HARD AS DIAMONDS • New sustainability goals
Fighting cholera • **ALGORITHMS BOOST RECYCLING**
PARTNERSHIP WITH GOOGLE • Underground analytics

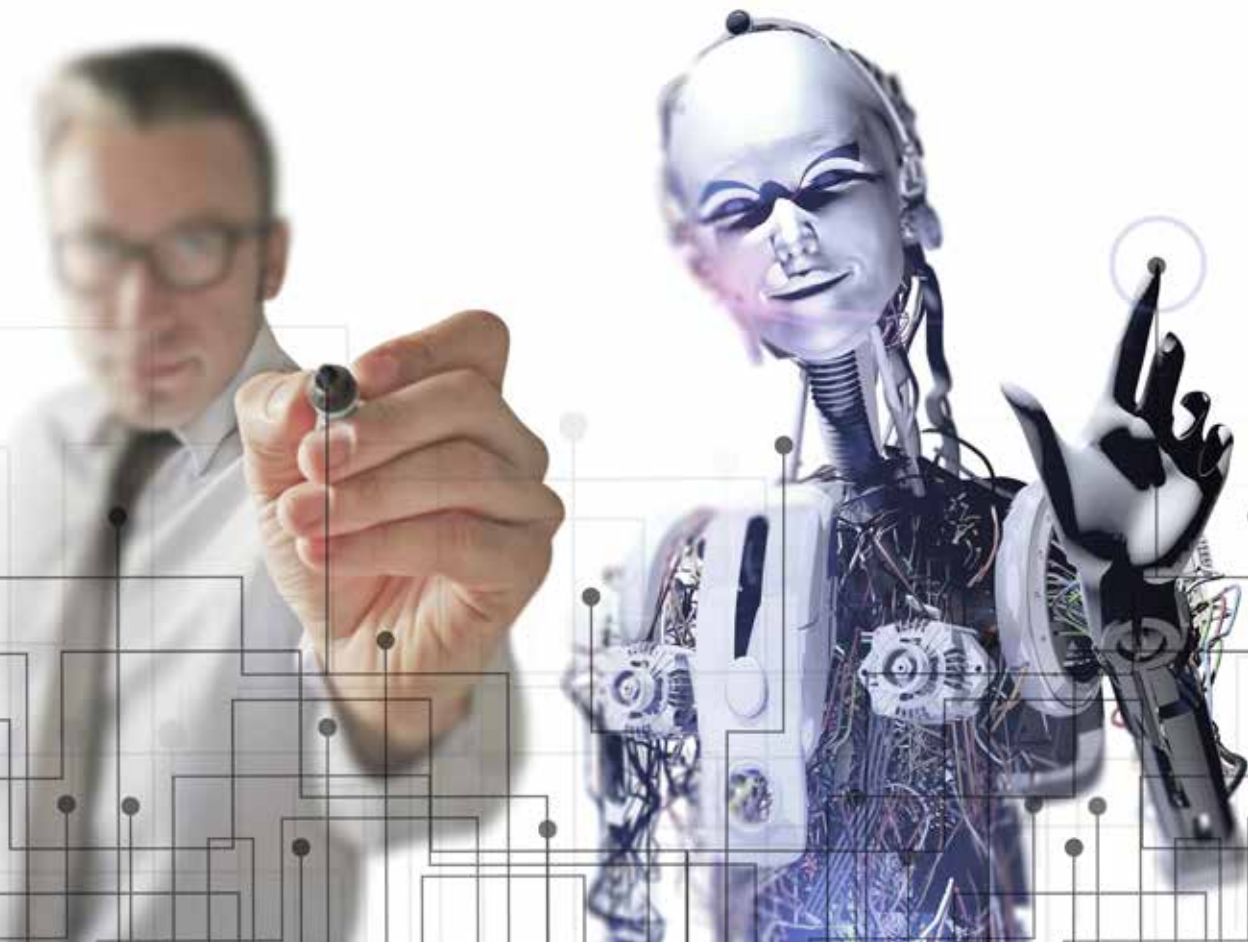
MEET SANDVIK

#2-2019

SANDVIK GROUP MAGAZINE

AI EXTENDS A HELPING HAND

Artificial Intelligence and digital technologies are transforming industries, business models and partnerships. Sandvik is leading the way.
PAGE 10



DIGITAL MINING
CANADA. A new acquisition strengthens Sandvik's offering in automation and connectivity underground.
PAGE 8

GAMING
FINLAND. Sandvik's eSports team won the silver medal at the Aura Quest gaming tournament in Turku.
PAGE 7

INTERVIEW
ULRIKA WEDBERG. Sandvik's new Head of Sustainable Business presents new 2030 sustainability goals.
PAGE 26

COMMUNITY
ZAMBIA. How upgrading sanitation facilities prevents disease and allows children to go to school.
PAGE 24

AI
INDIA. Sandvik helps Hindustan Zinc undertake a digital transformation at its Sindesar Khurd Mine.
PAGE 17

SHARP TOOLS
CHINA. An award-winning cutlery producer has chosen Sandvik steel for its premium knives.
PAGE 32

CONTENT #2-2019

Follow us on social media and find more stories at: home.sandvik/meetsandvik

MEET SANDVIK: A Sandvik Group magazine
PUBLISHER RESPONSIBLE UNDER SWEDISH PRESS LAW: Jessica Alm
EDITOR-IN-CHIEF: Marita Sander **PRODUCTION:** Spoon Publishing AB
WRITERS: Jonas Rehnberg , Cari Simmons, Danny Chapman, Peter Wiklund
PRINT: Falk Graphic **DATE OF PRINT:** September 2019
Published in Swedish and English, in printed form and at our website home.sandvik
EMAIL: marita.sander@sandvik.com.
PHOTO: Sandvik, Samuel Unéus, Alamy, Shutterstock, iStock

A NEW TYPE OF INTELLIGENCE

IN THIS ISSUE we take a deep dive into the subject of Artificial Intelligence (AI) and how this will affect the future and our industry. AI gives us fantastic opportunities to create new solutions that improve our customers' businesses. In the mining industry, we can analyse large amounts of data from mining equipment and applications to improve availability and use. It is also possible to predict the need for maintenance, which improves productivity and employee safety while reducing costs.

We talk about how we work with Google Cloud to simplify the programming of machines when doing metalwork, and with the help of AI we can reduce programming time by up to 94 percent. We work with the university in Skövde, Sweden and the steel company SSAB on developing more efficient and sustainable steel production, where our work includes increasing the proportion of recovered material.

Please also read about our new financial and sustainability goals launched earlier this year. These are ambitious and challenging targets that we intend to meet.

In May we announced that we are initiating an internal separation of the Sandvik Materials Technology business area, which will give it better opportunities to focus on its strengths. I am convinced that this will provide Sandvik Materials Technology with the prerequisites for prosperous long-term development and boost the prospects for profitable growth.

Björn Rosengren, President and CEO

DIAMONDS ARE FOREVER

Sandvik has created the first-ever 3D-printed diamond composite. While this diamond does not sparkle, it is perfect for a wide range of industrial uses. The new process means that this super-hard material can now be 3D-printed in highly complex shapes, revolutionizing the way industry uses the hardest natural material on the planet.

Diamond is a key component in a wide range of wear-resistant tools in industries such as mining and drilling, machining and medical implants. Synthetic diamond has been produced since 1953, but the material is so hard and complicated to machine that it has been almost impossible to form complex shapes with it.

Sandvik's patent-pending breakthrough entails printing in a slurry consisting of diamond powder and polymer using a method called stereolithography, where complex parts are produced layer by layer using ultraviolet light. The result displays extremely high hardness, exceptional heat conductivity, low density, very good thermal expansion and excellent corrosion resistance.

Watch a film on how the 3D-printed diamond composite was produced on https://www.additive.sandvik/en/diamond/

NEWS

NEW PODCAST! In the "Meet Sandvik pod #4: Digital Manufacturing", Sandvik's Petra Sundström and Pernilla Jonsson, Head of Ericsson Consumer & Industry Lab, discuss how digitalization, AI and Internet of Things are changing the landscape for manufacturing companies. Find it at Spotify, iTunes, Acast, Stitcher or Tunein by searching "Meet Sandvik".

4 **acquisitions.** Sandvik made four acquisitions during the first quarter of 2019; Wetmore and OSK (round tools), Artisan (battery technology) and Newtrax (wireless connectivety).

NEW BUSINESS AREA PRESIDENT

LARS BERGSTRÖM, PREVIOUSLY Senior Strategy Advisor and Vice President Sandvik Machining Solutions, has been appointed Acting President of Sandvik Machining Solutions. He has previously been the CEO of BE Group and the CEO of KMT Group. He also has more than 20 years' experience from ABB. Between 2011 and 2018 he was the President of Seco Tools.

"Lars Bergström is truly one of our most experienced leaders. I'm confident that he at this point is the best to manage the Sandvik Machining Solutions business area. With his understanding and engagement in the business area's strategy and action plans I trust that he will ensure a solid performance of the divisions in different market situations," says Björn Rosengren, President and CEO at Sandvik.

Lars Bergström is the new head of business area Sandvik Machining Solutions.

CO_2 EMISSIONS REDUCED BY 92 PERCENT

ALL INTERNAL VEHICLES at the Sandvik industrial area in Sandviken are being refueled with Hydrated Vegetable Oil (HVO100) instead of diesel. This change reduces carbon dioxide emissions from internal transport by as much as 92 percent or 2,200 tons.

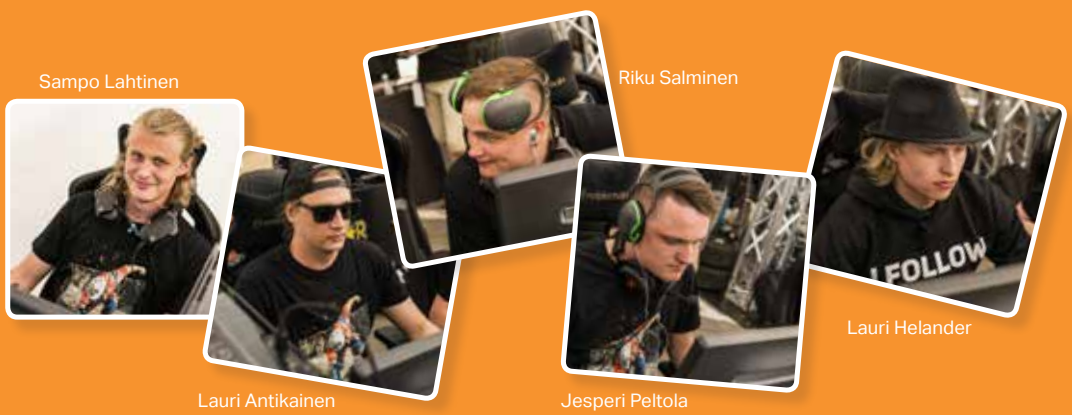
"To contribute to Sandvik's new sustainability goal to halve emissions of CO_2 by 2030, we needed to find new solutions with higher impact," says Roland Andersson, Manager Internal Transportations Sandviken. "We have 148 diesel-powered vehicles in our fleet that use 800,000 liters of fuel per year. By switching to biofuel, we contribute to major improvements for the environment, both in terms of emissions of carbon dioxide, particles in air and NOX gases."

HVO100 is made of residual products, mainly from the food industry and restaurants, and the name means that the fuel consists of 100 percent HVO.

SANDVIK VICTORIOUS AT THE ESPORT LEAGUE

THE SANDVIK ESPORT TEAM rocked the Aura Quest gaming tournament in Turku, Finland in June, 2019, and won the silver medal, playing Counter-Strike: Global Offensive.

eSports (short for Electronic Sports) is professional competitive gaming and the eSport industry is growing fast. According to the World Economic Forum, eSport is estimated to be near a one-billion-dollar business with a global audience of over 300 million fans.



The successful Sandvik Team consisted of Lauri Helander, Lassi Kärkkäinen, Sampo Lahtinen, Lauri Antikainen, Jesperi Peltola, and Riku Salminen. They all work at the Sandvik production plant in Tampere, Finland.

BJÖRN ROSENGREN TO LEAVE SANDVIK

BJÖRN ROSENGREN, President and CEO of Sandvik, has informed the Chairman of the Sandvik Board that he intends to resign and leave the company as of 1 February 2020. The Sandvik Board of Directors has initiated the work to appoint a new President and CEO for Sandvik.

"Björn Rosengren has, since he joined Sandvik in November 2015, established a solid decentralized business model for the company and made the organization more flexible and efficient. The Board is very grateful for his and all the employees' work during these years. We will initiate the process to assign a very experienced and competent industrial leader that can succeed Björn in the role as President and CEO and continue to develop the company even further", says Johan Molin, Chairman of the Board for Sandvik.

"This has not been an easy decision. Sandvik is a great company with a lot of future potential and I will continue to lead the organization with a strong commitment until end of January", says Björn Rosengren.

NEW SUSTAINABILITY GOALS

SANDVIK IS RAISING the bar in sustainability by launching four new ambitious 2030 goals.

The goals adress four areas; circularity, climate change, safety and fair play. "We need the dedication and commitment from all our employees if we are to achieve these challenging goals. Sandvik will be innovating for a sustainable future that we can all be proud of and that will present new opportunities for both us and our customers. I feel confident we will achieve this together," says Ulrika Wedberg, Head of Sustainable Business at Sandvik.

Read more in an interview with Ulrika Wedberg on pages 26-28.

DIGITAL MINING COMPANY ACQUIRED

Newtrax's solutions improve safety and efficiency in underground operations.

SANDVIK HAS ACQUIRED privately-owned Newtrax, based in Montreal, Canada, a supplier of leading technology in wireless connectivity to monitor and provide insights on underground operations, including people, machines and the environment.

"By including Newtrax into the Sandvik family we further strengthen our leading position in areas related to automation and digitalization," says Henrik Ager, President of business area Sandvik Mining and Rock Technology.

Sandvik's leading suite of digital tools for analyzing and optimizing mining production and processes, coupled with Newtrax's leading technology in wireless IoT connectivity, will create a powerful, streamlined digital solution to improve safety and efficiency in underground operations.

SANDVIK LAUNCHES ONLINE SELF-SERVICE PORTAL

SANDVIK IS LAUNCHING E-Track, a new self-service online platform that will allow customers to access information regarding round bar, hollow bar, pipe, flanges and fittings.

The new platform, an industry first among steel producers, provides customers with a personalized dashboard overview. Until now, the retail sector has been the main driver in adopting online sales and e-commerce, with industrial manufacturers often lagging behind.

The new online plattform lets customers place orders and buy products online. See etrack.materials.sandvik

"At the end of the day, I still believe that people buy from people in our business and the digital option is only there as a complement and support," says Johan Josefsson, Sales and Marketing Manager at Sandvik. "The new online platform is simply another way for us to move closer to our customers and it reflects the digitalization that is transforming our global economy. We want to be available 24/7 on any device, anywhere and anytime – that's the modern world we are living in."

The initial scope will be limited to customers based in Europe, with a few exceptions. The focus is on standard stock items that are often reordered on a regular basis.

SMASH-PROOF GUITAR AUCTION SUPPORTS SCHOOLS IN AFRICA

OVER 40 MILLION viewers saw Yngwie Malmsteen do his utmost to smash Sandvik's unbreakable guitar in the latest film in the Sandvik brand campaign Let's Create. Now the guitar has been auctioned out, which brought in USD 25,000. Sandvik donates the money to the NGO Engineers Without Borders (EWB), to be used for school projects in Tanzania.

The new owner is venture capitalist Pär-Jörgen Pärson who has also written the management book "Heavy Metal Management" and served for nine years on the Board of Directors of Spotify.

"Yngwie J. Malmsteen, one of my foremost guitar heroes, was just like me born in 1963, I think this beast of a guitar fits nicely in my collection theme and it's indeed fantastic to be able to at the same time support the important work that EWB does."

Watch the film on home.sandvik/letscreate

Pär-Jörgen Pärson bought Sandvik's unbreakable guitar at a charity auction.

FOCUS

AI CREATES A NEW INDUSTRIAL AGE

Digitization has been as revolutionary for industry as the introduction of electricity. Now artificial intelligence (AI) and big data are generating new opportunities – and a number of challenges.

Digitization lays the foundation for entirely new business models, sometimes simultaneously throwing out the old models.

IN THE "Artificial Intelligence in Europe" report published by consultancy firm EY, some 57 percent of the companies surveyed expect AI to have a significant or very significant impact on business areas that are "entirely unknown to the company today," and 65 percent expect AI to have a significant or very significant impact on their core business.

"The opportunities generated by digitization in general are game changers in most sectors, which is one reason why digital solutions have gained a strong foothold in different parts of society," says researcher Daniel Langkilde, who develops AI solutions for Scania, Volvo and other major companies.

Digitization lays the foundation for entirely new business models, sometimes simultaneously throwing out the old models. A new model could be based on servitization, with revenues being secured directly by the performance of the products. This creates an incentive for suppliers to constantly optimize the outcome, which has also become easier through digitization, Langkilde explains. "When the machines are

"More and more things are being equipped with sensors, giving us more data."

equipped with sensors that measure a range of different parameters, it's possible to schedule maintenance to secure operations," he says. "But there is also a possibility of using sensor data and AI to gain a clear picture of the customer's actual usage and to suggest methods or equipment that can improve productivity."

THE DATA VOLUMES generated can also be analyzed and used as a basis for developing the product range even further.

Petra Sundström, Head of Digital Business Development at Sandvik's Crushing & Screening Division, emphasizes that new technologies per se are not something new. What's new is that the digital technologies we see today, like AI and Internet of Things (IoT), serve as a glue that connects several different areas.

"Previously, we could basically produce hardware – unique and highly skilled products – and then leave them with the customers. Now we have to keep doing that, and at the same time understand that the products need to tie into services, to the aftermarket, to brands, to customers and to a lot of different stakeholders. It's becoming one big solution product."

Magnus Ekbäck, Vice President Strategy and Business Development at Sandvik Coromant, summarizes the main trends driving the digitization of the manufacturing industry: "More and more things are being equipped with sensors, giving us more data. At the same time the connectivity has improved fast and the demand for using data in the decision-making process has increased quickly. These three factors together are important in explaining the automation of the manufacturing industry that we see today; they are the enablers."

"THE TERM 'ARTIFICIAL INTELLIGENCE' can be misleading, because computers that make calculations and analyses are actually nowhere near intelligent in the usual sense of the word," notes Langkilde. "But they can learn to see connections by being fed large volumes of data, and the more data they receive, the better their analyses become."

Daniel Langkilde develops AI solutions for major industrial companies: "The opportunities generated by digitization are game changers in most sectors."

"AI is about developing the capacity of machines by equipping them with advanced algorithms and feeding them with huge amounts of data."

Jan Ekstrøm at IBM Watson IoT Europe agrees with Langkilde. He sees AI as "augmented" rather than "artificial" intelligence. Industrial developments are not focusing on any form of AI in which machines will be taking over the world as soon as they get smart enough, he says, adding:

"That's just science fiction. AI is about developing the capacity of machines by equipping them with advanced algorithms and feeding them with huge amounts of data. It's not at all the same as intelligence in the traditional sense; it's more a way of calculating complex relationships, making life simpler, more efficient and safer for companies and the people working in them."

SOME OTHER OPPORTUNITIES that AI can offer are monitoring processes to see where there is potential for making things more efficient and starting to use collaborative robots – robots that work with people or with each other. There may also be more strategic areas of use, such as detailed scenario planning or researching a large number of possible design variants of a new product.

These opportunities, however, present companies with brand new challenges: "Going from being a product supplier to a service provider, with all that this entails in terms of everything from revenue flows to corporate culture, is a major challenge. Another challenge is knowing exactly which solutions could drive business. A regular industrial company does not currently have this kind of expertise. There will be a powerful tug-of-war for skills in the labor market of the future," Langkilde concludes. ■

AI BRINGS BUSINESS BENEFITS

The "Artificial Intelligence in Europe" report, conducted by EY on behalf of Microsoft, is based on input from leaders in artificial intelligence (AI) in 277 companies across 15 countries in Europe. 71 percent of the companies surveyed said that AI was considered an important topic at executive management level. They indicated that they expected the biggest impact to come from "optimizing operations," with "engaging customers" a close second. Some 89 percent of respondents said they expected AI to generate business benefits in the future by optimizing their companies' operations, and 74 percent said they expected AI to play a crucial role in engaging customers.

OptiMine® Analytics transforms data into process improvements using the analytics functions of IBM Watson IoT.

NEW CHALLENGES UNDERGROUND

Mining and rock excavation underground face the challenge of improving both productivity and safety. AI can be part of the solution.

TODAY THE MINING industry is under increasing pressure to supply more minerals to meet the needs and expectations of a rapidly rising world population. This often requires extracting from greater depths, which in turn can create challenges when equipment needs servicing or repair.

"Identifying maintenance requirements before something breaks down enables us to make major direct savings in costs and time," says Patrick Murphy, President of the Rock Drills & Technologies division at Sandvik.

That is why Sandvik is working with IBM to introduce advanced analytical cognitive data processing and modeling based on data generated by sensors on loaders and trucks.

"OptiMine® Analytics, partnered by

"Data-driven maintenance is by far the best method."

IBM Watson IoT [Internet of Things] solutions, offers our customers a more complete view of their operations for smarter, safer and more productive working," Murphy says.

THE PRINCIPLE IS that OptiMine® Analytics transforms data into process improvements using the analytics functions of IBM Watson IoT. This information management system allows mining companies to combine equipment and application data from disparate sources in real time, analyzing patterns in the data. Everything is focused on improving availability, utilization and performance.

Jan Ekstrøm at IBM also highlights preventive maintenance as a key to more cost-efficient mining.

"If you organize maintenance into a specific plan, you will always know if you have done too little [because] you get problems with your equipment," he explains. "But you won't know if you've brought in too much maintenance, which, of course, isn't cost-efficient either, because all maintenance costs both time and money. That's why data-driven maintenance is by far the best method."

ONE GOAL OF preventive maintenance is to minimize the number of emergency shutdowns and so prevent the huge costs that arise from such shutdowns. In addition, reducing the risk of emergency shutdowns also improves operational safety.

"Certain mechanical breakdowns can

Mining companies combine equipment and application data from disparate sources in real time, analyzing patterns in the data.

The system automatically triggers an alarm if there is any indication of hazards in the working environment.

result in personal injury, and it may take considerably more resources to repair a vehicle in a hard-to-reach location than if it can be parked in a workshop as part of a planned maintenance scheme," says Ekstrøm.

Providing all employees with sensors that continuously measure different aspects of the environment is another solution that can improve underground safety. The system automatically triggers an alarm if there is any indication of hazards in the working environment.

"This type of solution requires expanded communication networks that are able to link together activities below and above ground. It's even more of a challenge now that mining is taking place at lower and lower levels."

TO MEET THIS challenge Sandvik has acquired Newtrax, a digital mining technology provider. The acquisition will help Sandvik create conditions for establishing an IoT network in a range of mining environments and for obtaining real-time information from the devices and equipment used in mines.

Sandvik and IBM clients such as Petra Diamonds and Barminco are using IoT to reduce miner exposure to hostile work environments and to increase safety. OptiMine® Analytics is scheduled to be used by Vedanta Zinc International's Black Mountain Mining (BMM) operations in South Africa's Northern Cape Province, to accelerate data-driven operations for safety, efficiency and productivity for trucks, loaders and drills.

ADDITIONALLY, HINDUSTAN ZINC, one of the world's largest producers of zinc, lead and silver, has tapped Sandvik to implement a major digital transformation at its Sindesar Khurd Mine in India. The aim is to ensure that all required infrastructure and platforms can achieve world-class mining safety, efficiency and productivity. ■

AI SUPPORTS AGILE WORKING METHODS

The development of AI solutions is creating a closer relationship between supplier and customer, with increased transparency and mutual exchange.

AI (ARTIFICIAL INTELLIGENCE) is opening up many opportunities for both producers and suppliers. Using AI to optimize maintenance and refine processes is increasing productivity and sustainability and at the same time improving safety. In addition, AI is driving increased automation, for example through the use of collaborative robots, which also increases productivity and lowers costs.

For suppliers, the new AI solutions can provide insights into how their products are used, and this information can be used not only in product development but also in advising customers.

INDUSTRIAL COMPANIES WANTING to develop and benefit from AI must be capable of working in ways that are different from traditional approaches and strategies. In the

Listen to a podcast where Petra Sundström and Pernilla Jonsson from Ericsson talk about the opportunities presented by AI: home.sandvik/meetsandvik

"Higher efficiency means better productivity."

future, producers will likely launch products earlier, before they are fully developed and tested, allowing users earlier access to the products and services and a role in a collaborative final development of the solution that more precisely fits the user's needs.

"We have to be much more open to the market," says Petra Sundström, Head of Digital Business Development. "It's no longer possible to have the development process shrouded in secrecy. We must start talking about challenges, not just about solutions, if only because that's the way we can attract the skills that we'll be depending on going forward."

IN THE MINING sector, there are clear incentives for exploiting the potential of AI to the full, she says.

"For a start, it's obvious that a whole lot of money can be saved. It's a basic necessity to be able to prevent unexpected stoppages in above-ground processes, which, if they happen, can cause costs running into millions for every hour that passes."

It is also possible to perform AI-supported analysis of, for example, various stages of production and the final products so that various processes can be optimized and streamlined.

"Higher efficiency means better productivity, of course, but at the same time there is an important sustainability side to this. Increased efficiency enables us to save on resources such as electricity and water, which is an extremely important goal to aim at."

Development and implementation of AI solutions provides Sandvik with the ability to offer customers increasingly detailed and appropriate advice on how certain operations could be performed more efficiently and how their machines can be used optimally in specific situations.

"This, too, requires a certain adjustment on our part," says Sundström. "Instead of delivering pure figures into customer systems, we undertake to contribute more directly to their productivity. This means closer collaboration and greater responsibility, which may be felt to be a big step to take. But it's the right way to go."

SUNDSTRÖM SAYS THE increasingly strong partnership follows on naturally from the agile development model. "You can look at it this way, that the solution we are selling is like a small snowball that we go on rolling so it gets bigger and bigger. And the customer has to be with us and at least show us the direction. Image-based technology may become an attractive line of development in AI in the future. "A specially designed, high-technology camera may be a highly useful type of sensor," Sundström says. "Image recognition is a fast-growing sector right now. Combined with machine learning, this may find applications all the way from personal safety to flow optimization."

BUT FOR GROWTH to make really great strides in the future, some of the skepticism surrounding AI will have to be dispelled. "There are still some who believe that AI will 'take our jobs,'" says Sundström. "Admittedly, some jobs will disappear, but new ones will be created, and the shift will be gradual. This development will open up an infinite number of opportunities in most areas of society. At the same time, it's important to be aware that AI has many different sides to it. It isn't a single solution but rather an umbrella concept that embraces a series of different applications." ■

Sandvik's cloud-based solution has made it possible for small companies to gain access to digital tools that have previously been the domain of the biggest market participants,

PARTNERSHIP FOR EFFECTIVE PROGRAMMING

Partnership is the way forward when it comes to modern digital tools for industrial production. Sandvik is working in close partnership with Google Cloud to create an artificial intelligence solution for faster and more secure programming of metalworking machines.

NO MAN IS an island, and this is particularly true when new digital solutions are to be developed and customized for the needs of a business. The Sandvik Applied Manufacturing Technologies division applies this philosophy in its work to produce applications that can be used in various stages of metalworking.

One example is a partnership with Google Cloud, which focuses on facilitating the programming of metalworking machines.

"This is a completely new way of working with programming," says Hugo Nordell, Vice President of the Center of Digital Excellence (CODE) at Sandvik.

CODE is an R&D organization that has been established with the aim of promoting software-based product development for Sandvik's customers.

"The actual processing is only one part of the customer operations," says Nordell. "They have to put a lot of time into such things as design, planning, programming, preparation, verifica-

"You can reduce the programming time by up to 94 percent for simple components."

tion and evaluation in order to ensure that the business keeps running. In all these stages, it is possible to identify time- and cost-savings using digital solutions."

One newly developed solution is the programming tool Prism™, where the programming does not take place in the interface of the processing machines, but rather in a user-friendly and easily comprehensible solution on an iPad.

"One of the starting points has been the ability to work in 3D the whole time, instead of being forced to take a detour via 2D drawings, which have to be manually translated into 3D prior to processing. This is a major difference for the user. It is considerably less complicated and provides obvious opportunities for saving a great deal of time."

USERS INSERT A 3D model of what they want to produce and state the material and machine they want to use. Prism analyzes the geometry and proposes the processing methods, tools and cutting data that are optimal, based on the specific conditions.

"The system calculates cutting data, and as a user you avoid significant manual steps that do not create value. We have come to the conclusion that you can reduce the programming time by up to 94 percent for simple components."

In the digital "engine" that drives Prism, there are a number of different functions with artificial intelligence and machine learning, including solutions for the automatic recognition of which geometry can be processed with which cutting method, and which tool path is the best for minimizing machining time.

"This is a cloud-based solution," says Nordell, "that has made it possible for small companies to gain access to digital tools that have previously been the domain of the biggest market participants, which are those with major investment resources."

THIS IS WHERE the partnership with Google Cloud comes into the picture.

"We have our own team of 15 people who work with development in data analytics, but to develop scalable solutions, it's necessary to work in partnership. For many companies, this may be a new way of working, one with which they are unaccustomed. It requires transparency and to add value yourself, but it is an absolute must in the current situation, to enable more rapid delivery of value to the customer." ■

Hugo Nordell
Vice President of the Center of Digital Excellence (CODE) at Sandvik.

INCREASED EFFICIENCY THROUGH PRODUCTION ANALYSIS

Sandvik is making use of artificial intelligence to improve its steel production processes, thereby reducing both its costs and its environmental impact.

THE RESEARCH PROJECT Swedish Metal, in which business area Sandvik Materials Technology is collaborating with the University of Skövde and steel company SSAB, was launched in spring 2018. With the help of artificial intelligence (AI), big data and machine learning, the project team is carrying out extensive production analysis work. The goal is a more efficient and sustainable steel production process.

Sandvik focuses on the analysis of production data to better map the content of internally recycled material. The aim is to increase the proportion of recycled material used – and reduce the need to add virgin materials – during steel production.

"In the current situation, we cannot utilize all the groups of recycled steel to the maximum, because we have to take into account the uncertainty surrounding their composition and distribution," says Magnus Josefsson, responsible for raw material optimization at Sandvik.

SANDVIK IS SENDING large amounts of data from the steelworks process to researchers at the University of Skövde for analysis.

"The basic idea is to study the connection between what raw materials we introduce into the molten iron and what steel composition is output, but we also use secondary data such as electricity use and oxide content in the slag. We hope that the new algorithms will be able to detect metal losses and material contaminants between different batches of molten iron and thereby isolate the effects that are due to unexpected content in the raw materials."

An important goal of the analysis work is to fine-tune the existing raw material optimization algorithms that Sandvik uses in its production process.

It is expected that this will make it possible to optimize raw material costs without compromising on steel quality.

"The material that we currently melt consists of about 45 percent internally recycled steel and residual products and 35 percent purchased scrap," says Josefsson. "The rest is purely metal alloys. We expect to be able to find better ways of utilizing the recycled material so that it is possible to reduce the proportion of alloys without risking poorer quality in the final product."

THE PROJECT IS scheduled to continue for three years. Josefsson expects that an initial result will be a clear snapshot of how the raw material mix can be improved in order to increase quality and efficiency as well as sustainability. "I hope that the analysis procedure can be implemented in a way that allows it to be conducted continuously in the future," he says. "Then we would be able to identify problems with the recycled steel sorting as they arise, and thus be able to put in place measures to prevent the problems."

In parallel with the efforts to reduce the proportion of alloys that are added, work is also under way to reduce the proportion of scrapping that takes place in production, which further increases the need to use the available recycled steel in the best possible way.

"Even though it is better to use recycled products than to buy alloys in order to economize on raw materials, the optimal scenario is not to circulate the material multiple times. It would, of course, be better if as much of the material as possible could be sold directly, so another important goal for us is how we can scrap less material."

A KEY REASON for Sandvik to become involved in the Swedish Metal project is reduced production costs, the result of using cheaper materials and reducing electricity consumption. It will also likely help the business gain detailed control of its processes and optimize them.

"Increasing competitiveness and distinguishing ourselves from our international competitors has become ever more important," says Josefsson. "In addition, we take the subject of sustainability very seriously. By demonstrating how hard we work with this issue, I think we can increase our chances of attracting new expertise in the future." ■

"We thought we would never go back to school," said ninth grader Ruth Bwalya at Kamitondo Primary School in Zambia. "But when we least expected it, Sandvik heard our cry, "

SUPPORTING THE FUTURE

Almost 2,000 children in Zambia have been able to return to their school after the local Sandvik office assisted in its refurbishment following a cholera outbreak.

CHOLERA, AN INFECTIOUS and often fatal bacterial disease usually contracted from infected water supplies, is a common problem in many parts of Zambia. But the outbreak that occurred in 2018 across the country's urban areas was particularly bad.

The country's Ministry of Health recommended that all schools close to contain the outbreak. When the closure order was lifted, the Kamitondo Primary School, located in the country's second city, Kitwe, had to remain closed because of the poor state of the children's toilet blocks and the unreliable water supply and inadequate sewage system.

Staff at Sandvik Mining and Construction's head office in Zambia learned that some of the local children were not able to go to school because

of this situation. A project team was put in place to help reopen the school and Annie Siwo, Central Africa Wellness Officer at Sandvik, became the project coordinator.

The Kamitondo Primary School is located in a community near the Sandvik head office in Kitwe," Siwo says. "As part of our corporate social responsibility efforts we try to help the surrounding communities. The aim is to support the communities Sandvik operates in."

SANDVIK WELLNESS OFFICERS are the main link between Sandvik and local communities. "My job is to coordinate the company's involvement with community organizations in accordance with CSR objectives," Siwo explains. "This includes visits to community organizations to see if we can support or form partnerships with them.

"The local authorities couldn't do the necessary repairs to the Kamitondo Primary School because their resources were limited," Siwo continues. "So we supplied funds through our CSR budget. The Ministry of General Education found a contractor that rehabilitated the wash rooms, diverted the sewer line into the main local sewer line and supplied a 10,000-liter-capacity water tank with a submersible water pump."

The project began in January and was completed in March 2018. The school, which has 1,700 students ages 10 through 15, reopened in April.

Daniel Banister, Sandvik's Sales Area Manager for Central Africa, explains why supporting the school was an important project for Sandvik. "Youth are the future," he says. "It's important that we actively assist community projects that are focused on the health and well-being of the younger generation who will potentially become the future leaders of our country and our organizations."

KAMITONDO PRIMARY SCHOOL held an official opening ceremony in February 2019, during which the children sang, danced and performed poetry.

"We thought we would never go back to school," said ninth grader Ruth Bwalya during the opening ceremony. "Not all days are sunny days. But when we least expected it, Sandvik heard our cry, came along and brought us sunshine. We will definitely maintain the standard that has now been set up by Sandvik and teach our current fellow students and the ones yet to join us to do the same."

Sandvik plans to continue to help Kamitondo Primary School. "Currently the school only has one computer, which is used by the school headmaster," says Banister. "We are looking at donating a few computers for the students to use as part of information technology development, and, with the help of our IT department, to train students in basic IT knowledge." ■

Celebrating success, George Munthali, Distributor Manager at Sandvik, shakes hands with the Head Master of Kamitondo Primary School, Richard Kateya.

SUSTAINABILITY SHIFTS INTO HIGH GEAR

Sandvik aims to lead the shift in the industry by making sustainability a part of every aspect of business. The company has launched four challenging sustainability goals for 2030. Ulrika Wedberg, Sandvik's new Head of Sustainable Business, explains why.

Why has Sandvik launched new sustainability goals?

We are convinced that sustainability is a true business advantage and a driver that enhances Sandvik's competitiveness. Customers want to work with sustainable suppliers. Shareholders and investors are setting sustainable criteria to invest in companies, and young people today want to work for companies that have a clear and strong focus on sustainability. By aligning the presentation of our new financial goals with our sustainability goals we wanted to underline the importance of our long-term goals.

How does Sandvik's sustainability work create value for society, customers, employees and shareholders?

Working with sustainability creates value in many ways. We want this company to exist long-term, so it is in everyone's interest that we work toward having a more sustainable business.

By offering sustainable products along with increased productivity and a reduced CO_2 impact, we help our customers reach their sustainability targets. We are also convinced that making sustainability part of our normal business increases our shareholder value.

We take a holistic view of our sustainability goals. We consider the impact of our operations, our supply chain and our customer offerings with specific targets for each of them that complement each other, and we are always trying to see the full picture and make the maximum positive impact.

Two of our new goals are people-related; we know our business depends on people. Our goal today is the same as it was yesterday and will be tomorrow – zero harm to people. In addition, we will also focus on occupational illnesses. Effects from pressure and stress in our organization are increasing, and we need to deal with this in a professional way.

How can sustainability efforts serve as a business driver?

We see many opportunities opening up for us to work more in partnership with our customers and to apply our engineering and innovation skills to find new products and business models. Our various recycling offerings save materials, resources and costs.

"We will launch an ideas hub with the goal of gathering 100,000 sustainability ideas or innovations by 2030."

Similarly, our target to always play fair drives behavior and business ethics in markets where we are active.

We want to bring our suppliers along with us on our journey, requiring the same standards from them that we do with our own organization.

What are the biggest challenges to becoming even more sustainable in the future?

We must ensure that we have enough engineering competence to drive innovation at the pace that will be necessary, as well as keeping the long-term focus, despite market fluctuations that require short-term actions. We will, however, integrate the follow-up of the new targets in the performance management system for each division to ensure that despite changing times we don't lose our focus on sustainability. Furthermore, we will launch an ideas hub with the goal of gathering 100,000 sustainability ideas or innovations by 2030, and we'll institute an internal sustainability champion award.

What are you looking forward to in your new role as Head of Sustainable Business?

I look forward to working closely with the business areas, divisions and individual sites and working together to reach our targets, while being the bridge to communicate our progress to investors, analysts and other stakeholders using my business knowledge.

Read more on the new sustainability targets on home.sandvik/about-us/sustainable-business

ULRIKA WEDBERG

Age: 51
Title: Head of Sustainable Business
Education: Master of Laws, Uppsala University, Sweden
Sandvik experience: Started as an in-house lawyer in 2000 and then worked with M&As before moving to Sandvik's Austrian powder supplier Wolfram Bergbau und Hütten in 2009, where she started as Vice President and in 2011 became President
Home: Sigtuna, Sweden
Interests: Skiing, running, shopping with girlfriends
Leadership style: "I'm sociable and open and get energy from working with colleagues. I believe strongly in giving people the freedom to act"
Strengths: Quick to grasp a problem and get things started
Weaknesses: "I'm rather impatient, so I tend to start too early. I should be more structured"

"MISSION ACCOMPLISHED"

Three questions to Sandvik CFO Tomas Eliasson

How would you summarize the new set of financial targets for Sandvik Group that was presented in May?

Our previous financial targets were about taking the Group from financial underperformance to good financial performance during a three-year period. We did that. As per our strategy we always start with stability and profitability before we go for growth. Now the majority of our businesses are stable and profitable, so we decided to take back growth as a target, both organic and through acquisitions. Together with growth we also have a new earnings target, as well as targets for the debt level and dividends.

What is the reasoning behind choosing a margin target that is expressed as a "floor"?

Sandvik has changed and is today more cost-efficient, decentralized and agile than it was historically. We are better prepared for all market situations, and to underscore that, we have chosen a floor that is considerably higher than what we have delivered historically. We have not set a target for a ceiling – i.e., a range – as we don't want to limit ourselves when the market is strong.

In May, the Board made the decision to initiate an internal separation of the business area Sandvik Materials Technology; does that change the financial targets?

The new targets include all three business areas as long as we have three business areas. If the separation leads to an actual stock listing for Sandvik Materials Technology in the future, we have to come back with information regarding the effects on the Group targets. What we have indicated is that the margin target of at least 16 percent would be approximately 2 percentage points higher if you exclude Sandvik Materials Technology.

SANDVIK´S NEW FINANCIAL TARGETS

- Growth of at least 5 percent, including organic growth and acquisitions,, through an economic cycle
- An adjusted EBIT (Earnings Before Interest and Tax) margin that will not go below 16 percent over a rolling 12-month period
- A dividend payout ratio of 50 percent through an economic cycle
- A net debt/equity ratio below 0.5

SANDVIK AT A GLANCE

Sandvik is a high-tech and global engineering group offering products and services that enhance customer productivity, profitability and safety. In 2018, the Group had approximately 42,000 employees and sales of 100 billion SEK in more than 160 countries.

BUSINESS AREAS

SANDVIK MACHINING SOLUTIONS

A market-leading manufacturer of tools and tooling systems for advanced metal cutting, expanding in additive manufacturing and digital manufacturing.

SHARE OF REVENUES **40%**
SHARE OF ADJUSTED OPERATING PROFIT **53%**

SANDVIK MINING AND ROCK TECHNOLOGY

A leading supplier in equipment and tools, service and technical solutions for the mining industry and rock excavation within the construction industry.

SHARE OF REVENUES **43%**
SHARE OF ADJUSTED OPERATING PROFIT **39%**

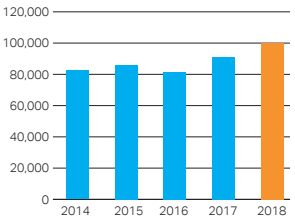
SANDVIK MATERIALS TECHNOLOGY

A leading developer and manufacturer of advanced stainless steels, powderbased alloys and special alloys for the most demanding industries.

SHARE OF REVENUES **15%**
SHARE OF ADJUSTED OPERATING PROFIT **7%**

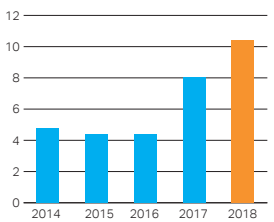
THE GROUP

REVENUES, MSEK



ADJUSTED OPERATING PROFIT, MSEK AND ADJUSTED OPERATING MARGIN, %

ADJUSTED EARNINGS PER SHARE, GROUP TOTAL, SEK



RECOGNITION AND MEMBERSHIPS

MEMBER OF Dow Jones Sustainability Indices In Collaboration with RobecoSAM

FTSE4Good

THE GLOBAL COMPACT WE SUPPORT

Figures refer to Group total 2018.

MAIN CUSTOMER SEGMENTS

MINING

We deliver drill rigs, rock-drilling tools and systems, mobile and stationary crushers, load and haul machines, tunneling equipment, continuous mining and mechanical cutting equipment, as well as various solutions to increase automation, safety and customer productivity.

SHARE OF REVENUES **34%**

ENGINEERING

Our tools and tooling systems for metal cutting as well as advanced materials and components are used in engineering industries worldwide, improving productivity, profitability, quality, output, safety and environment. Sandvik is also a global leader in high-alloy metal powder for different applications.

SHARE OF REVENUES **23%**

AUTOMOTIVE

Our tools and tooling systems for turning, milling and drilling in metals raise productivity when manufacturing e.g. engines and transmissions. Our stainless and high-alloy products are found in, for example, airbags and air conditioning.

SHARE OF REVENUES **12%**

ENERGY

Sandvik offers solutions for all forms of energy production, including clean and renewable energy. We supply high-alloy products, such as seamless stainless steel tubes as well as tools and tooling systems to satisfy the industry's metal-cutting needs.

SHARE OF REVENUES **11%**

CONSTRUCTION

We offer products and services that increase safety and customer productivity in the breaking, drilling, tunneling, crushing and screening niches of the construction industry.

SHARE OF REVENUES **9%**

AEROSPACE

Sandvik works closely with the world's aerospace companies. As they apply new materials to manufacture airplanes that are lighter, safer and more fuel efficient, advanced tooling solutions and light-weight materials from the Group are critical.

SHARE OF REVENUES **6%**

Figures refer to Group total 2018.

THE OBJECT | A cut above

Sandvik has teamed up with Cangshan Cutlery Co., an award-winning premium knife producer, to produce innovative next-generation knives using high-alloy Sandvik®14C28N steel, which is ideal for knife applications that place very high demands on edge sharpness, edge stability and corrosion resistance.

Combining the best qualities of Western and Eastern style designs, materials and workmanship, Cangshan creates knives for all levels of culinary professionals. https://cangshancutlery.com