

Mining & Construction

A magazine from Epiroc

miningandconstruction.com

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The Sustainability
Issue 02-2020

OUR CUSTOMERS

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High performance development in Chilean copper mines

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Sustainable for life

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At the heart of things

Lena Andersson links sales and product companies

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IRON WILL

Newly established Kaunis Iron partners with Epiroc to make their mark on the global market.

16-19

Working together for a sustainable future

DEAR CUSTOMERS, year 2020 has been very intense. As the COVID-19 pandemic started disrupting our industry, Epiroc set two top priorities: safeguard health and safety and support customers. During this difficult time we are working closely with you to ensure you get parts and services to keep operating. I hope your business and your people are doing well.

THE MAIN THEME in this issue is sustainability, one of Epiroc's key priorities. The mining and construction industries are vital to society. Without them we would not have mobile phones or hardly anything we associate with modern life. But, traditionally, our industry has not really been seen as sustainable.

Safety is everything, of course. We are working hard to contribute to an industry free from fatalities and injuries. Examples in-

clude our automation technologies that, for instance, move operators from dangerous areas at the work site. Another example is the Live Work Elimination work that will reduce and eventually eliminate exposure to potential hazardous energy sources.

EPIROC HAS LAUNCHED ambitious sustainability goals for 2030 (www.epirocgroup.com/2030-sustainability-goals). They include halving the emissions coming from customers' use of our equipment. Mining and construction contribute a fair amount to global greenhouse gas emissions. We all want to reduce this impact.

Key to achieving this is our battery-electric equipment. Customers are starting to realize the benefits: lower emissions, noise and vibrations, and higher productivity.

Let us work together for a more sustainable future. Stay safe and be well! ✕

Epiroc is a 145+ year old start-up; a dynamic new company, built on long and proven expertise and experience from the mining and construction industry.

On my radar

The COVID-19 pandemic

The situation remains uncertain, and we could still face more disruptions of our industry.

Automation and digitalization

Customers' interest in our digital solutions continues to grow as they seek to increase productivity and enhance safety.

Stay safe!

Helena Hedblom

Epiroc President and CEO



About Epiroc

Epiroc is a leading productivity partner for the mining and infrastructure industries. With cutting-edge technology, Epiroc develops and produces innovative drill rigs, rock excavation and construction equipment, and provides world-class service and consumables. The company was founded in Stockholm, Sweden, and has passionate people supporting and collaborating with customers in more than 150 countries.



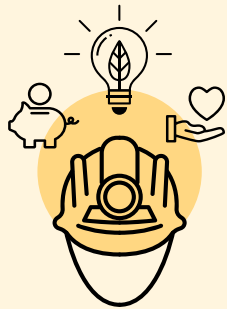
Epiroc Group – get to know us better

Our innovations

Industries we serve

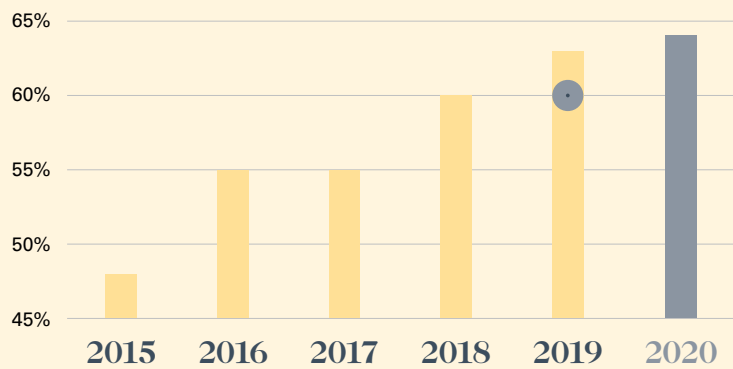
Renewable of total MWh energy used in operations

Our solutions aim to solve our customers' key issues – including requirements to reduce operating costs, increase productivity, increase utilization of equipment, reduce environmental impact, and enhance health and safety conditions.



- **Mining and quarrying**
Underground mining, surface mining, exploration, quarrying, well drilling, oil and gas.
- **Infrastructure**
Underground civil engineering, surface civil engineering and urban development, deconstruction and recycling.

● Target
■ Outcome



Target for 2019 was 60% and the result was 63%. The increase is mainly due to a change to 100% renewable energy at one of our main facilities.

The Group in numbers



14 000

- About 14 000 employees
- Customers in more than 150 countries
- 145+ years of experience
- Revenue in 2019: SEK 40.8 billion

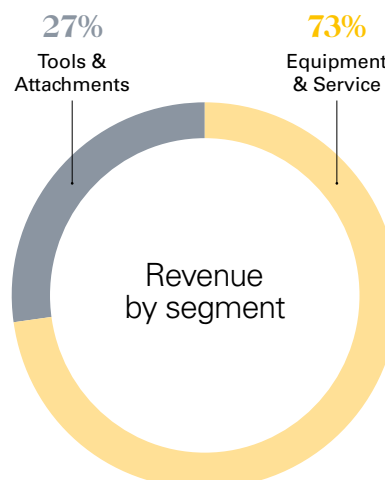
Tools & Attachments

Dedicated to rock drilling tools and hydraulic attachment tools, used for rock excavation, mining, construction, demolition and recycling. Also provides related services

Technology & Digital

Dedicated to technology solutions, and drives the automation and inter-operability expansions for Epiroc's divisions

Divisions and reporting segments Equipment & Service / Tools & Attachments



Surface

Dedicated to rock drilling equipment for use in surface mining, exploration, construction and quarries, as well as water well and oil and gas applications

Underground

Dedicated to a wide range of underground mining and tunneling equipment

Parts & Services

Dedicated to parts and services aimed at maximizing customers' productivity

[FEATURE]

Sustainability

Sustainability is the key to long-term survival. It needs to be considered in every decision societies – and businesses – make.

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Superior drilling quality

Hanil Cement wanted to reduce repair costs and improve operation rates. Thanks to the consistent nature of the SmartROC T35 surface drill rig, they have done just that.

22 | INNER WORKINGS

New level for dimension stone

Practically double the production at half the cost; the SpeedROC 3F has been a big hit for natural stone supplier VeroStone. The rig has three hydraulic rock drills instead of two, and feeds and rails are assembled around a new architecture.

44 | OUR CHALLENGE

Safeguarding the helper

Kent Well Drilling needed a water well drill that could be operated by the driller himself at times, improving safety for the helper. Epiroc customized the hands-free rod loader, with great results.



ON THE COVER

Since 2018, Kaunis Iron has operated the open-pit mine of Kaunisvaara, north of Pajala, located just above the polar circle and six miles from the Finnish border. Epiroc's SmartROC D65 rigs play an important role in daily operations.

The annual PDAC Convention, the world's premier mineral exploration and mining event, will be entirely virtual in 2021 for the first time in its 89-year history. The Convention will take place around its original dates of **March 7–10**. Exact dates will be confirmed after Mining & Construction Magazine's stop-press, so check the PDAC website for exact dates.

www.pdac.ca



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OUR CUSTOMERS
"You maximize the operation"

Chilean miner Pucobre aims to be a sustainable company over time, irrespective of the fluctuations in copper prices. An extensive collaboration with Epiroc just might be the answer.

JUAN CARLOS RECABAL



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Two lasers, an odometer and an IMU – it's Minetruck Automation.

Mining & Construction is published by Epiroc. The magazine focuses on the company's know-how, products and methods used for mining and construction worldwide.

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Safety first

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EPIROC IN BRIEF

Vale signs up for Batteries as a Service

The world's first Batteries as a Service (BaaS) agreement has been finalized in Canada, with Vale and Epiroc partnering on this innovative new approach for utilizing battery technology in mining operations.

With Batteries as a Service, Epiroc works directly with the customer to define a battery plan that suits the needs of their operation. The lifespan is guaranteed, and the battery status is carefully monitored to ensure predictive maintenance with reduced downtime. If a customer wants to increase or decrease their capacity, they can adjust their plan and the service will be tailored to meet their needs.

"A key component to the success of this offering is the flexibility it allows our customers. We take ownership of the battery itself and automatically replace and update the units as needed, which means the mine site can breathe easier and continue to focus on heightened production," says **Shawn Samuels**, Product Manager Rocvolt, Epiroc Canada.



EPIROC

Batteries as a Service eliminates the risks of owning batteries and provides all the benefits of electrical power, with a circular and sustainable business model.

As part of an ongoing sustainability commitment, Epiroc will remove old batteries and replace them with new ones. These older batteries are then used for secondary applications and will be recycled at the end of the process.

Along with the BaaS agreement, Epiroc will provide Vale with 10 battery-operated vehicles for two Canadian mine sites. These machines will include four Scooptram ST14 loaders, two Boomer M2 drill rigs, two Boltec M bolting rigs and two Minetruck MT42 trucks.

To complement the new battery fleet, Vale will also be adding three of

Epiroc's charging cabinets and seven charging posts for equipment support.

"We value and look forward to continuing our successful partnership with Vale as we move towards a zero emissions future in mining together. We both recognize the positive impact a successful battery service implementation can have on operations, so our mutual confidence in one another is well placed," says **Jason Smith**, General Manager Epiroc Canada.

The delivery of the battery equipment to both sites will occur over the course of 2020 and into the first quarter of 2021. ✕

A world first interoperability milestone in underground automation at Cadia East

EPIROC AND MACLEAN VEHICLE SYSTEMS have partnered with Newcrest to advance automation interoperability in underground mining. The three companies recently completed the successful commissioning of a teleoperation system that enables a fleet

of production and secondary reduction mining vehicles to work on the same production level while being operated from the surface. The commissioning took place at the Cadia East underground panel cave mine near Orange in New South Wales, Australia.

Epiroc sole supplier of rock drilling tools for Aitik mine

EPIROC AND BOLIDEN have signed a significant contract, dictating that Epiroc is the sole supplier of rock drilling tools for the large Aitik mine in Gällivare, Sweden. The contract spans over three years with a possible extension of two years, with a total

order value of nearly 100 MSEK. The order includes all Rotary products (tricone bits, team alloy pipes, V-Lok solutions and all accessories) and field service, including digital solutions. The Aitik mine is considered to be the world's most efficient open-pit mine.



All-new Diamec Smart 6M launched

EPIROC HAS LAUNCHED the second-generation underground core drilling rig with a mobile carrier. The Diamec Smart 6M utilizes the drilling capacity of the Diamec Smart 6 and the mobility and sturdiness of the Boomer S2 rig carrier. The carrier is purpose-built for demanding underground operations and features an extremely stable, yet flexible boom. The drilling capacity of the mobile version equals that of the Diamec Smart 6, meaning that the deep hole version is rated for 1 080-meter hole depth.

FIGURE

20 YEARS

Pit Viper standing the test of time

IN SEPTEMBER 2000, the first Pit Viper 351 was introduced to the public at MINExpo. Over the years, the drill rig has become an Epiroc legacy, setting a new standard in the mining industry and serving as a benchmark. Every four years, a new Pit Viper model is introduced at MINExpo. Since 2000, we've built over 800 Pit Viper rigs running in 35 countries. Oh, and the very first Pit Viper rig is still in operation.

Due to the COVID-19 pandemic, the world has been forced into new ways of working.

What have you learned about working digitally?



Cynthia Rodrigues

Product Manager,
USA

"How much value technology has had. Communication with your team has been one of the key things to keep up during this time. I think that if we focus and have our 'to do' lists and goals, working more from home may be an option for the future."



Silvia Véliz Poblete

Communications
Manager, Chile

"How to manage time better, be more efficient and optimize resources. Less paper has been printed. The virtual contact with colleagues and suppliers has been a great challenge, but also allowed me to keep in touch and develop my work in a good way."



Juan Pulido

Technical Service Engineer,
Sweden

"The situation has forced us to do all our training, advising, troubleshooting and rig start-ups virtually. Teaching online takes more time, compared to classroom training, so we adapted our material, adding more photographs and creating a number of simple presentations."

PROJECT NEWS

STRONGER

Sealed air-flow system and strong Enduro-treated buttons.



COP M series of flexible DTH hammers boosts drilling productivity

MINING COMPANIES SEEK to minimize the cost of drilling holes by opting for fewer and larger holes. However, traditional DTH hammers involve repeated consumable replacements and a large inventory. The COP M hammers from Epiroc, on the other hand, dramatically change profitability in DTH drilling thanks to their

innovative flexibility. Each hammer in the range can be used on a wide range of DTH drill rigs owing to an ingenious conversion kit located inside the hammer. Together, COP M6, COP M7 and COP M8 – where M stands for mining and the number, for the tool's dimension – cover drilling needs in the 6½"-10" dimension range.

More www.epiroc.com/cop-m-series



[On Location]
Chile

Digging deep to become a Mine 4.0

PUCOBRE LEVERAGING CUTTING
EDGE TECHNOLOGY TO DRIVE RAPID
MINE DEVELOPMENT PUSH IN CHILE





Lower ore grades and fluctuating copper prices are driving Chilean copper miner **Pucobre** to increase productivity. With new trucks, loaders, rigs and technology, Pucobre has entered a unique strategic partnership with Epiroc to implement rapid mine development (RMD) and monitor and meet ambitious targets.





In Punta del Cobre mine, Víctor Domínguez monitors the progress of a Boomer S2 face drilling rig, which has been spearheading Pucobre's improved tunnel development using the Rapid Mine Development method.

IN A DARK TUNNEL in northern Chile, inside a mountain, two monstrous beasts growl as they prepare to engage. A Minetruck MT65 truck lies in wait in the darkness waiting to be fed, and a Scooptram ST18 loader bellows as the yellow giant lumbers into view like a prehistoric beetle, lighting up the tunnel. The other behemoth roars into life and emerges from the shadows, while the Scooptram dumps tons of rock. Meanwhile on the surface, a woman monitors the maneuver on her screen. Sensors on the truck indicate the 65 metric ton weight limit has been reached and is loaded correctly; the driver is ready to start his 30-minute haul back to daylight. This is just one of the processes that Pucobre, a medium-sized miner operating three deposits and two processing plants near Copiapó in Chile's northern Atacama region, has benefitted from as it seeks to become a 4.0 Mine.

What started out as an agreement with Epiroc in 2017 to replace its fleet with 20 larger capacity Minetruck MT65 trucks and six Scooptram ST18 loaders, quickly led to new ideas to streamline the operation and a new type of strategic partnership, unique in Chile. "We decided to go for Epiroc's proposal because we could increase our production, maintain costs low, remain safe and competitive and be a more sustainable company over time, irrespective of the fluctuations in copper prices," said **Sebastián Ríos**, CEO of Pucobre. "The proposal also included estimated costs in spare parts and fuel consumption parameters that were comparable with what we already had, but with the increased production and use



Sebastián Ríos
CEO, Pucobre

of technology that would bring our costs down," Ríos added.

ENCOURAGED BY EPIROC, Pucobre decided to adopt Rapid Mine Development (RMD) – also called High Performance Development, a method for the full development cycle, which starts with drilling – for making high quality tunnels, faster. That led to the purchase of four of the latest Boomer face drilling rigs and three Simba production drills. Pucobre then unveiled a three-year development plan (2019–2021) to boost productivity by 40% and reduce costs by 25%. KPIs were established with Epiroc to monitor effectiveness of the new equipment, and Pucobre overhauled its organization. The miner adopted a four-pronged approach based on: Short Interval Control (SIC), which is a structured

process that measures a large amount of production data and parameters at short intervals to identify in real time opportunities for improvement, new technology, autonomous and teleoperated vehicles, and a long-term view of the working life of machinery.

Pucobre's new Minetruck MT65 trucks carry 25 metric tons more than their predecessors. That has required some modifications to the tunnels.

The previous trucks had to be replaced every two and a half years, whereas the Minetruck MT65 trucks are designed to last for nine. This has required a change in mindset, taking extra care of the machines and applying timely and predictive maintenance. Also, the drivers had to be retrained, since the cabin is on the left side. To address these issues, Epiroc established a maintenance workshop in their new branch in Copiapó, and Pucobre set up a top notch training facility.

"We had to train our drivers using Epiroc simulators, which helped a lot. For us, change management is about how we could change conditions, attitudes, roles and responsibilities, to capture the benefits of this new equipment," said **Victor Domínguez**, Pucobre's head of mine development operations.

Pucobre has already increased mineral extraction from 300 000 metric tons to 460 000 tons per month. Female truck drivers now represent 25% of the total and are highly valued as they drive slower, have fewer accidents and take greater care of the machines.

DESCENDING INTO THE darkness of Punta del Cobre, the largest mine, we drive past walls lined with water pipes, fiber optic and electric cables to where a Boomer S2 is hammering the rock. This face drill rig has a navigation system that allows for longer rounds and higher accuracy blasting than manual rigs. This means reduced overbreak and underbreak and a minimum amount of scaling. Data analysis of drilling indicates whether there is deviation that requires correction.



Epiroc's Minetruck MT65 trucks have boosted Pucobre's productive capacity. The longer life machines have required more meticulous maintenance and careful training of drivers using simulators.

Pucobre

- Owns three underground mines and two processing plants in a 20 kilometer radius of Copiapó.
- Employs 1 100 people.
- Extracts 5 m/yr metric tons of mineral and produces 45 000/yr metric tons of copper contained in concentrates and cathodes.
- Has two new mining projects in Chile (Coquimbo and Antofagasta regions), one of them in association with Codeco.

"You maximize the operation. Progress is more effective, execution time is reduced, and we are fulfilling our monthly operational goals," said Boomer S2 operator **Luis Herrera**. With the new machinery, his team is close to hitting 95% of their mine development target.

A few galleries up is a Simba E7 rig for long-hole drilling. Fitted with ABC Total, operators can program a drilling pattern and let the vehicles operate autonomously while they are at lunch or on shift changes. Simba rigs are spearheading Pucobre's drive to automation, and most of the rigs are expected to be operating semi-autonomously by next March, according to Mine Operation Superintendent **Hilario Arce**.

In 2019, a new collaboration agreement was signed with Epiroc to digitize the mining operations, developing an integrated information management system, using the capabilities of 6th Sense mine management solution



Victor Domínguez
Head of Mine Development Operations, Pucobre



Luis Herrera
Operator, Pucobre



“With 6th Sense solutions ... and Pucobre’s own systems, we monitor and control operations that we can’t see”

Victor Domínguez

Head of mine development operations, Pucobre

and other task management and reporting features developed by Pucobre. A new Mining Operations Center was built on site and incorporated Certiq, Epiroc’s Fleet monitoring system that gathers, compares and communicates vital equipment information to the surface.



Hilario Arce
Mine Operation
Superintendent,
Pucobre

of an LHD loader located hundreds of meters below ground that pushes rock into piles in the stopes. Likely to become a new standard in all Pucobre mines by next year, loaders and other machines will be able to continue to operate when drivers are not present.

All of the data channeled through this technology is essential for the success of the Short Interval Control (SIC) concept, which has seen engineering weekly preparing detailed planning for 48-hour periods. Operations now have to control progress in shorter periods, per minute, per hour, or per shift in order to be able to respond in real time.

According to Hilario Arce, Pucobre is advancing well towards meeting its three-year goals. Two of the mines, Punta del Cobre and Granate, are already operating 100% with Rapid Mine Development. In regards to the partnership with Epiroc, he says, “I recommend it. With clear rules, responsibilities and KPIs, there has been a commitment on both sides. It has been a very good experience, and the results show it.” ✕

INSIDE THE Mining Operations Center, people with headphones look at a wall of screens showing different data.

“This is the brain of the organization,” said Domínguez. “With 6th Sense solutions from Epiroc and Pucobre’s own systems, we monitor and control operations that we can’t see, that are far away.

It ‘lights up’ the mine and tells us what is happening elsewhere,” he says, adding that previously it could take hours before he was informed of a deviation in the production plan and could implement a corrective action.

In an adjacent building, a man moves a joystick in front of a screen. He is piloting a teleremote control

Pucobre and Epiroc

PUCOBRE HAS BEEN deploying different generations of Epiroc rigs for tunneling since the 1980s. The addition of Scooptram ST18 loaders and Minetruck MT65 trucks is the first time Pucobre has used Epiroc loaders and trucks, and the replacement of its entire fleet shows enormous trust. The close partnership involving on-site training with simulators and maintenance is unique in Chile. The decision to adopt Rapid Mine Development and the collaboration agreement to digitize Pucobre’s mining operations cement this long-term strategic relationship and could be repeated in operations elsewhere in Chile.



Punta del Cobre mine is located in Tierra Amarilla, 20 kilometers from Copiapó.

Punta del Cobre mine

- Underground copper mine using sublevel stoping method
- Has 450 kilometers of tunnels built over time, running from 620 meters to 145 meters above sea level
- First Chilean mine to have an access ramp, in 1974
- Houses Mining Operations Center, training facilities and maintenance workshop



FIVE KEYS TO SUCCESS

<p>1 People and teamwork</p> <p><i>Trust people, make them feel part of the company, welcome new ideas and empower the team to execute them. Training and retraining in new roles and use of technology is vital to eliminate non-skilled tasks and focus on added-value jobs.</i></p>	<p>2 Discipline</p> <p><i>Fundamental, but the most difficult challenge faced, partly due to cultural factors. Routine, standardized maintenance checks are essential for longevity of machinery and maximizing use. Cornerstone of long-term vision for Pucobre for the next 30 years.</i></p>	<p>3 Technology</p> <p><i>Investment in technology can deliver higher quality work, productivity and efficiency, as well as greater safety and a better working environment. Simulator training is fundamental to maximizing productivity of sophisticated machinery.</i></p>	<p>4 Planning</p> <p><i>Detailed, advanced planning and adherence to the plan is crucial for meeting shorter performance targets. SIC and online data has facilitated real-time monitoring, decision-making and prioritization, but requires strict coordination among different units.</i></p>	<p>5 LEAN management</p> <p><i>A flat management structure and a culture of task delegation and agile decision-making enabled Pucobre to rapidly decide to invest in new machinery, technology and operational practices that have helped shape its strategy to become a 4.0 Mine.</i></p>
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SmartROC T35

■ PERFORMANCE:

For the whole machine fleet, the average number of drill meters per operating hour was 26.2 in September 2020. Comparatively, drill meters per hour for SmartROC T35 was 28.6.

■ FUEL CONSUMPTION:

The average diesel consumption per operation hour was 27.9 liters for the whole machine fleet. For the SmartROC T35 rig, the average consumption per hour was 17.4.



[On Location]
South Korea

The **SmartROC35** is equipped with automatic control of correct drilling point and depth via GPS/GNSS, enabling an improved uniform bench at the drilling site.

South Korea goes Smart

»→ Aiming to improve operation rate and drilling quality, Hanil Cement decided on a SmartROC T35 for its quarry near Danyang. The rig has done exactly that – and fuel consumption has gone down, too.

THE NORTHEASTERN PART of South Korea features beautiful mountains and pristine ocean, and crowds enjoy winter skiing and summer beaches. At the same time, there are many cement quarries and underground mining companies in the area, owing to geological features with limestone deposits.

Hanil Cement is one of South Korea's major cement companies, with the main factory located in Danyang. Near the site, Hanil Cement operates a quarry, and in 2018, to solve drilling challenges, the company decided to invest in the intelligent SmartROC T35 surface drill rig, renowned for its fuel efficiency and high productivity. **Sang-Gil Lee**, Resource Team Manager, elaborates.

What are the main challenges in the drilling process?

“We quarry limestone, the raw material for cement. Our geological structure stems from the Paleozoic era of more than 250 million years ago. Due to underground cavities and dynamic geological effects, constant and accurate penetration is difficult during the drilling process.”

What were your goals when you purchased your first SmartROC T35 rig?

“By replacing old equipment with a new high technology machine, we wanted to reduce repair costs and improve operation rates. Another benefit was safer and more stable quarrying.”

How has the rig performed?

“The operation rate of SmartROC T35 is the highest in our machine fleet. Also, the drilling quality is superior. We get a suitable size of fragmentation and parallel holes at the correct drilling depth. On top of that, diesel costs have gone down.”

The rig is equipped with HNS (Hole Navigation System). What has that meant for operations?

“In the case of our large-scale blasting site, consistent and precise drilling is needed to produce the optimal fragmentation size. The HNS, along with the Rig Control System, allow us to drill an entire pattern in automatic mode, and make it easy to operate equipment even if we don't have a skilled operator. In the Rig Control System we can visually see during drilling that the work is being done consistently and correctly.” ✕



Sang-Gil Lee
Resource Team
Manager,
Hanil Cement

More www.epiroc.com/smartroc-t35



**JOAKIM
KEMI**

Sales Engineer
at Epiroc.
Based in
Skellefteå,
Sweden.



STRONGER TOGETHER

**Two young, ambitious
companies joining forces
at the top of Sweden**

»→ The partnership between iron ore producer Kaunis Iron and Epiroc has produced excellent results in just a short time – and both parties now see even greater opportunities in the future.



THE HISTORY OF KAUNIS IRON is short but eventful. The company was established in 2018, and that very same summer they launched the production of iron ore in the open-pit mine of Kaunisvaara, north of Pajala. There was already a mine there, operated by Northland Resources between 2012 and 2014. Kaunis Iron relies primarily on

Epiroc's SmartROC D65 rigs for its production drilling, and they have become an important part in what quickly became a profitable enterprise. In its very first year, Kaunis Iron exceeded its goals.

Mining & Construction Magazine sat down together with **Åsa Allan**, Deputy CEO of Kaunis Iron, and **Joakim Kemi**, Sales Engineer at Epiroc, to learn more about the successful partnership and how it can grow.

How did the cooperation between Kaunis Iron and Epiroc start?

ÅSA ALLAN: "There was already a relationship before Kaunis Iron was established. Our mine manager at the time had also been manager at Northland Resources, and they used Epiroc rigs. We knew they worked well in our company. SmartROC D65 is well suited to small open-pit mines like Kaunisvaara, where flexibility is important."



ÅSA ALLAN
Deputy CEO of Kaunis Iron. Based in Pajala, Sweden.



JOAKIM KEMI: “The relationships between Epiroc and Kaunis Iron are very good. Here in the far north there is a unique kind of straightforwardness. The most important thing for me is not ‘just’ selling a piece of equipment, but finding the best solution for you.”

What common challenges are there at Kaunisvaara?

AA: “For our part, accessibility to the rigs is number one. And getting a fast response from Epiroc in all situations where we need help. Everyone has to be on their toes to keep the entire chain moving. That is why we chose a service agreement under which Epiroc’s technicians are on site year round.”

JK: “We constantly have to draw on each other. We have six technicians in Kaunisvaara, and their job is to do everything they can to ensure that the Epiroc equipment is operating at all times. This means, for instance, performing regular service and taking care of unplanned downtime, as well as sharpening drill steel and making sure there is sufficient drilling equipment in stock at all times. If Kaunis Iron increases its rate of production, it is our job to keep up at every level.”

Is the accessibility as good as you would like?

AA: “It is, and the service agreement helps operations flow according to plan. Epiroc also helps

train our drill operators in the rig software, so we can use it optimally.”

JK: “Kaunis Iron has four SmartROC D65 rigs, and in two of them, we have installed Certiq, Epiroc’s fleet monitoring system, which allows viewing of the accessibility at a detailed level. That lets us improve our planning and also gives us a lot of information. The plan is to install Certiq in the other two rigs, as well.”

AA: “We are looking forward to that. We are now hiring a planner who will focus a lot on the maintenance side. It is important that information reaches us directly, and for you, this person will be a great speaking partner.”



[On Location]
Sweden

In Focus: Kaunis Iron

KAUNIS IRON WAS established in 2018 and operates iron ore mines in Kaunisvaara and plans to open another two mines in the near future. A business that was closed in 2014 was relaunched with new owners. The ambition is to create value for the local society and the region of

Norrbottnen, while securing a strong position on the global market.

- **Number of employees: 330 and approximately 150 contractors**
- **2019 production: 2 million metric tons of iron ore concentrate**

More www.kaunisiron.se

←

Kaunis Iron operates two iron ore mines – this is the main pit – in Kaunisvaara, and plans to open another two mines in the near future. In 2019, the company produced 2 million metric tons of iron ore concentrate.

What is the day-to-day cooperation like otherwise?

AA: “It is very natural. We are in contact at all levels, but the closest contacts, of course, are on the technical side. Our technical personnel work side by side Epiroc’s staff on each shift.”

JK: “That daily contact is incredibly important, especially when it is two rather new companies that need to ‘find each other.’ To work well, it has to be a team effort.”

AA: “Yes, and that is really what it feels like. Our employees view Epiroc’s personnel like a part of the team. They are considered colleagues and it makes no difference what company name happens to be on your work clothes.”

JK: “To enhance the cooperation, we have started having regular meetings with meeting minutes. As Åsa says, there is a lot of daily contact between staff from Kaunis Iron and Epiroc, but we want to be able to systematically pick up on important issues at all levels. And with meeting minutes, it is easier to reach a consensus and work together.”

AA: “This is a fantastic tool and is going to be even more important now that we are planning on investing in more rigs in order to grow the business. It is extra important that we understand each other.”

There are plans to grow the business then. What demands does that make of your cooperation – and what opportunities do you see?

AA: “Basically we need to keep to the path we are on. As a high-cost producer, we need to be cost-effective with regard to fuel consumption, for instance. The most recent rig we purchased was a SmartROC D65 XLF, which has an extra long feed. That means we don’t have to join as many drill pipes, which translates to time-savings and lower fuel consumption.”

JK: “We know how important the cost aspect is. Epiroc has a tool for calculating TCO, Total Cost of Ownership, for our customers, and we think that may be the next step. Examining this question requires trust on both sides, and can produce excellent results.”

AA: “At some point we want to switch to some form of electric power in order to meet EU climate requirements. We use only windpower and hydropower in our ore dressing, so of course we are interested in electric-powered rigs.”

JK: “This is something Epiroc is working hard on. We have come quite far on the underground side of things, so the technology is there. And we already have electric-powered Pit Viper rigs. This is a really important issue to us.” ✕



Åsa Allan
Deputy CEO,
Kaunis Iron



Joakim Kemi
Sales Engineer,
Epiroc



KEYS TO A SUCCESSFUL PARTNERSHIP

For a relationship to blossom, it takes commitment from both sides. Kaunis Iron and Epiroc list their common factors for success.

Openness

✓ The ceiling is high in the dialog between Kaunis Iron and Epiroc. If something is not going the way it should, the parties say so.

Service agreement

✓ Epiroc has staff stationed in Kaunisvaara to conduct regular service, take care of unplanned downtime, sharpen drill steel and ensure that there is sufficient drilling equipment in stock at all times.

Regular meetings

✓ In addition to daily contact on the technical side, regular meetings with meeting minutes are held, where issues such as training, personnel, etc., are also raised. It lays the foundation for successful planning.

Common goals

✓ Both parties take care to ensure that the SmartROC D65 rigs have high accessibility and function optimally in the production. The fact that Epiroc’s on site staff have local anchoring strengthens the team spirit.

More www.epiroc.com/service-agreements

AROUND THE WORLD IN BRIEF



Justin Strharsky of Unearthed Solutions believes that there's a lot of untapped potential for data science in exploration, and that machine learning will become business as usual.

“Data will transform exploration by 2025”

► **DATA SCIENCE WILL** allow for significantly more efficient exploration by 2025, resulting in greater investment in data collection and interpretation and higher discovery rates. That's what **Justin Strharsky**, the founding director of Perth-based *Unearthed Solutions*, believes.

Writing in *Mining Magazine*, Strharsky notes that the exploration sector is still primarily dominated by small businesses that have not yet migrated to modern

digital technologies or recruited the required skilled resources. He predicts that by 2025, exploration will be structured to be more data-driven and automated, allowing geologists to focus on geological interpretation.

Strharsky also believes there will be better tools to sort our data. Currently, data scientists spend more than 90% of their time preparing data, rather than building and testing models. By 2025 data preparation could be down to well below 50% of the project time.

Prospect Mining Studio supports mining start-ups

► **INDIAN MINING** conglomerate Vimson Group and New York-headquartered innovation hub Newlab have founded Prospect Mining Studio. The idea behind the partnership is to support top entrepreneurs, engineers, inventors, and prominent researchers to advance the natural resource and mining industries. In the initial draft round, the studio received 70 applications and subsequently picked 15 companies for its cohort.



Nils Jansson

Associate Professor of Ore Geology, Luleå University of Technology

How did you discover a new mineral?

Five years ago you were searching for barite in the Zinkgruvan mine outside of Askersund when you discovered something else. What was it?

“A new mineral. I was looking for barite for a sulfur isotope study, but the drill core also contained another mineral that we were unable to identify. It was very beautiful, with colors changing from yellow to red. At first I was frustrated about not being able to find it in any mineral database. But when we started to analyze the mineral, I realized why that was. It was a whole new mineral.”

How do you establish that?

“It requires several analyses of the chemistry and crystal structure, including with the help of x-ray diffraction. In the end, we had such a solid basis that IMA, the International Mineralogical Association, could approve zinkgruvanite as a new mineral. The name alludes to the discovery site.”

What do you see as its scope of application?

“It's too early to say, but every time a new mineral is discovered, we gain new insight into how atoms group in the chemical compounds that form the Earth's crust. The same chemical and physical principles apply to man-made materials. All of a sudden, that knowledge spills over into materials science, giving us new ideas about new materials.”

More www.bit.do/zinkgruvanit



Pinpointed

1 442 carat rough found at Letšeng mine Letšeng, Lesotho

➊ Africa-focused **Gem Diamonds** has found a 442 carat type II rough at its Letšeng mine in Lesotho, *mining.com* reports. The company claims it is one of the largest gem-quality rocks recovered this year. Since 2006, Gem Diamonds has found more than 60 white gem-quality diamonds over 100 carats each, which makes the mine the world's highest dollar-per-carat kimberlite diamond operation. At an average elevation of 3 100 meters above sea level, Letšeng is also one of the world's highest diamond mines.

2 Infrastructure to boost Thailand's economy Bangkok, Thailand

➋ A decrease in tourism and exports has dealt a blow to Thailand's economy. In order to boost it, the government plans to increase spending on road and rail projects, *International Construction* reports. The financing will come from the ministry's annual budget allocation from the central government, combined with revenue from state enterprises and income from various funds. The transport budget in the new fiscal year will be around 232 billion baht (USD 7.4 billion), up about 32% from the current period.

3 SMI director sees immense opportunities Brisbane, Australia

➌ The mining industry faces many challenges post COVID-19 and given the UN Sustainable Development Goals. Speaking to *Mining Magazine*, Professor **Neville Plint**, Director of the Sustainable Minerals Institute at the University of Queensland, Australia, acknowledges the challenges, but also sees immense opportunities. "The transition to a sustainable world is likely to drive significant demand for a range of existing and emerging mineral commodities. Some of these are obvious ... [while] other minerals are less obvious, but no less important."

4 DeepGreen advancing seafloor discovery program Vancouver, Canada

➍ **DeepGreen Metals** has formed a partnership with scientific research institutions and universities on its deep-sea discovery program to characterize the potential impacts of lifting polymetallic nodules from the bottom of the Clarion Clipperton Zone (CCZ) of the Pacific Ocean, *mining.com* reports.

The data collected will enable informed decision-making and regulatory development in advance of the start of a new resource industry, which DeepGreen says has the potential to provide billions of tons of critical battery metals required for the global transition to clean energy.



RICHARD BARON, DEEPGREEN COMMS

THREE ROCK DRILLS AND DOUBLED PRODUCTION

»—» The new SpeedROC 3F rig enables both precision and efficiency with a remarkable decrease in fuel consumption. It is already in use in various quarries of Upper Bavaria and works in all weather conditions with similar high quality standards.



Peter Schminkel
Machine Operator,
VeroStone

Eichstätt in Upper Bavaria, Germany. VeroStone is a local supplier of natural stone, with clients all over the world. The operator has been in his job for 18 years now, working with all kinds of drill rigs. “The precision and velocity of the 3F, as

well as its cleanliness, have made the work much faster and more efficient,” he says.

FEATURING THREE HYDRAULIC rock drills instead of two, Epiroc built the machine specially for the dimension stone industry to double performance – regardless of whether drilling in granite, limestone, marble or sandstone. During field tests in a limestone quarry, each of them drilled an average of 1.5 meters per minute, which equates to a total of two kilometers of drilling length over an eight-hour shift.

P

PETER SCHMINKEL IS satisfied. It is 11 AM, the sun is shining, and the drill rig operator has already exceeded the production minimum for the entire day. “In the summer we usually start at 6 AM, and I am basically done,” he says, looking around. With weather conditions like this, he doesn’t even need to sit inside the SpeedROC 3F drill rig.

He stands next to it or sits on a chair and uses a remote control.

This device helps the operator to make positioning easier and provides a better overview. When he operates the rig directly from the cabin, two cameras on the front rail of the rig give him a good view of the work area.

This morning, Schminkel is operating the rig at the VeroStone Petersbuch quarry next to



The Petersbuch quarry consists of Jura limestone and is located next to Eichstätt, a town in Upper Bavaria, Germany.

In order to reduce weight, the feeds and rails are assembled around a new architecture. This helps keep the total cost of ownership low. Furthermore, extensive boom coverage, 360-degree carrier rotation and very flexible terrainability allow the SpeedROC 3F to reach almost every part of the quarry. Additionally, its four support legs stabilize the rig during drilling.



[On Location]
Germany

THE PETERSBUCH QUARRY consists of Jura limestone. It is one of six that belong to VeroStone. The company provides stone slabs for building façades and floor for museums, subway stations, universities, malls, operas and airports in countless countries worldwide. At the same time, it produces stair steps and windowsills for local homeowners.

Marcus Hausner, managing partner of VeroStone, confirms the operator's description of the new SpeedROC's advantages. At the same time,

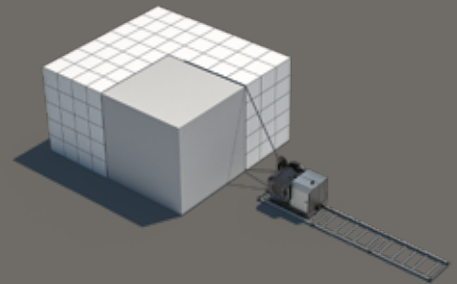


LEARN MORE // SPEEDROC 3F

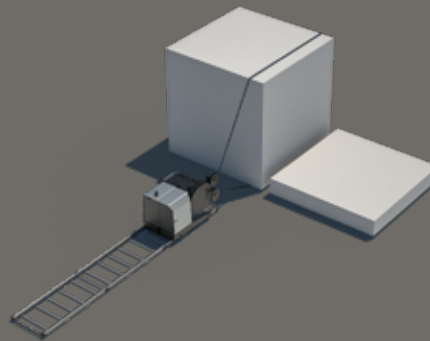
The art of separating

DIMENSION STONE is the name given to natural rock that has been quarried and shaped into certain dimensions. Dimension stone is separated by precise and gentle techniques such as sawing and precise drilling.

Big blocks of stone are loosened from the primary quarry's bench using different methods such as cutting, sawing and drilling, and smooth blasting.



Primary blocks are **divided into slices**, in order to obtain parallelepipeds with a rough thickness of 1.5 ÷ 3 meters.



The big slices are then divided into **smaller parts**.



The "small" slices are squared with different methods, like in-line drilling, and **split to suitable sizes**.

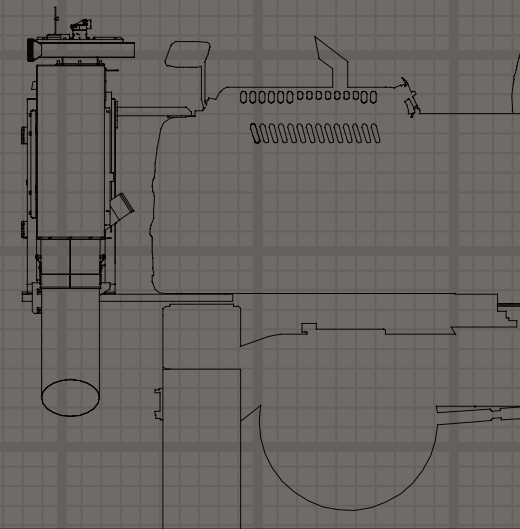




The automatic function of the SpeedROC 3F permits to set the drilling parameters and operate it using a remote control.

Technical specifications

1. **360° coverage area** saves time in tramming and positioning.
2. **Long boom reach** optimized for bench drilling and block dressing.
3. Three rock drills for **increased efficiency**.
4. Fast drilling and positioning gives **high productivity**.
5. Protective guard for **operator safety**.



Marcus Hausner
Managing Director,
VeroStone

he is very satisfied with the low fuel consumption of the drill rig. “Now it is around 15 to 16 liters per hour. Our former rig used to consume around 30 liters,” Hausner says, adding: “To sum it up, with the SpeedROC 3F our production practically doubled while costs were halved.”



Franz Heiß
Master Mechanic
commercial vehicles,
Heiß Hydraulik

AT THE SAME TIME, he stresses the big advantage of Epiroc’s service partner Heiß Hydraulik. “The rig is very dependable and mainly needs preventive service, but with heavy work like ours, it is fundamental for us that a mechanic shows up fast whenever necessary. Heiß Hydraulik is very reliable.” Franz Heiß, owner of the service unit, confirms the good working relationship. “We know very well the challenges of VeroStone’s work. That’s why we’re available to service their drill rigs whenever needed,” he says.

While rig operator Schminkel gets back to his chair, operating the rig with his remote control, Hausner says: “VeroStone used to be part of the Sto Group, a multinational construction materials and facility full-service provider group. About half a year ago we realized a management buy-out. Buying a SpeedROC 3F was one of our first decisions when we started. The current results prove that our decision was right.” ✕

Petersbuch Quarry

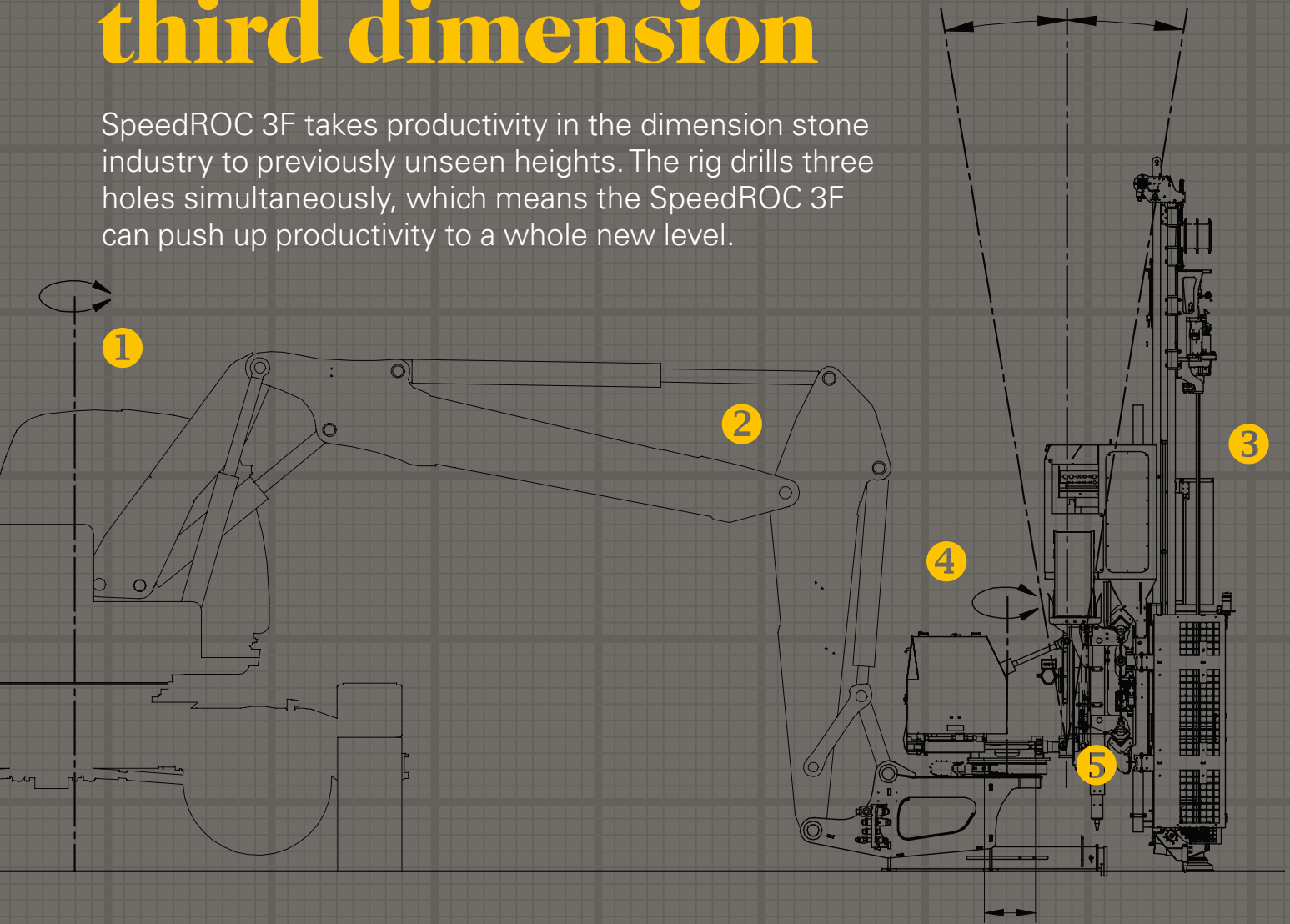
VeroStone’s Jurassic limestone quarry is located at Petersbuch just out of Eichstätt, in Upper Bavaria, Germany. Its rock is 140 million years old and the total thickness of the deposit is approximately 25 meters. The site consists of twenty-six layers (in different layer heights from 20 to 140 centimeters), and provides natural stone for stone slabs, stair steps and windowsills. Customers are based in countries all over the world, as well as in the region around the quarry.

More www.vero-stone.com/steinbrueche

SPEEDROC 3F

Taking DSI into the third dimension

SpeedROC 3F takes productivity in the dimension stone industry to previously unseen heights. The rig drills three holes simultaneously, which means the SpeedROC 3F can push up productivity to a whole new level.



VeroStone GmbH

VeroStone offers a broad product portfolio: Jura limestone, shell limestone and sandstone. The company extracts the natural stone in their own quarries in Upper Bavaria and processes it in modern production and processing plants by detail-accurate manual work.

- 5 Jurassic and 2 shell limestone quarries
- Clients in 18 countries worldwide

Production and size of the Petersbuch Quarry



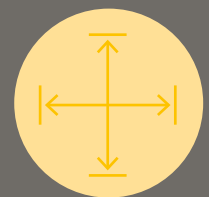
9 000 m³

Jura Limestone
(per year)



45 m³

Jura Marble
(per day)



300 x 150 m

Size
Petersbuch Quarry



[Feature]

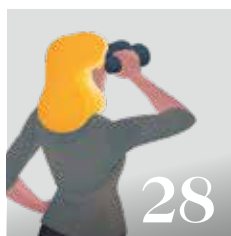
Sustainability

The concept of sustainability – the art of living well, while not diminishing the chances of future generations to do the same – has slowly entrenched itself into the human psyche.

Today, most of us are aware of the challenges ahead and what we need to do to overcome them.

The question is, will it be enough?

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ORIENTATION

Our Common Future – as it stands

33 years ago, *Our Common Future* formulated a definition of sustainable development. How are we doing?



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ON SITE

Driving sustainable change

Making a difference for future generations is top of mind at Epiroc Tools & Attachments division in Fagersta.

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PERSPECTIVE

The sustainability trend

The rise of the low-cost mass market “fast fashion” faced a clothing industry with sustainability challenges. Those have not gone away, but there are examples that things can be done differently.

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SURVEY

“Competition is very fierce”

Non-sustainable practices can bring a lot of profit in the short term, but if you want your business to have longevity then sustainability is key, says assistant professor Lea Fünfschilling.

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SEVENTHINGS

How not to do it

Being sustainable in the long run is a huge task for societies. Many have failed, for various reasons. We look at seven examples from The Fertile Crescent to Atlantis.

BJÖRN ÖBERG, JOHANNES BERNER, SHUTTERSTOCK



The road to sustainability



Humanity is at a crossroads, en route to environmental calamities. The way we act over the next few decades will have major implications for generations to come. Will we be able to turn the colossus around?

The birth of modern sustainability thinking can be said to have taken place in October of 1987, with the publication of *Our Common Future*, commonly referred to as the Brundtland report.

The report was the result of four years of hard labor by a UN-appointed commission and, among much else, formulated the commonly agreed definition of sustainable development: *development that meets the needs of the present without compromising the ability of future generations to meet their own needs.*

The report has been immensely influential, and both the Sustainable Development Goals (SDG) set up by the UN in 2015 and the Paris Agreement signed in 2016 can trace significant portions of their roots back to it. Yet, 33 years into *Our Common Future*, we still seem to be struggling to implement sustainable solutions at an effective scale.

Karin Hogstrand, Project Manager at the Swedish Environmental Protection Agency, leads the work on periodically evaluating the overall progress Sweden is making toward its national environmental goals. She has a clear-cut view on the subject:

“We have to manage the transition. We only have one planet, so it’s a question of not only ensuring a good life for all, but ultimately of our long-term survival. If we don’t do this, it may be game over for humanity,” says Hogstrand.

She says the most immediate goals that need to be addressed are climate change and loss of biodiversity.

“In these areas there has been negative progress on both the national and the global level. They both have potentially drastic consequences for humanity and require strong measures.”

Karin Hogstrand emphasizes that there is no need to be overly pessimistic. There has been global progress in other areas like poverty, education, clean water and sanitation.

“This shows that it’s possible to make great strides if we put our heads together and work hard. We’ve never been as aware of the problems facing us, we have more knowledge than ever before, we’re more globalized than ever, and we have a strong framework in the form of the SDG. We must get into a mindset where we seek solutions, and be prepared to make certain changes,” says Karin Hogstrand.

Views differ on which tools most effectively will help us achieve sustainability. Lately there has been much buzz around the concept of the circular economy, which in its ideal form eliminates waste and makes continual use of resources. But it might not be a catch-all solution, according to **Michael Søgaard Jørgensen**, an Associate Professor at Aalborg University in Denmark, where he does research on sustainable innovations and transitions.



Karin Hogstrand
Project Manager,
Swedish Environmental Protection Agency



Michael Søgaard Jørgensen
Associate Professor,
Aalborg University

“In theory it sounds great to turn society into a circulatory system where everything is recycled. But it’s too nice a narrative for me. It’s not that simple.”

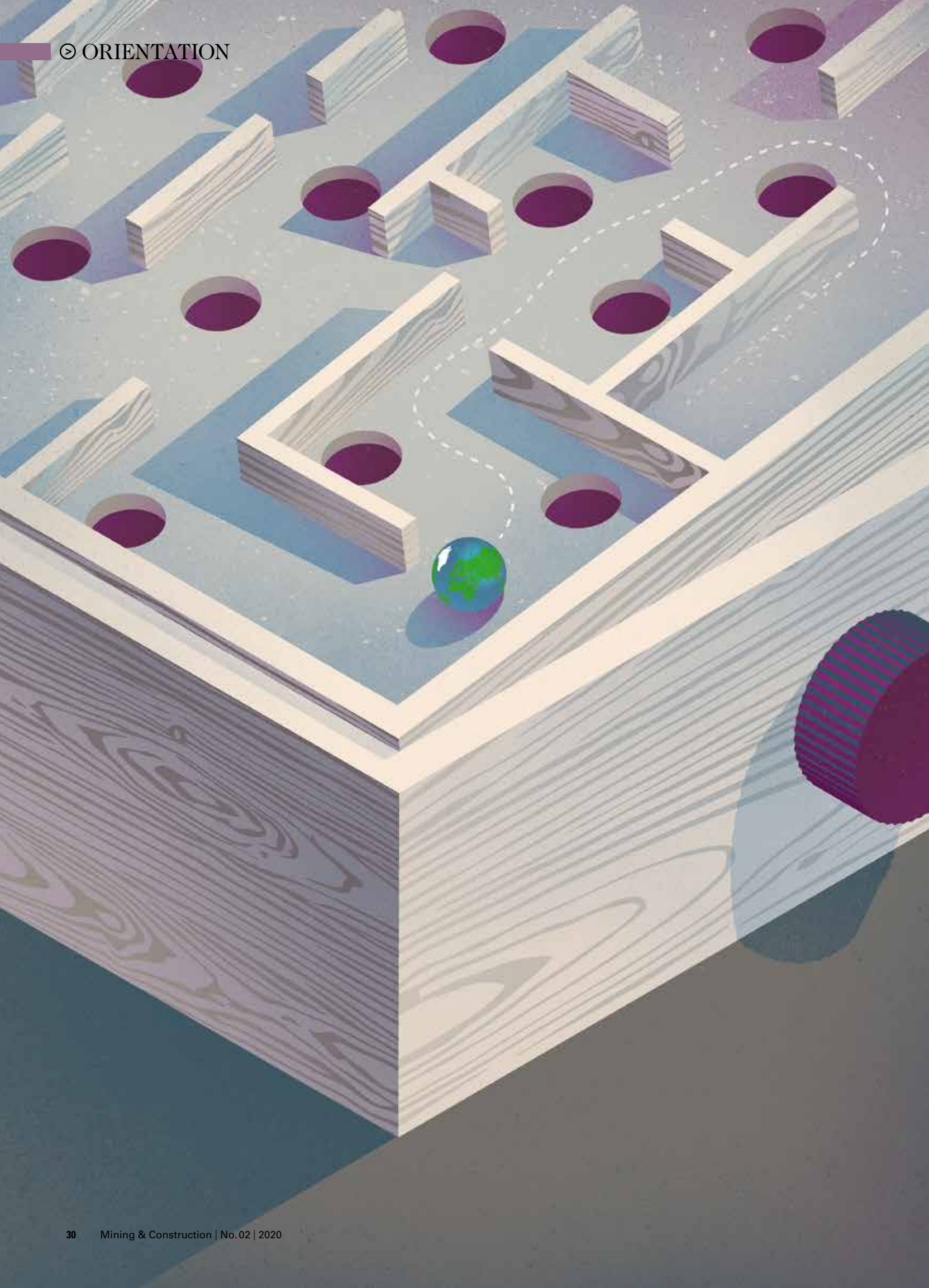
Instead, he is more enthusiastic about the concept of the slow economy – in which products have longer lifespans – and sharing, to minimize the number of products needed.

“The fact is that houses are worth a lot more when in use than as sources of building material. This is paralleled in other products like mobile phones and vehicles,” says Michael Søgaard Jørgensen.

He states that critical areas ahead include reduced meat consumption, increased public transportation and efficient housing.

“Even though houses have become more energy efficient, we live on more square meters per person, which cancels out the energy savings. We have to reduce global resource consumption maybe tenfold. This will be particularly hard work for rich western countries like Denmark, since we start out at such a high level.”





“The world will change whether we want it to or not. Let’s make sure that we change it in the desired direction”

Karin Hogstrand
Swedish Environmental Protection Agency



If we reduce consumption, will there still be room for growth? There might be. Voices in industry see sustainability in itself as a growth business.



Anthony Watanabe
Head of Digital and Climate Innovation in Rail Control Solutions, Bombardier Transportation

“We see a gradual change happening in the world, with more capital flowing towards green businesses,” says **Anthony Watanabe**, Head of Digital and Climate Innovation in Rail Control Solutions at Bombardier Transportation.

Bombardier is a global provider of rail solutions and related products, with sustainability as a key element of the business strategy.

“Our products are part of the solution – rail is, after all, the greenest

form of motorized transportation. Take our monorail project in Bangkok, which will double the public transport passenger count while boosting the local economy. So it clearly supports economic growth, with a net positive environmental impact,” says Watanabe.

He says that the benefits of taking a strong stance on sustainability include customer satisfaction and employee engagement.

“Our company has lots of young staff, and they take pride in the work we do to decarbonize infrastructure. There is also an economic shift happening, with more investors now equating climate risk with financial risk. There are

some challenges, not least the speed of change. We’re a large organization trying to keep up with the pace at which the world is transforming.”

The time aspect is echoed by Karin Hogstrand:

“The environment is changing fast, while science is a slow process. We have to start acting from the knowledge we already have, tackle the problem in all parts of society, and be prepared to make major changes. To continue in this way is simply not an option. That will lead to habitat destruction, mass migration and conflicts. So the world will change whether we want it to or not. Let’s make sure that we change it in the desired direction,” says Hogstrand. ✕

MINDING THE GAP

Data gathering initiatives

TRACKING THE PROGRESS of the Sustainable Development Goals requires accurate and reliable data, of which there is a shortage in many countries around the world. However, the data revolution and the rise of big data has brought opportunities to improve the situation, potentially shedding light on previously hidden disparities in societies.

In the shadow of the work on the SDGs themselves, the UN is taking initiatives to improve the quality of the data gathering. For example, an appointed independent expert advisory group has made recommendations on how to address these challenges and is calling for UN-led efforts to fill the data gaps, and the Global Pulse initiative strives to innovate data science.

Epiroc in Fagersta

SUSTAINABLE ENGINEERING

»→ Greater ecocycle awareness, smarter transportation and products that last longer and improve safety. There have been rapid sustainability developments in the mining and construction industry, and companies need to find new ways of working. At Epiroc Drilling Tools in Fagersta, we have come a long way in our work towards change.



“Everything is automated. We have a number of these machines, and a single operator can operate them all”

Peter Dahlberg
Plant Manager Short Goods



COOLOANT SPLASHES inside the glass when each of the tool heads drives the drill steel up and down, up and down. Two similar tools turn threads in them; the same threads for both drill bits – and for all other drill bits that the machine has produced and will produce.

“Everything is automated. We have a number of these machines, and a single operator can operate them all.

The operator feeds the cell with raw materials, and the robots do the rest: load, drill, mill and turn,” says **Peter Dahlberg**, Plant Manager Short Goods.

Above him is a green lamp, but in the cell beside it, a corresponding light is flashing yellow. That alerts the operator that the machine will soon need a new tool. “The machines operate six to eight hours non-stop, and when the process is up and running, the operator’s next task is to test measure the products,” says Peter Dahlberg.

WE ARE IN FAGERSTA, where Epiroc has several production facilities that manufacture rock drilling tools.

This particular one opened in 2012. Investments were made in highly automated machinery, and drill bit production was moved from South Africa to Sweden. In the entrance hangs a framed diploma attesting that in 2018 the factory won the division’s LEAN award, with the motivation: *A school book example of how a systematic approach to solving problems can make dramatic improvements, reduce waste and show real savings.*

“The transferred production used to require over a hundred employees. Now eight is enough,” says Peter Dahlberg.

ON THE OTHER SIDE of the road sits **Jonas Falkeström**, Vice President R&D Epiroc Drilling Tools. He notes that the Fagersta facility is fully in line with Epiroc’s sustainability ambitions.

“Sustainability is high on our agenda, and it has become an increasingly important topic over a short period. To begin with, we are driven to make a difference, and when we recruit, many young people ask ‘what do you do for the environment?’”

Falkeström continues: “Our customers come with ever higher demands from their owners. So we have to support them to become fossil-free and part of circular economy, and so on.”

Epiroc does this by analyzing its value chain and asking itself a series of questions: What do





Peter Dahlberg
Plant Manager
Short Goods

we “build into” the product and how long can it be used? It’s about knowing where we can make the biggest impact as a supplier.

“Is the material we use recycled? That makes a big difference to the climate. What does the electricity mix look like? Here we use almost exclusively renewable energy from hydropower. How do we transport our products? Here we are shifting from air to sea.” Jonas Falkeström says that Epiroc does a lot of things right in many areas – but that there is more to be done.

“An important upcoming area is products with extreme service lives. If our customers can drastically increase the number of drill meters, there will be a lot less downtime for service, saving the customer both costly stops and keeping staff out of potentially hazardous environments.”



Jonas Falkeström
Vice President R&D
Epiroc Drilling Tools

ANOTHER PERSON WHO knows a lot about the challenges facing customers is **Fredrik Gransell**. As Product Line Manager Percussive Technologies, he is the link between customers and the product development department. He knows what he values highly in his customer relationships:

“Transparency! We have to be open about which drilling solution is best suited to the current conditions, the product’s service life, and the cost. And to understand customers’ needs and make reliable calculations, we need to know their operating costs. We want customers to be demanding of us. That way we can make big headway together in sustainable mining,” says Fredrik Gransell.

When he talks to customers, it is clear what is

most important to them: products that last and that drill both fast and straight. Straightness is a growing demand with great importance for the entire mining cycle. It is a matter of having the holes exactly as the drill design, especially as the mines are going deeper the stress of the rock increases. Just as Jonas Falkeström did, Fredrik Gransell also notes service life expectancy.

“Thanks to new technology, we can achieve extreme service lives for our products, which can increase the service life tenfold and which means the drill bit rarely needs replacing. This opens up for new possibilities for automation and means that operators can be taken out of hazardous environments.”

AN EVER MORE IMPORTANT aspect of sustainability is economizing resources. By recycling materials, we reduce the need to produce new raw materials. When **Yibin Wei**, Strategic Purchasing Manager, drew up guidelines for a material supply strategy, she took this into consideration. In cooperation with raw material suppliers and recycling companies, Epiroc has built a “closed loop” recycling system. The concept entails returning all scrap from production and stocks of finished goods to the raw material suppliers, who then recycle it for the production of new raw materials.

“By buying scrap based steel produced using hydropower, Epiroc has managed to reduce carbon emissions by over 40 000 metric tons per year,” says Yibin Wei. “An important part of the total waste management strategy is to involve our



Fredrik Gransell
Product Line
Manager Percussive
Technologies

Q&A

Ingrid Bengtsson, SHEQ Manager,
Epiroc Rock Drilling Tools division, Fagersta, Sweden



There are many aspects of sustainability in production, both internal and external. At Epiroc in Fagersta, SHEQ takes a unified approach.

Q Describe your role in the organization.
A “I head a group that works with safety, health, environment and quality. The group includes three quality engineers and one laboratory, where we test and certify the quality of products. This can involve checking units of measurement and heat treatment. Both the number of claims and the number of scrapped products in manufacturing have declined. High quality reduces the risk of delivery delays.”

Q And also benefits the environment?
A “Absolutely. We use fewer materials and avoid the extra transportation that comes from claims.”
Q What more does Epiroc do here in Fagersta for the environment?
A “The main challenge is achieving energy effective production – and increasing the share of renewable energy. We are now at 96 percent renewable: mainly certified hydropower, but also some wind power. We are also looking at how we can reuse

the heat from heat treatment, for instance by selling it to the district heating power plant or using it as floor heating.”

Q What are your thoughts regarding safety?
A “The main goal is to reduce the number of near-accidents and accidents in production. One way to do this is by making sure employees are not exposed to hazardous situations, and automation has helped a lot. The need for heavy lifting has also been reduced. To make sure that everyone is aware of the risks and how to prevent them, we work with safety bulletin boards that have been set up in various places in production. Important information is posted there and regular meetings are held there. We have also improved the procedure for reporting near-accidents and accidents. Accurate statistics are a primum motor for the improvement work.”

More www.epirocgroup.com/health-and-safety

“Eighteen months ago, 40 percent of deliveries were made by air and 60 percent by sea. Now that ratio is 10/90”

Anna Grubb
Manager Distribution Center





Emil Berglöv, Operator PD, distributes the pile of chips so they do not end up back in the conveyor.

Interior threading of the drill bit, one of many steps now performed by a CNC machine, assisted by robots.



business partners in our LEAN work within information flow, to produce exactly what customers need and deliver it when it is needed. In that way we minimize the amount of obsolete material and products, as well as unnecessary stock and transportation.”

Another part of the strategy is to offer customers help with recycling their used drill bits in the future.”

“Customers appreciate that we take responsibility so we can save both money and secure material supplies. In the long-term we want to involve customers even more, so we get even better at manufacturing and transporting exactly what is needed,” says Yibin Wei.

ONE AND A HALF MILES AWAY from the two factories – on the other side of Strömsholm canal, that

runs through the old industrial town – lies one of Epiroc’s distribution centers. I count twelve stories of shelves with so-called long goods, i.e. drill rods. In total, there are 2 500 items in stock here. Everything manufactured in Fagersta – and a small amount from other factories – comes here before it is sent out into the world, first by road and then mainly by sea.

“Throughout Epiroc, concerted efforts are made to streamline our supply chain. The flow of rock drilling tools must ensure that customers’ production never stands still, but there is more to do to make the distribution as smart as possible,” says **Anna Grubb**, Manager Distribution Center.

She continues: “Eighteen months ago, 40 percent of deliveries were made by air and 60 percent by sea. Now that ratio is 10/90. Sending products once a week instead of once a day has required a



Yibin Wei
Strategic Purchasing
Manager



Anna Grubb
Manager
Distribution Center



↑
Some 2500 items are in stock at the Distribution Center. Throughout Epiroc, concerted efforts are made to streamline the supply chain.

←
In the button cell, the hard metal button is mounted in the drill bits. Here, the robot packs a copper chip in each hole before the hard metal button is mounted.

Tools & Attachments

Tools & Attachments is a division within Epiroc. It develops, manufactures and markets rock drilling tools and hydraulic attachment tools for rock excavation, mining, construction, demolition and recycling worldwide. The divisional headquarters and main production center is in Fagersta, Sweden.

major reorganization and different type of stock management. When we prepare for truck loading we do so by country and not by the type of goods, in order to minimize handling of the goods as much as possible.”

To streamline the flow of goods – and make even more progress in our sustainability work – we have tightened the cooperation with our Customer Centers around the world so they send us more exact forecasts. In that way we avoid having too many small deliveries – or Customer Centers making excessively large orders.

“For better accuracy, Epiroc is developing a smart inventory management app which makes it easier for end users to forecast future needs for rock drilling tools. It could be another important building block for Epiroc in its overall sustainability work,” says Anna Grubb. ×



Mikael Hjortborg
Drill Foreman, LKAB,
Kiruna, Sweden

What results has Powerbit Underground produced?

You tested a new type of drill bit in a mine in Kiruna. Why?

“We needed an alternative to the cross bits we used to drill in the ore. They wore out after about five holes, and many broke in the hole. Those that were worn we could sometimes re-sharpen, but it is an expensive process, and the button bits we used for the wall rock could not handle the ore. So we needed a new type of button bit that could also be used in the ore and we looked for a supplier who could work with us to develop one. Epiroc quickly snatched up the project, producing Powerbit Underground.”

What is different about these button bits?

“They have several flushing holes and better cooling. The small micro-cracks that gradually form on the button, ‘snakeskin’, occurs much later now that the cooling is better. The buttons are substantially improved, and the material in the drill bit has also been developed to strike the right balance between softness and hardness.”

What results have you seen?

“We opted for rigs with two booms instead of three for other reasons, but even at two-thirds capacity, with the new bits we are about at the same production level as before. The button bits manage between 25 and 50 holes, depending on the rock, which is a heavy increase. Moreover, they are far less expensive to sharpen.” ×

More www.lkab.com

PERSPECTIVE

THE SUSTAINABILITY TREND

There are always things to be learned from other organizations and other industries. This is how another player has approached the theme of this issue.

☑ Christian Tarras Ericsson
📷 Shutterstock



A number of new – or repurposed – materials will aid the clothing industry in the transition to more sustainable practices.

The times they are a-changin'?

THE CLOTHING INDUSTRY has one of the highest environmental impacts on the planet and has a number of sustainability challenges to overcome. Many of the problems can be traced to the rise of low-cost mass market “fast fashion” in the 1960s and 70s, then headlined by large retailers like Zara, H&M and Benetton. Collections were traditionally often planned years ahead, but the new rapid trend response and consumerism behavior increased the frequency of new releases and shortened the lifespan of fashion.

Some of the environmental issues facing the clothing industry today are excessive use of water for dyeing and

growing textile crops, often in freshwater stressed areas; skyrocketing use of pesticides and other chemicals; pollution by microfibers shed from synthetic fabrics; dependency on motorized transportation for distribution and returns; and low rates of recycling and second-hand use. There are also social sustainability issues, with a history of bypassing unions and social welfare contracts resulting in overworked and underpaid production employees.

BUT THERE ARE signs that may herald a more sustainable future. Nike, for example, has a recycling program in place for shoes, with recycled materials

going into new sportswear items and even sport surfaces. Another Nike initiative is a new European distribution center in Belgium that is run entirely on energy from renewable sources.

THERE IS ALSO a focus on sustainable cotton in the industry. For example, the Target retailing company has set a goal to source 100 percent sustainable cotton by 2022 for their own brands in apparel, home and essentials. And companies like H&M are steadily increasing their investments in organic cotton, which eliminates the use of synthetic pesticides and fertilizers, and requires lower amounts of energy and water. ✕

In Focus: Greener fabrics

Naturally colored cotton

Cotton can be grown in a number of natural hues, like mauve, red, yellow, and orange, reducing the need for synthetic dyes. Natural colors show less wear and fading over time.

Hemp

Hemp requires little water and is naturally resistant to pests and diseases.

Bamboo

Like hemp, bamboo requires very little in the way of pesticides and agrochemicals.

Soy fabrics

Derived from the hulls of soybeans, a manufacturing byproduct. Soy fabrics are light and silky, and almost completely biodegradable.

Qmilk

Manufactured from casein in milk. One kilogram of Qmilk fiber requires merely two liters of water and is completely biodegradable.

PET plastic

Recycled bottles can be made into fibers and textiles.

More www.bit.do/greenerfabrics

SURVEY

WHY IT MAKES SENSE

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

☑ Gustaf Höök

01

What are the main benefits of sustainability in business?

02

How do you work with sustainability in your field?



Lea Fünfschilling

Board member Sustainability Transition Research Network, Sweden



Claus Stig Pedersen

Head of Global Sustainability & PA, Novozymes, Denmark



Verónica Martínez

Innovation and Technology Lead, ICMM, UK

01 "THERE'S SOMETIMES an assumption that sustainability and business don't go well together, but I'd like to challenge that.

For a business to be successful over a longer period of time, it needs to be sustainable. The competition is very fierce, so I would say that sustainability is the key to longevity. Sure, it's possible to excel without being sustainable, making a lot of profit using non-sustainable practices, but you probably won't be around in 20–30 years' time."

02 "I'M AN ASSISTANT PROFESSOR at CIRCLE at Lund University and also a board member of the Sustainability Transition Research Network. At STRN, researchers such as myself focus on sustainable transformation of socio-technical systems. The underlying assumption is that a change towards sustainability often requires deep structural changes in society and business, and we provide stakeholders with analyses on how to meet those challenges."

01 "COMPANIES CAN HELP make a real difference in the work towards the Sustainable Development Goals (SDGs) adopted by the UN General Assembly. As for Novozymes, we are committed to providing the world with biological solutions that can help limit a global warming increase to 1.5 °C. This commitment has been validated by the Science Based Targets initiative."

02 "NOVOZYMES' PURPOSE, business strategy and targets are inspired by the SDGs, because our solutions enable us to contribute to one or more of the SDGs every single day. All projects in our innovation pipeline are assessed in relation to their potential impact on the SDGs. This enables us to advance solutions that could have a highly positive impact on the SDGs. We believe in the power of partnerships, and most of our contributions are driven through collaboration. SDG 17 (global partnership for sustainable development) is therefore a guiding principle for our company and the way we do business."

01 "IN THE MINING and metals industry, how companies operate is as important to society as the natural resources they extract, and the products they produce. When companies act responsibly, the extraction and management of natural resources can be transformative for the lives of employees, their families, local communities and entire nations – supporting sustainable economic growth and the building of resilient and inclusive communities."

02 "MY ROLE WAS CREATED to drive collective action and enhance sustainability performance. For example, the value proposition of ICMM's Innovation for Cleaner, Safer Vehicles initiative is built upon improving safety, health and environmental performance in the industry. By bringing together ICMM members and OEMs to collaborate in a non-competitive space, we will accelerate the development of a new generation of mining vehicles that will benefit the entire industry."

More www.bit.do/6benefits

Unsustainability

Every unsustainable society is unsustainable in its own way. Here is a sample of cultures that, for differing reasons, failed in the long run.

01

Norse Greenland *Environmental*

A rich Norse culture thrived alongside the Inuit on Greenland for half a millennium, but the last of the Vikings were wiped out by the 15th century. Mostly due to environmental damage caused by the destruction of the natural vegetation, soil erosion, and by cutting turf.

02

The Soviet Union *Social + Economic*

A shattered economy (in part due to an arms race with the West), a radical reform program initiated by Gorbachev, and growing dissent and unrest in countries behind the Iron Curtain ultimately led to the mostly peaceful dissolution of the Soviet Union in 1991.

03

The Khmer Empire *Social + Environmental*

At its apex, the empire covered most of South-east Asia, but it ended with the fall of the capital city Angkor in the 15th century. Reasons for the decline include civil unrest, increased population pressure on water systems, and systematic deforestation.

04

The Fertile Crescent *Economic + Environmental*

The lush Middle East "cradle of civilization" was first farmed at least 11 000 years ago. Over the centuries nations rose and declined, and irrigation works fell into disrepair. Today, the heavy salination of the soil makes the land gradually unfarmable.

07

The Olmec Culture *Environmental*

The Olmecs, the earliest known Mesoamerican civilization, flourished for a thousand years. The population dropped rapidly around 400 BCE, however; in part probably due to environmental changes triggered by the siltation of rivers due to agricultural practices.

06

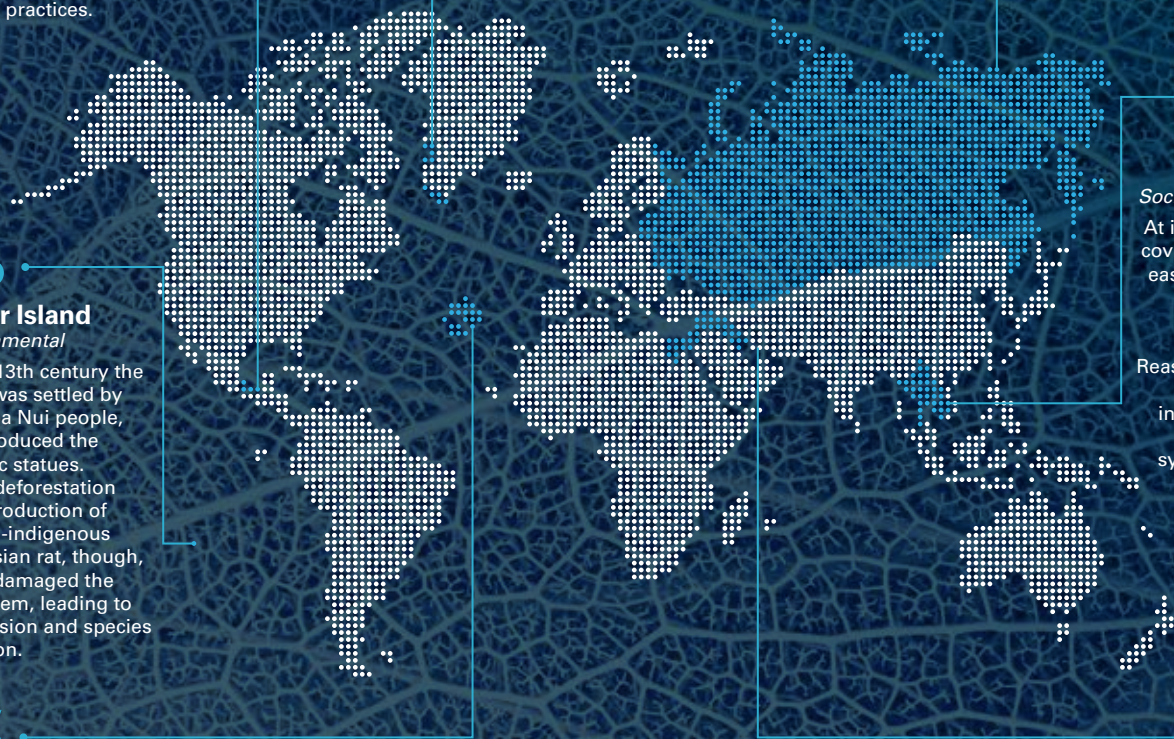
Easter Island *Environmental*

By the 13th century the island was settled by the Rapa Nui people, who produced the majestic statues. Heavy deforestation and introduction of the non-indigenous Polynesian rat, though, fatally damaged the ecosystem, leading to soil erosion and species depletion.

05

Atlantis *Theological*

This rich and mighty mythical island, first mentioned by Plato, supposedly sank into the ocean eons ago. The cataclysm was the result of a failed attempt at conquering Athens and thus a falling out of favor with the often petulant and impulsive Greek deities.



Next issue
[Feature]

Working together for a common purpose to achieve mutual benefit; collaboration makes sense in more ways than one. In the next issue of Feature, we take a closer look, and give an example of how Epiroc collaborates.

MY WORK: BUSINESS SUPPORT MANAGER

Epiroc'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.

☑ Gustaf Höök
📷 Andreas Hylthén

“I love all international contacts”

»→ **Lena Andersson** likes working internationally and seeing the clear results of her work. As Global Business Support Manager, the whole world is her workplace, and she leads a team that plays a key role when the Surface division does business.

“ I had already worked with international contacts when I started at Atlas Copco 22 years ago. Still, the change of jobs was a big thing, because I moved to a big company with long traditions. I started off as Marketing Assistant and eventually also became Area Manager for France and Spain. About ten years ago, I became team leader and then head of Global Business Support in the division. The team consists of eleven people – most of whom are based in Sweden, but we are also present in India, China, Japan and France. And we act as a link between Epiroc's global sales organization and our various product companies.

In practice, responsibility for the Forecast-to-delivery process entails: being in close contact with Customer Centers around the world, gathering prognoses for production planning, responding to delivery times, handling orders and, of course, making sure




LENA ANDERSSON

Age: 60
Job: Global Business Support Manager, Örebro
Joined the company: 1998
Best part of the job: “Working internationally. I like feeling that I am part of the world”

our rigs are shipped out in the world. Another important task is ensuring that we are trade compliant – for instance, with respect to sanctions – and reviewing contracts to minimize the risk for the company.

A TYPICAL WORK DAY involves many meetings, and I often work late due to the different time zones. It's a matter of being structured and understanding cultural differences, but I love all international contacts and using my language skills. And it's fantastic seeing one's co-workers grow and become proactive – and be able to help Epiroc drive home important orders.

When I am not working, I spend time with family and friends or spend time in my cottage close to Örebro. I find working in the garden, taking long walks in the woods and fishing to be peaceful. Just like reading books. And I like to travel, especially to big cities. Contrasts make life more fun.” ✕

A portrait of Lena Andersson, a woman with shoulder-length brown hair and bangs, wearing red-rimmed glasses and a white long-sleeved top. She is smiling and standing against a light purple background. Her hands are on her hips, and she is wearing a skirt with a floral pattern.

As Global Business Support Manager, Lena Andersson leads a team responsible for the Forecast-to-delivery process. She relishes the international contacts and being able to use her language skills; Swedish, English, French and German. Lena Andersson also has a knack for organizing – a must in her role.

The hands-free road loader, designed for the Diamondback series drilling rigs, facilitates the loading and unloading of drilling rods throughout the drilling process. Epiroc made some custom changes for Kent Well Drilling, with great results.

BETTER SAFE THAN SORRY

»» Time-consuming and sometimes hazardous work made Kent Well Drilling long for a custom hands-free rod loader. Epiroc took on the challenge and managed to deliver a simple, yet effective solution.

1

THE CHALLENGE

KENT WELL DRILLING is a family-owned business based in Wrenshall, Minnesota, just outside of Duluth. The company has served the same area for over fifty years, drilling and repairing wells. In the past Kent Well Drilling has used other brands of equipment, where the normal procedure was for the driller to control drilling from a console while a helper manually handled rods by lifting overhead with a winch. In the fall of 2019, owner



Cody Green
Product Manager,
Water Well Drills,
Epiroc

and CEO Bob Kent Jr. contacted Epiroc with hopes to streamline operations.

“He expressed the need for the driller to be able to operate the rig by himself at times,” says **Cody Green**, Production Manager, Water Well Drills at Epiroc Surface division.

“That would bring two advantages: the helper would be freed up to do other things, and safety would be improved. The less time the helper has to have a suspended load over his head while operating the rig, the better.”

2

THE SOLUTION

AT THE TIME, Epiroc had a prototype design for a hands-free rod loader in the works. This option, designed for the Diamondback series drilling rigs, facilitates the loading and unloading of drilling rods throughout the drilling process. Epiroc had already made vast improvements to the design by shortening the loader arm, making it more stable and reliable.

“Having spoken to Bob Kent, we decided to make some custom changes just for Kent Well Drilling. We modified the driller’s console and also produced a hand-held control for the helper, so the helper can operate the rod loader out of harm’s way. As for the driller’s controls, the ultimate goal was to keep the hands-free rod loader moving in the background while the driller concentrates on drilling,” says Cody Green.

To improve safety, the drilling sequence was divided into three parts. At the push of the first button, the rod handler lowers into the rod bin, clamps a rod, picks up the rod to the vertical position, and then rotates the arm over to the rotary head. As a safety measure, once the rotary head threads on to the rod, the operator must push a release button to ensure it is now safe to release the clamps on the drill rod. Once the rotary head lifts away from the rod loader, the arm will return back to the home position, ready to pick up another rod.

“**SAFETY WAS THE** highest priority on this design, as we wanted automated features but enough control from the operator so he is aware of what is going on at all times,” says Cody Green.



3

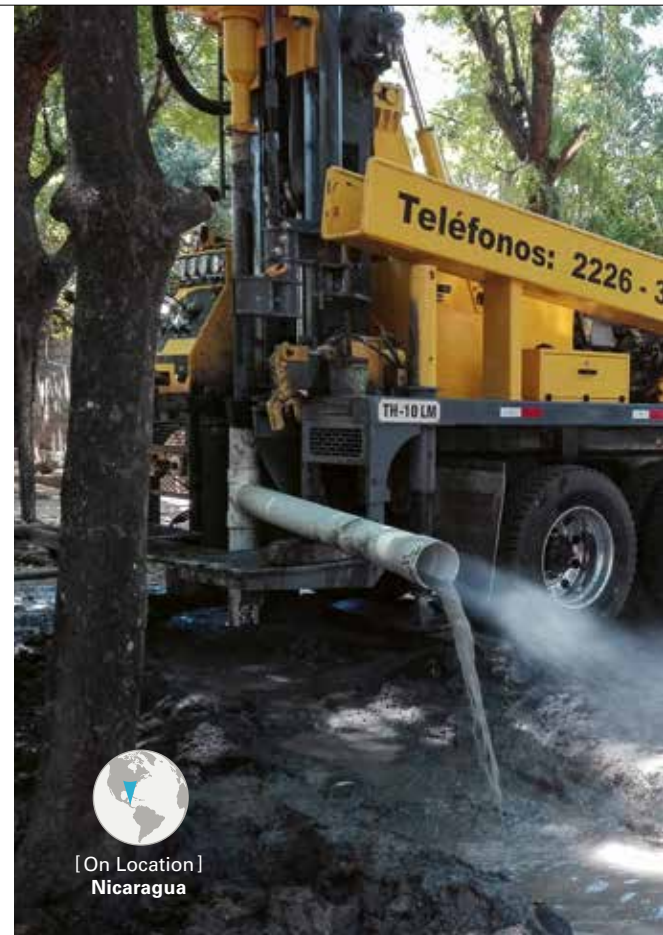
THE RESULT

KENTWELL DRILLING is very pleased with the functionality of the hands-free rod loader. The device does exactly what it was supposed to do: reduce the need for manual labor and improve safety.

“Cycle times are comparable to manual loading as the helper can perform other tasks while the hands-free rod loader is doing the heavy lifting. Kent Well Drilling is now able to complete a well safer and more cost effectively than ever before,” says Cody Green.

Once the system had been delivered to the customer, a local Epiroc service technician performed the start-up and trained Kent Well Drilling to use the hands-free rod loader optimally. Service provided from the Epiroc Milwaukee service center has been well received by the customer, and at the six month mark, Epiroc representatives from the Texas factory paid a visit to Kent Well Drilling to perform a check-up and service the rig.

“It’s been a real partnership,” says Cody Green. “Kent Well Drilling gave us feedback on the hands-free rod loader, and we were able to provide their company with a valuable solution.” ✕



[On Location]
Nicaragua

A calling to water

Access to clean water can be limited in Nicaragua, and HydroLOGICA wanted to do something about it. With an Epiroc TH10 LM water well drill in its arsenal, the company is making a difference.

Brandon Stone was a missionary in Haiti in 2010 when he experienced a calling of another kind: a calling to clean water.

He saw in Haiti – despite being surrounded by water – a lack of clean drinking water, causing one health crisis after another and limiting the dignity of people living there.

“I was a missionary and quickly found myself running a cholera clinic. I saw many people die, many kids, simply because they did not have access to clean water,” Stone says. After his mission work, he joined *Living Water International*, a non-profit that works on clean water projects. He worked as a driller and eventually in organizational management that took him to Nicaragua.

Stone says, “In 2014 I met Michael Montgomery, who had experience in

the oil and gas industry and wanted to change the water well industry through leadership and practical and technical excellence.”

MONTGOMERY AND STONE eventually formed *HydroLOGICA*, based in Nicaragua. “We formed a company to show people how it looks when you do it right.” Montgomery and Stone had previously encountered projects with inadequate equipment, materials and supplies, so consulting and educating as they drill wells and install pumps is integral to what they do.

“We train others how to drill water wells and install pumps. We want to share what we know with others, to tackle the global water crisis,” Stone says.



Brandon Stone
CEO,
HydroLOGICA

HydroLOGICA’s tagline is *The Brain of a Company & Heart of a Philanthropist*. They have a drilling crew and an office crew that also supports the supply chain by selling pumps, parts and drilling equipment so water wells are repaired in a timely

manner and safe water is a permanent reality.

THEY DO THIS in part with an Epiroc TH10 LM water well drill rig by their side. This long mast rig is designed for drilling up to 300 meters deep with air and mud.

“We sat down and asked ourselves, ‘What does Nicaragua look like geologically, and what would be the most appropriate rig for Nicaragua?’. Based on my experience working for nonprofits,”



↑
The TH10 LM has proven to be a workhorse for HydroLOGICA. “When you come in with the right equipment and the proper technique, you can drill a well that gives 50 gallons a minute so people not only have enough water for drinking, but now they can bathe and shower,” says CEO Brandon Stone.

Stone says, “I wanted a rig that could get to difficult locations. It was basically about putting the biggest rig in the smallest package with long-term durability. We wanted a simple rig. Don’t get me wrong, I love electronics but electronics in the middle of nowhere? It’s not a good mix.”

SUCH A BASIC THING as clean water becomes special when it is new to a community. In Las Palomas, for instance, a 2019 study by *OneWorld Health* measured the effectiveness of a new well completed by HydroLOGICA. Local residents’ stool and urine were tested before and after the new well. There was a 76.6 percent decrease in the prevalence of parasitic cysts in the study population. The study also found a 100 percent improved bacterial flora. ✕

Epiroc has selected eight relevant UN Sustainable Development Goals, connecting them to the company’s own goals. In each issue, we highlight one of them.



Water for All is Epiroc’s main community engagement. The non-profit organization was founded back in 1984 by two employees and has almost 10 000 members worldwide.

PURSUING CLEAN WATER SINCE 1984

➤➔ The global Sustainable Development Goals (SDG) formulated by the UN are also guiding Epiroc’s sustainability work. We take a closer look at goal 6.

WHILE SUBSTANTIAL PROGRESS has been made in increasing access to clean drinking water and sanitation, billions of people – mostly in rural areas – still lack these basic services. For instance, worldwide, one in three people do not have access to safe drinking water.

The challenge behind SDG goal 6 – Ensure availability and sustainable management of water and sanitation for all – is something that Epiroc has put emphasis on for many years.

“Epiroc’s main community engagement is Water for All,” says Mattias Olsson, Senior Vice President Corporate Communication. “It’s a non-profit organization founded back in 1984 by two Epiroc employees (Atlas Copco employees at the time). Since 2018 Epiroc and Atlas Copco have co-run the organization, and it has almost 10 000 members worldwide. Water for All is driven on the local level by our employees on a



Mattias Olsson
Senior Vice President
Corporate Communication,
Epiroc

voluntary basis. The work is financed through employee donations that are matched by the Epiroc and Atlas Copco with twice the amount.”

Epiroc still manufactures water well drilling equipment, so the connection has always been there. A guiding principle for Water for All is that access to clean water is a human right and the foundation for improved living conditions.

“We’re proud of Epiroc’s contribution, and we strive to further develop Water for All so that we can support more projects and help even more people get access to water and sanitation,” says Mattias Olsson. ✕

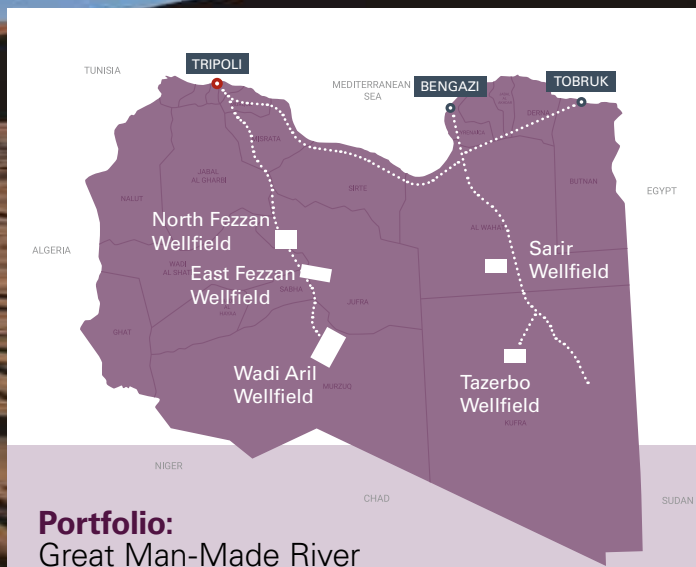
More www.epirocgroup.com/un-sustainable-goals

BLAST FROM THE PAST YEAR 1989

Innovative products and a wide array of customers: Epiröc is a new company with a long and rich history, dating all the way back to 1873. In each issue of Mining & Construction, we take a glimpse in the rearview mirror.

☑ Gustaf Höök
📷 Shutterstock

The Great Man-Made River (GMR) was described as the largest irrigation project in the world, the Libyan government proudly proclaiming it "the Eighth Wonder of the World!"



Portfolio: Great Man-Made River

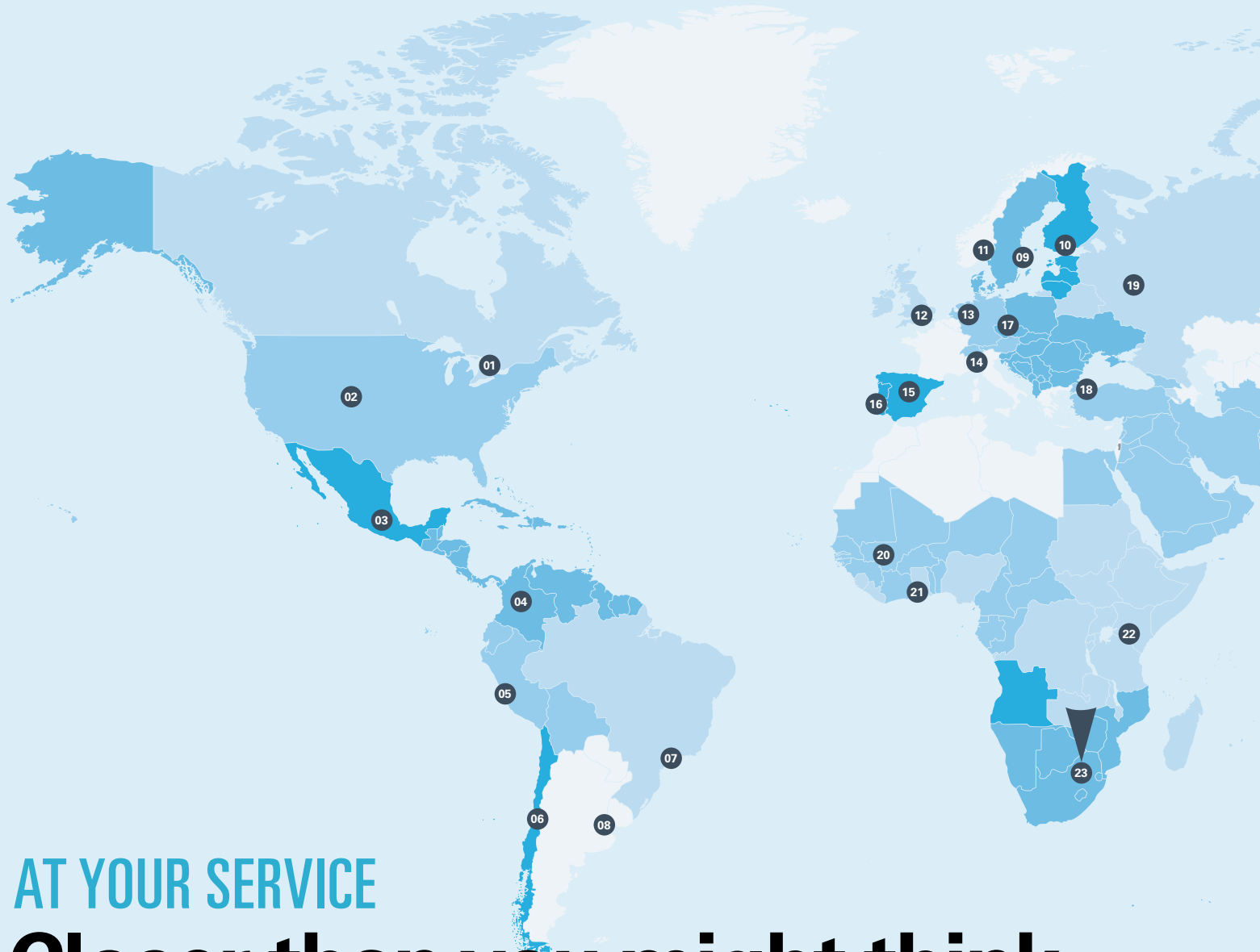
IN THE 1950S, during exploration drilling for oil in the Kufra district in Libya's southeastern desert, something else was discovered. Water – lots of water. Subsequent analysis indicated that this find was part of the **Nubian Sandstone Aquifer System**, a vast reservoir of “fossil water” that is anywhere from 10 000 to 1 000 000 years old.

Initially, the Libyan government planned to set up large-scale agricultural projects in the desert, but plans were changed in the early 1980s, and designs were prepared for a massive network of pipelines to the coast. Construction of the

Great Man-Made River (GMR) began in 1984 with Dong Ah Consortium as the primary contractor, who in turn selected Atlas Copco ROC 712HC rigs for most of the drilling operations. Trenches were almost as large as a bench – 10 meters wide and 7–8 meters deep.

The GMR was originally conceived as having several arms, or phases, though not all have been built and some may never be. Nevertheless, since 1991 the project has supplied much-needed irrigation and drinking water to populous cities and farming areas in Libya's northern region.

More www.bit.do/manmaderiver



AT YOUR SERVICE

Closer than you might think

OUR CUSTOMERS ARE located all over the world and so are we. There is always an Epiroc office to turn to, making us truly local. At the same time, we are a global enterprise with worldwide resources. We have Customer

Centers in 32 regions. In each one, there are one or more Service Centers.

All this supports our goal: Count on us to listen, collaborate and deliver the right solutions for you.

01 Canada Toronto	07 Brazil São Paulo	13 Europe 1 Essen	18 Turkey & Middle East Istanbul
02 USA Denver	08 Argentina Buenos Aires	14 Southern Europe & Northern Africa Milan	19 Russia Moscow
03 Mexico Mexico City	09 Sweden Stockholm	15 Spain Madrid	20 Mali & Burkina Faso Bamako
04 CVCA Bogota	10 Finland Helsinki	16 Portugal Lisbon	21 Ghana Obuasi
05 Andean Lima	11 Norway Oslo	17 Central Europe Prague	22 Eastern Africa Nairobi
06 Chile Santiago	12 UK & Ireland Hemel Hempstead		



[In focus]

Johannesburg, South Africa

Hello there! What's happening in South Africa?



George van Zyl
Workshop Manager,
Epiroc South Africa

EPIROC'S WORKSHOP in South Africa is located in Jet Park, in the eastern part of the capital. The state-of-the-art facility boasts a total of 3 500 square meters of workshop space. Here, the service teams cater to Epiroc customers from all of Southern Africa. Work-

shop Manager **George van Zyl** elaborates.

What kind of services do you perform?

"We have two workshops; the main one has 12 work stations where we work with full machine overhauls, repairs and machine segments such as towers, track frames and power packs; and then there's a components shop where we tend to component rebuilds like powerheads, compressors, rock drills, pump drives and feed assemblies."

How are things working out? Are the customers satisfied?

"Very much so. The feedback has been really good. I put this down to our ever-expanding product range, as well as our team. We have a good mix of skills, and people are very motivated. The fact that we are on track towards doubling last year's revenue tells us that we do a good job."

What about challenges and future plans?

"We're in the process of finalizing a dedicated test center, a first for Epiroc on a global level. It includes a brake test ramp for our underground equipment, as well as a dedicated drilling and automation area. We'll use this space to commission customer equipment, but also to showcase our machine capabilities." ✕

23 Southern Africa
Johannesburg

24 India
Pune

25 Central Asia
Nur-Sultan

26 Mongolia
Ulaanbaatar

27 Gr. China
Nanjing

28 Southeast Asia (South)
Jakarta

29 Southeast Asia (North)
Bangkok

30 South Korea
Seoul

31 Japan
Yokohama

32 Australia
Perth

Find Epiroc
in your country:

www.epiroc.com



Big step underground

To enable Minetruck Automation, each truck is equipped with two lasers, an odometer and a unit that measures accelerations and turning speeds.

» With Minetruck Automation, Epiroc makes big advances in underground mining. Software Developer **Torkel Trampe** provides insight into how the development team went about their work.

What is the Minetruck Automation solution?
 “Basically, it’s software that allows the automation of mine trucks. Each machine is fitted with two lasers, one in front and one in back, that measure the surroundings. There is also an odometer to measure the driving distance, as well as an IMU, inertial measurement unit, that measures accelerations and turning speeds – so we can see how the machine moves. All communication takes place via WiFi.”



Torkel Trampe
 Software Developer,
 Epiroc

ual operation. Because the machine can be operated remotely, customers can also cut down on a lot of work hours, since the operator doesn’t have to travel to and from the site where the machine is located. Minetruck MT42 is the first truck to be automated, and other models will follow.”

What challenges did you come across in the development phase?

“Many customers will want to operate the truck both manually and automatically and so we wanted to make that possible. For the manual control module, we partnered with an external supplier and then put a lot of work into integrating the two systems. There are lots of safety requirements that have to be met, and it is critical that the mine truck is as flexible and user-friendly as it is safe.”

What is the biggest customer benefit?

“Minetruck Automation improves both safety and productivity. The machine can be used in environments that may not be fully secure for man-

Minetruck Automation in brief

- Control of Minetruck operation via WiFi from any remote location
- Manual, tele-remote and autonomous driving
- Common operator station as for Scooptram loaders
- Possible to operate several Minetruck and/or Scooptram vehicles from one operator station.

More www.epiroc.com/minetruck-automation