening as industries and physical manufacturing become integrated with the Internet of Things. At the same time, the changes might not be so fast, and for the mining industry, the changes might be all for the better. Håkan Schunnæsson, a professor at Luleå University of Technology in Sweden, is one of those working hands-on with this development in his research on Mining and Rock Engineering.
The real challenge is to retrieve the right data and use it in a valuable way in the production process.

Håkan Schunnnesson, Professor at Luleå University of Technology

He is thrilled by the possibilities, but does not expect a quick overhaul of the industry. “This has been going on for a number of years. We are working with new technology applied in a new way, but nothing will change overnight the way it almost was with the Spinning Jenny, for example,” he says. “Just because there’s talk of the fourth revolution we shouldn’t be misled into believing that there will be shortcuts or that things will be solved by some kind of magic. It’s a slow development where people in the industry need to learn new processes.”

STILL, THE POSSIBILITIES to change and modernize the mining industry are bright. All the mining processes – such as drilling, boring, blasting and loading – will be affected by new digital processes that will increase productivity, and the data generated will also help safety and environmental work.

“We are working on data-logging for many different types of mining equipment, both above and below ground,” says Schunnnesson. “With drilling data we are able to predict ore quality, locate ore boundaries and have the opportunity to measure the geomechanical features of the surrounding rock mass.”

THAT WAY MINING COMPANIES will be able to let lithology and ground conditions improve resource efficiency and mining economics. Unit operations, such as blasting to predict fragmentation, will also be improved and will be carried out long before starting the downstream operations. All thanks to machines being connected to each other. But a revolution?

“Well, connecting machines is just the first step,” says Schunnnesson. “They generate incredible amounts of data, and that is excellent. But the real challenge is to retrieve the right data and use it in a valuable way in the production process. It will be some time before we are there.”

SAY WHAT?

NEW TERMS TEND TO be thrown around carelessly once they become established. What exactly is, for example, the difference between Internet of Things and Industrial Internet of Things?

The Internet of Things:
A network of physical objects with embedded electronics that enable the objects to share data. Includes smart home appliances, like connected refrigerators, or heart monitoring fitness bands.

The Industrial Internet of Things:
Drives together fields like the Internet of Things, big data and machine learning to analyze data and use it to adjust operations. This could concern the oil, gas or mining industries, power generation or healthcare. The Industrial Internet helps operators to optimise productivity or detect a failure before it occurs, and it can deliver powerful financial outcomes. The more machines, systems and devices that are connected, the more data and valuable insights we will get.
Karin Jirstrand switches on her Pit Viper drill rig and starts the engine — but rather than traming off in the machine, she logs into a web portal. “You can follow what the machine is doing here,” she says. “Right now I’m going to run through a drilling process to verify that everything can be seen in the portal.”

“We need to ensure that customers are getting the most from what they buy.”

Improving fleet management is vital to Atlas Copco and we’ve set the bar high. By 2020, the majority of machines are to be connected. The Atlas Copco automation team is at the heart of the revolution.

She then looks at her laptop on the Certiq portal to track two real machines. “They have had an abnormally high number of alarms over the past 24 hours,” she explains. “One of them has stabilized, so the operator must have remedied the fault. The other one is still having problems, so I need to download the settings and assess them.”

“We need to ensure that customers are getting the most from what they buy.”

AT THE LAB in Orebro, Karin and her colleagues are coming up with definitions to allow the easy evaluation and tracking of more than 60 different models. Their work helps the Atlas Copco Customer Centers around the world to become more proactive and the equipment to be used more efficiently. Atlas Copco’s goal is for the majority of machines to be connected by 2020. New products are being designed in order to achieve this, while older machines are being adapted so that they can be linked through Certiq. The idea is to collect as much valuable information as possible, which can then enable customers to use their equipment to its full potential.
"Atlas Copco’s job is not just to develop and sell good equipment and then provide quick service. We also need to ensure that customers are getting the most from what they buy. We are moving from being quickly reactive to being slowly proactive," says Olav Kvist, Vice President Mining Technology.

He continues:

"Take spare parts, for example. Traditionally, our role was to supply new parts as quickly as possible when something broke down, but if you can measure the 'health' of a machine then you can predict when the part is going to fail. We call it anomaly detection. It means we can send spares efficiently and in an environmentally friendly way, replacing a part before its failure causes the machine to stop working. Our vision is to have zero unplanned stops, since the cost of having expensive machines standing still is high."

EXTRACTING DATA FROM equipment is nothing new to Atlas Copco, but the methods and possibilities have changed radically. In the 1990s various types of portable memory were used, moving in the early 2000s to satellite communication in the ProCom system. Now it is done by wireless telecommunication, so at the heart of Atlas Copco’s work is Certiq – a telematics solution that is available for all types of mining and construction equipment, both surface and underground.

Real time data allows owners and operators to monitor and optimize the operation of their equipment at any time and from anywhere. Olav Kvist pulls out his laptop and logs on to the Certiq portal. One customer page displays a chart featuring low yellow and green bars, and considerably higher red ones.

"Red means that the machine has been shut down, yellow that it is idle and green means that it is in active production. It shows this data for each 24-hour period and as you can see in this example, the machine is operating at a low rate. That is the reality for most of our customers, and we want to help them increase their productivity."

Karin Jirstrand nods and interjects:

"It’s about generating business benefit from the opportunities offered by the Internet of Things and the Industrial Internet. For our part, it is about helping customers to connect digitally with their fleet – but also to interpret the information provided by relevant indicators. Partly so that we know when preventive maintenance is needed, and partly so that our customers can create optimal strategies for achieving their business goals."

ATLAS COPCO HAS around 64 equipment models connected, which creates a major challenge when creating useful indicators and benchmarks – they need to be relevant to each customer in each given context.

In early 2016, the first drill rig was connected through the Certiq telematics solution in the US market. Since then more than a hundred machines have been connected, with new being added every week.

Q&A

Martin Wallman
Product Manager, Customer Center USA

In early 2016, the first drill rig was connected through the Certiq telematics solution in the US market. Since then more than a hundred machines have been connected, with new being added every week.

How has Certiq been received in the US?

"The response from our customers has been very positive. Maintenance people are using the planning and service part to optimize their service operation, while people that are more focused on the operational side of the business are primarily using the machine performance data available in Certiq to fully utilize the machine. In the end, Certiq is a tool to help our customers to reduce their total cost of ownership and optimize their operation."

What are the main challenges for the customers to use Certiq to the max?

"It is important that the customers understand how the data is collected and what it is based upon when they are looking at different rows in the Certiq portal. What is key to one customer might not be as important to another. Therefore, we give our customers the possibility to modify and adjust what they can see in the portal to what will fit them best, based on their operation. Connectivity was something that one customer had some initial concerns about, but so far we haven’t seen any need for a satellite connection, which is an alternative to the standard 3G solution for surface customers. Going underground, a local network is required if pickup points are not the preferred solution."

How has Certiq changed the way you work within the parts and service field?

"It enables us to be more proactive and efficient. We can support our customers in a more proactive way since we know how the machine fleet is utilized, or for example when a specific machine is due for service or is having operational issues. This will of course reduce and minimize customer downtime while also lowering the total cost of ownership. As more machines get connected, and we produce more data, we will also be able to reach out to customers to discuss how we can help them improve their profitability and not just performance and service."
“We want to make data available to other contractors or third parties selected by our customers.”

Karin Jirstrand
Product Manager Interoperability,
Atlas Copco

“Demand for benchmarking figures has increased enormously,” says Olav Kvist. “Our customers want to know what good looks like. It’s only once they see relevant information from a comparable part of the world that they know how they are doing, so we are giving benchmarking high priority.”

He continues: “Sales are of course important, but the most important task for us is to help the customer increase their productivity. Certiq will give our product managers the ability to identify customers that might need help in taking the next step when it comes to productivity. Quite simply, we want to take greater responsibility for the customer’s business. Our aim is that our customers will do better than comparable companies. I have been a product manager myself, and I know the great difference between theoretical performance and real productivity. While theoretical performance can be dismissed as sales talk, the information available in Certiq is on a completely different level. What you can see in Certiq shows the reality in black and white.”

TO GENERATE THE MAXIMUM possible customer benefit, Atlas Copco is also facing a number of technical and practical challenges outside of the actual telematics solution – such as connectivity underground or for remote areas, having the data secured from non-trusted sources and available to trusted ones.

“We need to create interfaces so that all our information works with other systems that the customer is using, like Maximo for maintenance or the Dassault system for dispatching, just to name a few,” says Karin Jirstrand.

“Generally speaking, we are in favor of open access. We want to make data available to other contractors or third parties selected by our customers so that they can utilize data to create services that maybe we haven’t thought of. The more people who can benefit from the data, the more it increases the value of our equipment. It’s a win-win situation.”

SO ALTHOUGH THERE are lots of challenges, the opportunities are many more and much greater. When 5G becomes standard, remote services will be taken to a whole new level. For example, it will be much easier to troubleshoot and update programs remotely – which will lead to an explosion in the market for connected equipment.

“We are firm believers in the value of information from our connected machines,” says Karin Jirstrand. “They carry a huge amount of data that needs to be interpreted and converted into usable information. By using this to make comparisons, we can help our customers become more efficient. The future looks extremely exciting!”

The automation department in Örebro, Sweden, makes sure that Certiq, Atlas Copco’s telematics platform, can be of optimal use to customers.

Steve Molter
Rental Equipment Manager, Luck Stone

How is your fleet connected to Certiq?

What kind of machines, and how many, do you have connected through the Certiq telematics solution?

“We have two SmartROC D60 drill rigs connected. Luck Stone is a mining operation based in Richmond, Virginia. We are one of the largest family owned and operated producers of crushed stone, sand and gravel in the US, and we use those rigs every day.”

How has Certiq changed the way you use your machines and operate your business?

“It has helped us to better utilize and monitor our production. Before, we relied on the drillers to provide us with information using pen and paper, but with Certiq we are a bit more accurate. The machine performance data enables us to maximize how the rigs are operated, be it drilling or tramming. We are also able to track and monitor our moving from location to location. I would also like to mention that the CO2 monitoring system in Certiq has been very beneficial. It has helped us track our emissions, which is a big benefit for our environmental stewardship program with the State of Virginia.”

What has been the gain for the company?

“Using the SmartROC D60 drill rigs more efficiently, Luck Stone has improved production by at least 8–10 percent. We are very happy with Certiq and the information that can be extracted. With time, we learn more and more about the system and I am certain it will help us be even more efficient in the future.”
The cars will be carrying passengers doubling as backup drivers, and the search for 100 brave, pioneering families is underway.

“The aim of the Drive Me research project is to focus on how to enhance people’s lives and have a positive impact on society. No one else to our knowledge is developing autonomous drive from a human-centric standpoint,” said Henrik Green, Senior Vice President, Research and Development at Volvo Car Group.

Each participant will be assigned a state-of-the-art semi-autonomous Volvo XC90. The hybrid cars come equipped with radar, lidar (kind of like a radar, but using laser light), an assortment of cameras in every conceivable direction, a connection to the cloud for maps and, in charge, a highly advanced piece of machinery – the Autonomous Driving Brain.

The test period will, for instance, help determine how self-driving cars can improve traffic conditions, and give hints as to what changes need to be made in existing infrastructure. The feedback provided by the human users will help to gradually perfect the technology.

“We want to learn more about how people feel when they engage and disengage autonomous drive, what the handover should be like, and what sort of things they would do in the car when it’s driving them to their destination,” added Henrik Green.

A parallel test will take place in London, UK, starting in the summer of 2018. Further tests are planned for several cities in China.

An estimated 1.2 million people die in vehicle-related accidents each year, at least 90 percent of which are caused by human error. The safest bet seems to be to eliminate human involvement in driving altogether.

Experiments with self-driving vehicles have been conducted since the 1920s, but the pace has picked up considerably in the last decade with heavyweight companies like Google, Tesla, General Motors and Volkswagen investing heavily in the field.

One of the cutting edge competitors is the Drive Me project, helmed by Swedish car company Volvo, which is on the verge of conducting an extended public pilot test. To that end, a 50-kilometer long section of road has been staked out, consisting of a double loop along heavily trafficked highways and routes around Gothenburg, Sweden.
SURVEY
INTERNET OF THINGS

Want more input on this theme? Three people from different fields give their views to help paint a broader picture.

01

Henning Banthien
Secretary General, Plattform Industrie 4.0, Federal Ministry of Economic Affairs and Energy, Germany

"In our opinion, it is correct to talk about a revolution. In the world of Industrie 4.0, people, machines, equipment, logistics systems and products cooperate with each other directly. This makes manufacturing more efficient and flexible, but most importantly: Completely new business models are developed. In the tradition of the steam engine, the production line, electronics and IT, smart factories are developed. In the tradition of the four industrial revolutions, but more of a slow process. Connecting machines is just the first step. They generate incredible amounts of data, and that is excellent. But the real challenge is to retrieve the right data and use it in a productive way. It will be some time before we are there."

02

Maher Cheddo
Chief Commercial Officer, Global Power Solutions, General Electric, France/USA

"I can't say, but something big is changing. This fourth industrial revolution is about transforming data that can help you do new things. This is a new era of machines doing what the brain does; collecting data, analyzing data and making decisions based on the data. With the right algorithms we can make predictions that benefit both companies and customers."

03

Håkan Schunnesson
Professor, Mining and Rock Engineering, Luleå University of Technology, Sweden

"It's an important development, but more of a slow process. Connecting machines is just the first step. They generate incredible amounts of data, and that is excellent. But the real challenge is to retrieve the right data and use it in a productive way. It will be some time before we are there."

Is it correct to talk about the development of connectivity and automation as a “fourth industrial revolution”, or is this an exaggeration?

What are the challenges for traditional industries in order to keep up to date with this development?

Synergy: Combinations outshining the sum of their individual parts. This is the evolution of connectivity.

01

Trade routes
Culture + culture

- Trade routes have been around for thousands of years, linking cultures together and allowing for the exchange of goods and knowledge. Prime examples are the Silk Road (east-west) and the Amber Road (north-south).

02

Aqueducts
Water + city

- Bringing fresh water into cities laid the groundwork for rapid population growth. The Roman Empire perfected the art of aqueduct construction—the Valens Aqueduct connected Constantinople with springs 240 kilometers away.

03

Power looms
Steam + machine

- In the late 18th century the first steam-powered looms appeared. The mechanized innovations were a key development in the industrialization process. By 1850 there were 260,000 in operation in England.

04

Switchboards
Telephones + telephone

- Early telephones were rented in exclusive pairs, but the advent of the switchboard let anyone connect with anyone else. Direct dialing, automation and long distance direct calls were soon to follow.

05

Assembly lines
Tool + conveyor

- The moving assembly line pioneered by Ford in the early 1900s reduced the production time for the Model T from over 12 hours to mere minutes. "Faster than the paint driver," as the saying went.

06

ARPANET
Computer + computer

- The ARPANET, a grandparent of the Internet, transmitted its first message—login—from one computer to another on October 29, 1969. An earlier attempt crashed the system after sending the letters "01001010" and "00101001."
Hanna Kristofferson is part of a group that’s vital to Atlas Copco’s product development. As a structural analyst, she makes sure the products are sound enough to be up to the job.

“I’m a structural analyst in the Rocktec division and my field is solid mechanics, so it’s up to me and my colleagues to ensure that the products live up to quality demands in that regard. We might be involved in product updates, new product development or failures, for instance. Our job is to analyze strength and service life, and to predict behavior. We carry out calculations for everything from components to complete vehicle models – so it’s quite a broad scope. We might be looking at welded or bolted joints, or the consequences of making small holes in sheet metal for hosing purposes.

When working on product development, we have to understand the application and the conditions it will be exposed to. We look at all of the parts of the product and apply different loads and use boundary conditions in our equations. It’s all done in a virtual environment, using information about the geometry and material that we get from other Atlas Copco teams – mainly working with finite element software. Since Atlas Copco’s equipment is used in very diverse environments, we also use statistics. We work closely with design engineers throughout the analysis process.

The biggest challenge in my work is to help adapt the models so that the finished product satisfies the required quality and performance standards. Field measurements are made to verify our analyses. Coming up with solutions to problems I’ve never dealt with before can also be pretty demanding, but that’s part of the attraction. The job is all about being analytical and solving problems – and that’s never boring. It also feels great to be part of something bigger: I love it when I play a part in enhancing something so that the customer gets a better product.”

HANNA KRISTOFFERSON
Age: 37
Job: Specialist Mechanical Analysis (Rocktec division, Örebro)
Joined Atlas Copco: 2006

Atlas Copco’s greatest asset is our employees. We take pride in offering them an outlet for their creativity in order to provide the best possible value to our customers.
As good as new

At RAK Rock’s limestone quarry in the United Arab Emirates, a 15 year old drill rig was breaking down frequently and slowing down production. Instead of buying a new machine, the company tasked Atlas Copco’s Midlife services with sparking new life into the rig.

THE SECOND WIND

OUR CHALLENGE

As good as new

Emirates, a 15 year old drill rig was breaking down frequently and slowing down production. Instead of buying a new machine, the company tasked Atlas Copco’s Midlife services with sparking new life into the rig.

THE SOLUTION

TLAS COPCO PRESENTED the Midlife services program as the best alternative for RAK Rock. It was the best option in the present market conditions, rather than investing in a new machine, and also more economical than a major re-building of the rig. Still, a midlife rebuild could mean several years of added life to an old machine.

"For a couple of months we had discussions on pricing, since it is still a big investment for the customer and Midlife services was a new thing for the RAK Rock management. But after so many years of working together, they were always confident in us and we were confident that we would be able to make a deal. Eventually, we settled on a price," says Vasanthalu Shivakumar, Sales Manager at Atlas Copco in the Middle East.

THE SERVICE CONSISTS of engineers and technicians from Atlas Copco going through the machine thoroughly, replacing vital parts. In this case, feed beam components and the electrical harness were the major components that needed an upgrade.

Shivakumar says: "In situations like this, we have to convince the customer that our service team will perform the job in a right way to Atlas Copco standards and with high quality compared to repairs carried out by the customer, who are obviously constantly fixing the machines. So we have to make the customer understand that our service will be of a higher level."

THE AVAILABILITY of spare parts was a challenge, as this particular machine model has been out of production for several years. Thanks to good communication with the Distribution Center and parts planning in Sweden, as well as contacts with sub-suppliers, the parts were eventually found – and within the agreed time frame. An agreement was made that when the majority of the spare parts had arrived in the UAE, the Atlas Copco crew would start working to save time, and the machine was being stripped.

THE RESULT

N JUST EIGHT WEEKS, the Atlas Copco workshop completed the job. When the ROC F7 was running again, the drill rig’s availability increased from 55–60 percent to 95 percent with improved performance, reliability and operational efficiency.

The operation turned out so well that RAK Rock has already confirmed an order to perform a midlife rebuild on a second ROC F7 rig, and on completion Vasanthalu Shivakumar is expecting to carry out midlife rebuilds on a ROC F9 rig as well.

"I have been working with the Customer Center for 12 years now and I have been part of a number of midlife rebuilds. The outcome is always good," he says.

JEFF RIDLEY, Quarry Superintendent at RAK Rock, says: "We could not be happier with the results. We are now reaping the benefits of the much improved drilling accuracy from this machine, with operators now able to collate the machine better and drill straighter holes. This is helping us to realize down the line operational costs savings through improved blast performance."
Ice to water in India

The idea is to utilize the meltwater that would otherwise run down the valley and be wasted. Instead, the water is channeled down from the mountains in pipes and hoses, in order to be sprayed over a pile of gathered brushwood. When the water meets the cold air it freezes to ice, rather like the principle behind a snowcier – or a frozen waterfall – has been constructed along similar lines, acting as a water catchment basin. For a number of years this project has received grants from Water for All via the Swedish-Tibetan Schools and Cultural Association.

For Äsa-Kajsa Zetterman, the trip was an amazing experience – even if the weather prevented the Atlas Copco delegation from actually reaching Kugshok.

“Once of the climate problems in the region is that it snows considerably less compared with a few years ago. But just when we were there, there was substantial snowfall which meant that we were unable to get through on the roads right up to the village and the glacier,” says Äsa-Kajsa Zetterman.

“In the north of India the glaciers are melting, threatening the population’s water supply. Innovative artificial glaciers, supported by Atlas Copco’s Water for All, may be the solution.

KUGSHOK HAS AROUND 60 households; half are Buddhist and half Muslim. Religious differences have never hindered good collaboration. The residents celebrate each others’ festivals and help each other out with the most important thing: Securing the supply of water.

“The artificial glacier has resulted in significantly better harvests, and the people have been able to resume their farming. We got to meet the monks who manage the project. They’re amazing people, and we’re keeping in contact with them via Facebook and Instagram,” says Äsa-Kajsa Zetterman.

THE FIRST INVENTION is what is known as an ice stupa, in the village of Pbyang.

Engineer Sonam Wangchuk is the man behind the idea of the ice stupas. His invention has helped villagers in Ladakh to store winter water to use in springtime.

The cone-shaped stupas are built with a base of brushwood, which is then sprayed with water. When the water freezes to ice, the stupas grow and can become more than 30 meters high. Read more on miningandconstruction.com and facebook.com/AtlasCopco.

THE SECOND INVENTION, a development of the ice stupa, can be found in the village of Kugshok. Here an artificial glacier – or a frozen waterfall – has been constructed along similar lines, acting as a water catchment basin. For a number of years this project has received grants from Water for All via the Swedish-Tibetan Schools and Cultural Association.

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This Foundation was formed on the death of Peter Wallenberg Sr, when funds were donated to Water for All by both private individuals and companies. "Initially, SEK 3 million went to a flagship project in Malawi. The remaining funds in the Foundation are invested to provide a return, and then reinvested in Water for All,” says Josefine Gustafsson.

The idea is for the Foundation to facilitate the establishment of new ventures and small Water for All organizations.

IN APRIL THIS YEAR, Josefine Gustafsson had opportunity to visit some of the beneficiaries of Water for All initiatives when she visited Kitui, a region south-east of Nairobi in Kenya.

"It was amazing to see. We visited five projects in the region, all with a few years behind them. Our trip included visits to two schools that have been provided with water, as well as a dam construction project. A barrier is built on the riverbed ahead of the rainy season. It’s filled with sand and when the rain comes, the sand fills the water, which becomes groundwater and fills the dry wells. It’s a brilliantly simple way to create a sustainable supply of clean drinking water."
In the Black Hills of South Dakota, the figure of legendary warrior Crazy Horse is emerging. It has been since 1948, when acclaimed sculptor Korczak Ziolkowski pledged to create a work of art dedicated to all Native American tribes. When completed, the Crazy Horse Memorial will be the world’s largest mountain carving: 563 feet (172 meter) high and 641 feet (195 meter) long (the face is 87.5 feet tall, equalling 27 meter). The sculpture is being carved out of red pegmatite granite. Atlas Copco has been a part of the blasting and carving work during much of its history. At present, a radio remote controlled Atlas Copco FlexiROC T15 R drill rig is being used – along with SB hydraulic breaker attachments and RH handheld rock drills.

More: crazyhorsememorial.org
Hello there!
What’s happening in Polkowice?

IN APRIL OF THIS YEAR, a Mining and Rock Excavation Service Center was opened in Polkowice, Poland. Andrzej Mielko, General Manager Atlas Copco Central Europe, explains the thoughts behind the launch.

“The market demand for remanufactured components and machine overhauls has increased. When calculating TCO (Total Cost of Ownership), customers seriously consider giving second life to their existing fleet. In principle, it’s money very well spent. Mining and Rock Excavation Service Center Polkowice has a workshop area, allowing us to perform everything from simple component reconditioning or exchange to entire machine rebuilds.”

What kind of customers are you looking to serve?

“Today, our priority is a customer segment within the underground rock excavation business, with the focus mainly on mining equipment (drill rigs, loaders and trucks) and components (feeds, booms, hydraulic cylinders, transmission and axles). In the next phase, we expect to evaluate the business within surface and exploration equipment.”

Why was Polkowice chosen as the location?

“This is a Regional Service Center, so we’re not only serving Poland. The new center will support almost 20 countries in terms of repair, rig overhauling and Midlife services. We have created high standards, including many new ones. It is about a smooth start with a focus on quality and delivery. Mining and Rock Excavation Service Center Polkowice has a workshop area, allowing us to perform everything from simple component reconditioning or exchange to entire machine rebuilds.”

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“Today, our priority is a customer segment within the underground rock excavation business, with the focus mainly on mining equipment (drill rigs, loaders and trucks) and components (feeds, booms, hydraulic cylinders, transmission and axles). In the next phase, we expect to evaluate the business within surface and exploration equipment.”

Why was Polkowice chosen as the location?

“This is a Regional Service Center, so we’re not only serving Poland. The new center will support almost 20 countries in terms of repair, rig overhauling and Midlife services. We have created high standards, including many new ones. It is about a smooth start with a focus on quality and delivery. Mining and Rock Excavation Service Center Polkowice has a workshop area, allowing us to perform everything from simple component reconditioning or exchange to entire machine rebuilds.”
Peter D. Miller, Product Engineer at Rig Control Systems, is one of the people behind Atlas Copco’s newest automation solution.

Why choose a Rig Control System in the first place?
“Computerized control systems do not deviate from how they are trained to perform but instead create a predictable, safe and repeatable day, which means increased productivity for everyone involved.”

What were your main challenges?
“The original AutoDrill required machine-specific setup by someone with in-depth knowledge of how the drill works and how to drill properly for the current consumables and ground conditions. AutoDrill 2 simplifies the setup and interface with preset operating parameters. The main challenge for us was going from an autodrill system that worked for one ground condition on one rig, to a system that works across Pit Vipers and adapts to varying ground conditions. To accomplish this we changed the interface from direct output actuation to setting real work targets like weight on bit, feed speed and torque and presetting those targets to the appropriate values for the drill bit. We also used closed loop control, so the system adapts the outputs to the correct actuation for the rig to achieve the setpoints, and we developed a drilling strategy which adjusts those setpoints to actual ground conditions.”

How much time did you spend developing AutoDrill 2?
“About 3000 man-hours in the field over the course of three years, testing and talking to real users, and another 9000 man-hours in development between field visits. Their experience and guidelines were very useful for us in the development phase.”

AutoDrill 2
Changing the game – again

Atlas Copco’s engineers spent three years conducting field tests at several sites with different terrain. They then went back to the lab and created AutoDrill 2, our latest automated Rig Control System.

AutoDrill 2 can be used on all Atlas Copco’s Pit Viper models and was launched for rotary drilling earlier this year.
In Q4 it will also be available for hammer drilling.
Worldwide field testing on site showed that AutoDrill 2 is faster than both manual and competitor automated drilling, that it has a considerably higher penetration rate and that 95 percent of the drilling time is possible without interaction.