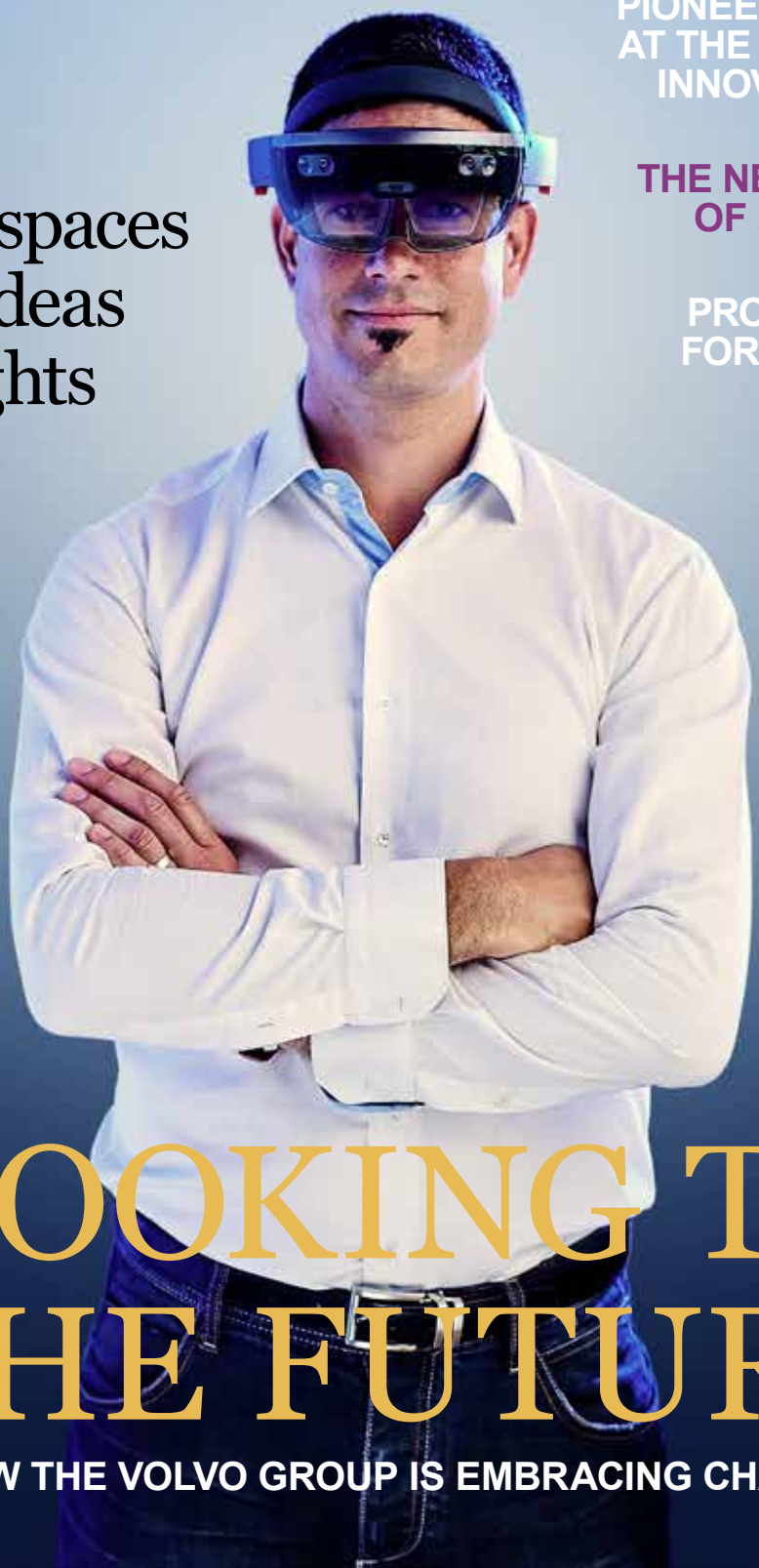
Volvo Group magazine 4.2017

PIONEERING CONCEPTS AT THE VOLVO GROUP'S INNOVATION SUMMITS

THE NEW GENERATION OF DIESEL ENGINES

PRODUCTION START FOR VOLVO TRUCKS' NEW US RANGE

Creative spaces for new ideas and insights



LOOKING TO THE FUTURE

HOW THE VOLVO GROUP IS EMBRACING CHANGE

We are creating the future today

THIS IS AN exciting time to work in the Volvo Group! At a global level, the need for both transport and infrastructure is going to increase and, at the same time, solutions will need to be increasingly sustainable. We are also facing a major technology shift in which automation, electromobility and connected vehicles and machines will change not only our industry but also society as a whole.

Automation will lead to greater productivity, fuel efficiency and safety, but developments will take place step by step. The right level of automation will be determined by the value it gives our customers and by the rules and regulations that surround our vehicles and machines.

Electromobility has already revolutionised the bus industry and we are at the forefront of these developments. We will be taking advantage of this experience as we develop hybrid and fully electric solutions in other business areas.

With 600,000 connected vehicles, we are leaders in our industry and we have huge potential to transform data into increased uptime and customer benefits. It's a journey that we are only seeing the start of.

FOR SOME TIME now, we have been investing substantial resources in these areas to produce new solutions together with our customers and partners. At the same time, we are continuing to improve the combustion engine and other more well-known technology which our customers are currently using and will continue to use for the foreseeable future.

Sometimes not being able to focus all our energy on new technology and new solutions is seen as a problem, as we are an established player in the industry and have existing customers and existing operations to run. But instead, I see this as a strength and an opportunity.

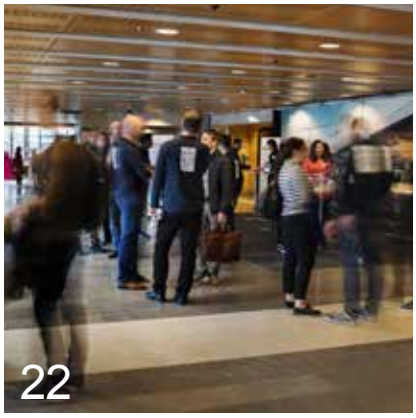
We have an industrial backbone that enables us to run a pilot project and then scale it up to a competitive global offer. We have in-depth industrial experience, strong brands, sales channels and service networks that help us to create customer value throughout a product's life cycle. We also have long-term relationships with our customers that help us to develop the right products and services, both now and in the future.

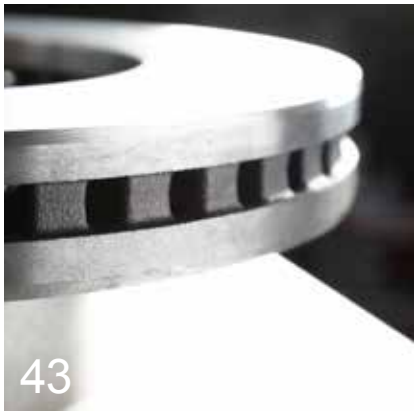
The world is changing and we are ready to rise to the challenge.

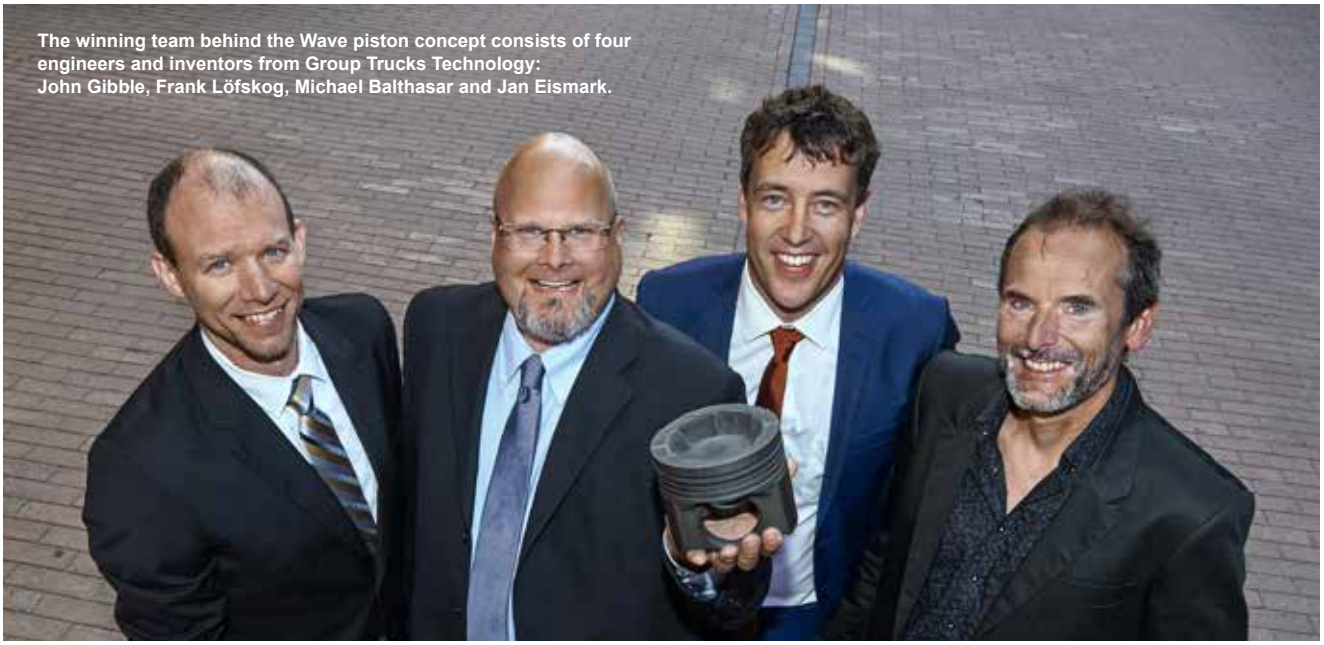
MARTIN LUNDSTEDT
PRESIDENT AND CEO,
VOLVO GROUP

VOLVO GROUP MAGAZINE is aimed at all the co-workers within the Volvo Group. It is published five times a year in Swedish, English, German, French, Portuguese for Brazil, Polish, Russian, Japanese, Dutch, Korean, Thai, Chinese and Spanish. PRINT RUN approx. 75,000 copies ADDRESS Volvo Group Magazine, Volvo Group Headquarters, Dept AA13400, VLH6B, SE-405 08, Göteborg, Sweden PHONE +46 (0)31 66 00 00 E-MAIL groupmagazine@volvo.com EDITOR RESPONSIBLE UNDER SWEDISH PRESS LAW Markus Lindberg EDITOR-IN-CHIEF Ann-Mari Robinson EDITORS Lotta Bävman, Carita Vikstedt, Tobias Wilhelm and Åsa Alström. A Group-wide Editorial Network also contributes content. MARKET LANGUAGE REVIEW Ann-Mari Robinson EDITORIAL PRODUCTION Spoon (project team: Maria Sköld, Linda Swanberg, Nic Townsend, Lina Törnquist, Pernilla Stenborg, Ken Niss, Sofia Hammarin) PRINTED BY LSC Communications CHANGE OF ADDRESS Contact your local HR TRANSLATED BY Lionbridge

Volvo Group magazine 4.2017







The winning team behind the Wave piston concept consists of four engineers and inventors from Group Trucks Technology: John Gibble, Frank Löfskog, Michael Balthasar and Jan Eismark.

PHOTO: CICCI JONSON

Award for wave piston design

REDUCING EXHAUST emissions while at the same time improving fuel efficiency are key challenges for engine developers. By adding wave-shaped ridges to the piston crown, the Volvo Group has managed to enhance the mix between fuel and oxygen late in the combustion cycle, leading to lower emissions of soot and directly increased the thermal efficiency of the engine. The wave piston concept recently received the 2017 Volvo Technology Award.

The technology is unique within the automotive industry and is protected by several patents. Working in combination with other engine enhancements, the wave piston delivers improved fuel efficiency of up to 2.2 per cent for the D11 engine and 2.5 per cent for the D13.

The wave piston has been launched in North America and Japan. From 1 January 2017, the wave piston design has been standard in D11 and D13 engines in the USA. Future versions for the EU market with further improvements in fuel efficiency and applicable for other engines are under development.

Team Volvo in world's largest half marathon

1,317 RUNNERS FROM the Volvo Group and Volvo Cars joined Team Volvo in the Göteborgsvarvet Half Marathon in Gothenburg, Sweden on 20 May. Together, the team included employees from 22 nations! The event attracted around 64,000 runners and is one of the world's largest races. Volvo Group employees also helped staff the event and a Volvo truck was used as a makeshift stage for a band performing along the running track.

PHOTO: ADRIAN SJÖDAL

High five! Yawei Ma from Volvo Car China joined Team Volvo to compete in the Göteborgsvarvet Half Marathon.

GTP creates two new functions

GROUP TRUCKS PURCHASING (GTP) is reshaping its organisation by creating two new functions. Uptime, Adaptation & Synergies will secure uptime targets and customer needs with faster and more efficient sourcing, while Innovative Purchasing will master and safeguard new technologies.

Sweden takes lead on electromobility

THE SWEDISH GOVERNMENT has initiated a pre-study for a national test laboratory for electromobility, with support from the Volvo Group and other key stakeholders. The aim is for Sweden to become a world leader in electromobility through collaborative research initiatives.

More remote services in USA

MACK TRUCKS AND Volvo Trucks North America are expanding connected vehicle services. Mack Over The Air (OTA) and Volvo Remote Programming allow customers to update software and key vehicle parameters without disrupting their schedules, improving efficiency, performance and uptime.
Mack OTA will be available on all Mack models equipped with Mack GuardDog Connect and Mack's 2017 engines, including the Mack Granite (pictured). Volvo Remote Programming will be available in the third quarter for all Model Year 2018 Volvo trucks equipped with Volvo's remote diagnostics and Volvo's GHG 2017 engines.

PHOTO: MACK TRUCKS

8–14 OCTOBER

...are the dates for the Volvo Group Diversity & Inclusion Week 2017. The theme this year is "D&I fuelling our Innovation" and will showcase how both diversity and inclusion boost the ability to innovate.

PHOTO: VOLVO GROUP

Through training schools, the Volvo Group is hoping to meet the demand for more skilled mechanics and truck drivers across Africa.

DRIVER TRAINING IN AFRICA

SINCE 2013, THE Volvo Group has been running vocational training schools for mechanics in Ethiopia, Zambia and Morocco. The next step is to start training new truck drivers in Ethiopia too.

"This helps to create jobs and promote economic growth, while also benefiting our business and that of our customers," says Johan Reiman, Manager CSR Projects.

New Volvo CE website gets results

THE VOLVO GROUP recently updated its Volvo-branded websites and Volvo CE has already noticed major benefits.

"Online research is the second most important information source for our customers when looking to purchase construction equipment. Since our new websites went live the number of leads generated online is higher than ever before," says Eva Bärnheim, Digital User Experience Project Manager.

The Volvo CE web presence has 250,000 visits each month and consists of 126 different web sites in 30+ languages, providing information about products and services to target audiences in 135 countries. Volvo CE recently won the Sitecore Experience Awards for its web project based on results, size and complexity.

PHOTO: VOLVO FINANCIAL SERVICES

The VFS Marketing Excellence Award recognises exceptional achievement in collaboration with the Group product companies. VFS China and VFS Canada were awarded second and third.

Award for excellence

VFS REGION EMEA and VFS Germany received the 2017 Marketing Excellence Award for their strong marketing integration with Volvo CE at Bauma 2016. The efforts – from print, social media, online, apps and finance calculators to joint customer and dealer events and sales targets – led to a finance penetration of 58 per cent on over 500 sold machines. "This testifies to the 'One-Stop' shopping concept, offering customers a full package from machine to soft offers," says Christian Krauskopf, Volvo CE Business Director Central Markets.

"We are excited, pleased but also rewarded for all the efforts the team has made," says Michael Ksionzek, Sales Director VFS Germany.

PHOTO: VOLVO PENTA

VOLVO PENTA POWERS RACE

Volvo Penta returns as the official engine supplier to Volvo Ocean Race. Although the use of engines as a primary propulsion source is prohibited during racing, the D2-75 engine is a key part of life on board, providing electricity for the computers, navigation equipment, lights and communications units on the boats. Volvo Penta engineer Johannes Karlsson (pictured to the left) will deliver full-time support during the race.

PHOTO: VOLVO TRUCKS

VOLVO GROUP TAKES PART IN AUTOFREIGHT

SELF-DRIVING TRUCKS could lead to more efficient container transport. AutoFreight, a research project in Sweden, is investigating the prerequisites with a case study of trucks transporting containers between the Port of Gothenburg and the inland city of Borås. The Volvo Group is one of ten partners.

The Volvo FH LNG and Volvo FM LNG are the first heavy-duty trucks powered by LNG that can deliver enough horsepower to meet the demands of inter-regional and long-haul customers.

LNG trucks offer big CO_2 reduction

WITH THE LAUNCH of the new Volvo FH and FM LNG, run on liquified natural gas, Volvo Trucks can now offer significant reductions in CO_2 emissions in inter-regional and long-haul applications.

Both trucks, which are available with 420 hp and 460 hp, offer the same level of performance and reliability as their diesel equivalents. The only difference is that the new trucks are powered by liquified natural gas. When using natural gas, CO_2 emissions can be reduced significantly and even more so when powered by biogas.

With the Volvo FH LNG and Volvo FM LNG, Volvo Trucks can now meet the growing need for alternative fuel that does not compromise performance.

PHOTO: RENAULT TRUCKS

Check & Drive helps sharpen sales skills

SOME 580 RENAULT Trucks sales representatives from 26 countries were invited to La Valbonne near Lyon during six summer weeks to sharpen their sales skills and share best practices.

The Check & Drive event was an opportunity to drive and experiment with the robustness of the Renault Trucks T, C and K in extreme conditions and to compare them with competitor trucks. It even included an overnight stay in the cab!

PHOTO: ASBJÖRN HANSSEN

Volvo Group supports Pride

The Volvo Group was a proud bronze partner to West Pride Sweden 2017, supporting its vision for an inclusive world free from prejudice and discrimination.

So much knowledge!

PHOTO: ROBIN ARON OLSSON

Interviewing colleagues for stories in the *Volvo Group Magazine* is rewarding for several reasons. For one, it expands my network and I get to learn new things. What is really striking is how much talent we have in the Volvo Group; smart, passionate people who love their jobs. Companies often say that employees are their biggest asset. It is definitely true.

ANN-MARI ROBINSON, EDITOR-IN-CHIEF

The trends shaping cities

Two-thirds of the global population is expected to live in cities by the year 2050. To meet challenges related to this, the Volvo Group is hosting a number of Innovation Summits to discuss solutions and showcase pioneering innovations.

TEXT ANN-MARI ROBINSON PHOTO ROBIN ARON OLSSON

VOLVO GROUP INNOVATION SUMMIT 2017

A series of events designed to promote discussion and introduce new thinking on prominent issues, including air quality, pollution, congestion, health and road safety. The summits include demonstrations of some of the latest R&D innovations.

- London 16 May
- Brussels 7 September
- Beijing 15 November

“Construction is a wasteful business and there are huge efficiency gains to be made. We are very keen on digitalisation and put a great deal of effort into finding out how it can support us,” says Roger Bayliss, SVP Operational Efficiency, Skanska.

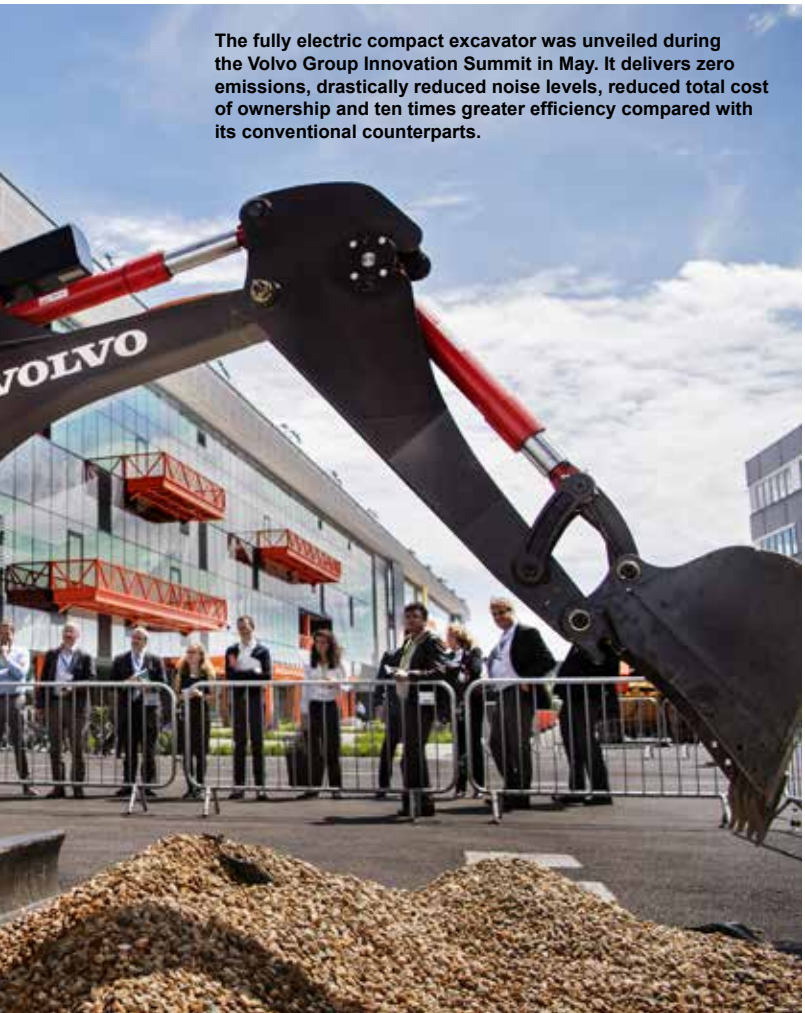
“I am proud of the fact that we have an even greater product focus within the Volvo Group today, with a clear engineering agenda that matches the requirements from society, customers and our brands,” says Lars Stenqvist, CTO at the Volvo Group.

“Are the right decision makers talking to each other before major construction work in cities?” asked Richard Westcott, BBC Transport correspondent in a panel discussion between Lars Stenqvist, CTO Volvo Group, Michael Browne, professor of transport, Matthew Hudson, Head of Technology & Data Strategy at Transport of London, and Terri Wills, CEO of the World Green Building Council.

The former press and broadcast centre at the 2012 London Olympic Games is temporarily hosting the inaugural Volvo Group Innovation Summit where some 120 leading authorities from governments, major transport providers, industry bodies and the media are engaged in round-table discussions. The first on stage is today’s host, Volvo Group Chief Technology Officer Lars Stenqvist, who describes transport as the lifeblood of society and a key enabler of prosperity, growth and welfare.

“We are at the start of a paradigm shift in transport which will reshape the cities and societies we live in. Three strong trends; automated driving, electromobility and connectivity have the potential to impact mobility, and, when they converge, they will radically transform transport.”

The building cranes and construction work ▶



The fully electric compact excavator was unveiled during the Volvo Group Innovation Summit in May. It delivers zero emissions, drastically reduced noise levels, reduced total cost of ownership and ten times greater efficiency compared with its conventional counterparts.

Jon Wilson

SALES ENGINEERING MANAGER, COMMERCIAL SALES, VOLVO GROUP UK

"London is now pushing for zero emissions vehicles and we are selling the whole package; the bus and the infrastructure solution with OppCharge. I first rode on the electric bus in Gothenburg, route 55, two years ago. Having worked for the Volvo Group for 25 years I must say it was my proudest moment so far. A bus used to be dirty and noisy, but look at this now; it really is a 'man on the moon' moment! It's a fantastic time to be part of our industry."

This autonomous refuse truck from Volvo Group was on display at the London summit. The truck is designed so that the driver, who walks ahead of the reversing vehicle, can focus on refuse collection and does not have to climb in and out of the cab every time the truck moves to a new bin.

"We are trying to squeeze things into 24 hours, so how about exploring more deliveries at night?"

MICHAEL BROWNE, PROFESSOR, UNIVERSITY OF GOTHENBURG

going on nearby at the vibrant Queen Elizabeth Olympic Park in eastern London are symbols of the rapid development of a city that needs to cater for the transport of people, goods and waste. Cities all over the world are dealing with the added need for transport, as well as outdoor air pollution, which is causing serious health concerns.

"Space is a precious commodity and a complex question for a city like London that has a mix of public and private landowners. We are all fighting for space and need to share more, for example by making use of offices and parking lots which are empty outside work hours. Time adds to the complexity. We are trying to squeeze things into 24 hours, so how about exploring more deliveries at night?" says keynote speaker Professor

This fully electric Volvo bus was one of the innovations demonstrated at the Volvo Group Innovation Summit. Electromobility solutions like this one are allowing cities to cut emissions and improve quality of life.

Michael Browne, University of Gothenburg, who has focused his research on urban goods transport.

He is developing his thoughts in a panel debate with Terri Wills, CEO of the World Green Building Council, a global network aiming to transform and reshape the way society grows and builds infrastructure, and Matthew Hudson, Head of Technology & Data Strategy at Transport of London. For them, it is evident that increased collaboration is key to building smarter infrastructure and that this collaboration should include the OEMs.

"Today, too much is built around cars. Future cities need to be more people focused, with

Grace Sun

SENIOR COMMUNICATIONS MANAGER, VOLVO GROUP CHINA

"I am part of the event team here in London, since the Volvo Group will host an Innovation Summit in Beijing in November. It's the right timing since innovation and automation are hot topics in China. Safety, efficiency and pollution are urgent issues to resolve and a global level event will strengthen our message to the media and key stakeholders. The Volvo Group has a strong voice."

WHAT'S THE BIGGEST CHALLENGE FOR FUTURE TRANSPORT?

YANA STANKOVA, Senior Project Director, ViewPoint Media (media partner to *The Times*)
"Collaboration. It's important to have different groups talking and discussing these issues together, not just transport people on their own. Everyone here is very engaged and willing to share experiences. Well done for making this summit so interesting."

VIVEK JETHANI, Managing Director, Global Unitech Limited
"The key issue is infrastructure solutions. Innovative products will not function if the infrastructure does not work. My main takeaway from this summit is the electric bus. I believe the Volvo Group has the solution and we have to build understanding for what is needed."

NICHOLAS SANDERSON, Policy adviser for transport charity Sustrans
"Air quality is a big challenge for London and for many other cities. But the key question is how transport impacts public health. How do we keep people physically active by fitting walking and cycling into urban life?"

New innovations captured the imagination and attention of attendees at the Volvo Group Innovation Summit. Automated driving, electromobility and connectivity were some of the trends discussed during the summit.

"GTT is expected to lead the Volvo Group into the future when it comes to technology."

LARS STENQVIST, CHIEF TECHNOLOGY OFFICER, VOLVO GROUP, AND EVP OF GROUP TRUCKS TECHNOLOGY (GTT)

offices and housing situated next to public transport systems. How new buildings are constructed is important but also how we make sure goods are transported using sustainable vehicles," says Terri Wills.

The UK, and London in particular, is spearheading the shift towards future transport. The UK is a forerunner when it comes to congestion charges and it was among the first countries to introduce hybrid buses in many cities. In 2018, eight fully electric Volvo buses will start to operate in Harrogate, a city in northern England.

Other cities showed an interest to take part in projects together with the Volvo Group during the Innovation Summit in London. It is being followed by similar events in Brussels and Beijing.

"I sense a new kind of debate when it comes to city planning. We are not the ones designing future cities, but we can act as a credible and strong partner and we have a unique range in our offer," says Lars Stenqvist.

One of the electric buses is being demonstrated right outside the Innovation Summit, together with two pioneering research innovations; an autonomous refuse truck and an electric compact excavator from Volvo CE.

"We believe that transport will increase and this will inevitably result in challenges and problems for society. But we also think that we should be part of the solution. These products are innovations based on the needs of both society and customers, which we show in early concept phases to get input from different stakeholders. This is how we can contribute as a Group, by being solution oriented and credible in our approach and never compromising on safety," says Lars Stenqvist.

He is proud of the Group's increased product focus and engineering agenda: "GTT is expected to lead the Volvo Group into the future when it comes to technology so we need to embrace that challenge and deliver on the expectations." ◉

3 DISRUPTIVE TRENDS within commercial transport – automation, electromobility and connectivity – will lead to substantial benefits for customers and society and drive prosperity. This is how the Volvo Group has reshaped its organisation to better master the new technologies.

AUTOMATION

A new Vehicle Automation Department headed by Jan Ove Östensen was established within GTT on 1 June 2017. It includes teams that were working with automation in the former Advanced Technology Research (ATR), as well as resources from Vehicle Engineering and Powertrain Engineering. It is governed by a Vehicle Automation Board chaired by Lars Stenqvist, CTO and EVP GTT.

ELECTROMOBILITY

The Electromobility development function was organised within GTT in June 2016 and is located together with Volvo Buses' City Mobility Team. It includes key competences in product planning, engineering, purchasing and sales from GTT, GTP and Volvo Buses. Electromobility is headed by David Hellstedt and the team is further strengthened through a transfer of resources from ATR as from June 2017. It is governed by an Electromobility Board chaired by Lars Stenqvist, CTO and EVP GTT.

CONNECTIVITY

Connected Solutions was established in April 2017 and is headed by Anna Westerberg. The function will lead the development of connected services and solutions. It has the following main functions as of July 2017; Innovation Lab, Product Management, Technology, Delivery & Operations, Volvo Group Venture Capital and WirelessCar. Connected Solutions is governed by an internal Board chaired by Jan Gurander, Deputy CEO and CFO.

A self-driving refuse truck, an electric excavator and an electric bus were all on display at the Innovation Summit in London. Learn about the next generation of technology and meet the engineers that make it happen.

TEXT MARIA SKÖLD PHOTO ROBIN ARON OLSSON

INNOVATIONS ON SHOW

The electric excavator

What is it? The EX2 is the first completely electric excavator. The combustion engine has been replaced with two lithium-ion batteries and the hydraulics with electric architecture which incorporates electromechanical linear actuators. The battery could be substituted with a fuel cell or a diesel range extender.

Benefits: The machine is 100% emission free and the noise level is ten times lower than a conventional machine. At the same time, it is ten times more efficient. The EX2 is extremely versatile and can be remotely operated with a mobile phone or a tablet, which is important when working under potentially hazardous conditions.

Challenges: EX2 electromechanical linear actuators are new technology and still need to be validated in the harshest conditions.

Is this a concept vehicle? Yes, it has not yet been commercialised.

Meet **Ahcène Nedjimi** who worked on the development of the EX2 on page 18.

The autonomous refuse truck

What is it? An autonomous Volvo truck that monitors its surroundings and immediately stops if an obstacle suddenly appears on the road. It is driven manually to and from the area in which the refuse is collected. It is also driven manually the first time it is used in a new area, so that it can learn which route to follow and which bins it has to empty. This is possible thanks to an on-board system of sensors and GPS technology.

Benefits: Can contribute to safer, more efficient refuse handling and create a better working environment for drivers. Since the automated systems optimises gear changes, steering and speed, fuel consumption and emissions can also be reduced.

Challenges: The technical scope already exists, so the focus is now on developing an additional safety system.

Is this a concept vehicke? Yes, it is still a prototype.

Meet **Andreas Johnsson** who worked on the development of the autonomous refuse truck, on page 20.

The electric bus

What is it? The electric bus is equipped with an electric motor powered by lithium-ion batteries. Whenever the bus slows down, the resulting 'engine-braking' effect generates electricity that is used to charge the batteries – power that would otherwise be wasted.

Benefits: Since it is quiet and exhaust emission free, this bus can operate in places where traffic is currently banned, opening up new opportunities for urban planning.

Challenges: Energy storage is a top priority in the industry. Everyone wants to come up with the perfect solution that makes batteries lighter, cheaper and more efficient.

Is this a concept vehicle? No, it is a commercial product. More and more cities are interested in buying either fully electric or hybrid buses.

Meet **Hanna Bryngelsson** who worked on the development of the electric bus, on page 21.

AHCÈNE NEDJIMI

Works at: Volvo CE in Belley, France
Lives in: Lyon
Education: master s degree in Electrics & Electronics from engineering school ITII-Ecole Centrale in Lyon
Family: wife and two children
Leisure interests: cycling, economics and spending time with the family

Ahcène Nedjimi has worked for the Volvo Group since 2002 in a number of roles.

“I always believed that we would succeed”

Ahcène Nedjimi
Project manager for EX2, Electromobility Vehicle Architecture Specialist

“It is, of course, both exciting and a great honour that ‘our’ excavator, the EX2, was on display at the Innovation Summit in London. It proves that we have succeeded in realising our target of creating what we believe is the world’s first fully electric excavator.

“I always believed that we would succeed – you have to believe – but there are no guarantees. So the first time we saw the excavator actually move was fantastic. It was a bit like having a baby!

“We began the project in 2012 in collaboration with six French companies and with the support of French authorities. Keeping a project together with so many different players isn’t always easy, but it’s really enjoyable and rewarding.

“Testing new technology is another challenge. Among other things, we wanted to use batteries with a lower voltage than before. This requires fewer safety measures and makes it easier to collaborate with other players, from the world of passenger cars, for example.

“Industrialising the product is another challenge. We have to demonstrate the durability of the technology and make the product at the right price for our customers. We have good signs, since the cost of batteries is steadily decreasing along with other technology, so that’s starting to make electromobility more attractive financially. One way of reducing the cost is through creating economies of scale. It will only be possible when the market fully accepts this technology and we start to see major breakthroughs in terms of volume.

“I have been working for the Volvo Group since 2002 and I have had a number of roles within electromobility and electronics. I have, for example, been a system designer, functional project leader, global part team leader and a compact excavator systems leader. I have also been an internal consultant within Operational Development.

“It’s fantastic being an electromobility engineer at a time like this when such major breakthroughs are being made. It will be something for me to tell my grandchildren about!” ◉

“We have now proved that this is possible”

Andreas Johnsson
Project Portfolio Manager at Vehicle Automation, GTT Vehicle Engineering

“I work as a Project Portfolio Manager within automation, one of the Volvo Group’s priority areas. It’s my job to make sure that our projects within the portfolio match the technology strategies. They have to have the right focus, content and staffing. The challenge is ensuring that all the projects work together in the optimal way, so that we share information and create synergies.

“The autonomous refuse truck is a good example. It is a continuation of our previous work in the project involving the autonomous Volvo FMX for underground mining environments. It’s basically the same technology, but the project manager Johan Tofeldt and the team have been examining how it can be adapted to a new application.

“We have been collaborating with a number of external partners. The refuse truck we are using comes from the Renova recycling company and it has been converted to make it autonomous. When the refuse is collected, only one operator is required and he or she can be on the outside, thereby getting a much better view. This is important so that we increase safety and reduce the risk of accidents. We have also fitted laser sensors round the truck and added an advanced safety system in order to stop the truck in an emergency. However, we need to develop this system still further.

“I joined the Volvo Group in 2000 and spent some time working on product development, but I have now moved to the development of less mature technology. It’s great being an engineer at such a large company, because there are so many opportunities to switch between development work of different kinds.”

Andreas Johnsson enjoys working on new automation solutions, one of the Volvo Group’s priority areas.

ANDREAS JOHNSSON

Works at: Vehicle Automation at Vehicle Engineering, GTT, Gothenburg, Sweden
Lives in: Gothenburg
Education: engineering degree in electrotechnology from Chalmers University of Technology in Sweden
Family: wife and two children
Leisure interests: extending his house

Hanna Bryngelsson has found her passion – electromobility. Before joining the Volvo Group, she was researching lithium-ion batteries.

“I take the electric bus to work every day”

Hanna Bryngelsson
Specialist in energy storage systems within Electromobility, GTT Powertrain Engineering

“It’s great that the electric bus has been such a success and that there is so much interest in public transport. We can now really achieve green, quiet, emission-free city centres.

“I actually take an electric bus to work every day. It’s really cool to realise that I have helped to develop it. When the first hybrids arrived, I travelled on them a great deal and I was a little tense. At every acceleration and deceleration, I visualised how the charge level of the battery was increasing and decreasing. I’m glad to say I never experienced any problems.

“Before I started working here, I was researching lithium-ion batteries. I joined the Volvo Group in 2008 and I was involved in developing the first hybrids. At that time, we never thought completely electric-powered buses would be produced so quickly. Developments related to batteries have been absolutely fantastic. Already in 2008, interest in this area was enormous, but knowledge about batteries was not so wide-spread. We have now invested heavily in ensuring that everyone understands what electromobility is. I just got back from giving a lecture on batteries at the Volvo Group University. It was really fun!

“I love this job. As an engineer here, there is so much development potential and it’s great to have colleagues with so many different skills. I think the best thing about the profession is the mixture of creativity and structure, really being able to see how an idea becomes a product.”

HANNA BRYNGELSSON

Works at: Electromobility in GTT Powertrain Engineering, Gothenburg, Sweden
Lives in: Gothenburg
Education: PhD in inorganic chemistry
Family: husband and three children
Leisure interests: enjoys painting and reading

Giulia Morello from Italy was one of 95 students who took part in high-speed interviews when the Volvo Group visited Chalmers University of Technology in Gothenburg. Here she tries out a simulator with support from Jimmy Kling, Volvo Penta.

FINDING TALENT IN 15 MINUTES

The competition for engineers in the automotive industry is razor sharp. High-speed interviews with students is one way of finding the employees of the future.

TEXT LINDA SWANBERG **PHOTO** ROBIN ARON OLSSON

GIULIA MORELLO IS more than happy. She has just been given the chance to present herself to the Volvo Group in a 15-minute interview. Even though she has one year left of her master's degree in chemical engineering at Chalmers University of Technology in Gothenburg, she has already started thinking about the next step in her career. "I come from Italy, but I would really like to stay in Sweden. I'm interested in research and development and, after today's interview, I feel that the Volvo Group is a good match. I like the fact that it's a big company and I think I can contribute," says Giulia Morello.

On this particular day, the Volvo Group has taken over part of a corridor at Chalmers, one of Europe's leading universities of technology, with many international students. Apart from high-speed interviews, students are offered CV reviews and they are also given the chance to put questions to the heads of different operations. A new Volvo truck is parked outside the entrance and anyone who wants can attempt to moor a boat using Volvo Penta's simulator.

This event is a way of showing the students what the Volvo Group has to offer, but it is also an opportunity to find new employees. At Group Trucks Technology, GTT, in Gothenburg alone, hundreds of new engineers are needed. "We are competing with many other companies

Susanne Hedberg, Global Programme Manager HR Services, thinks it is important for the Volvo Group to make its presence felt at universities. "Using events of this kind, we can create close ties with the Volvo Group and make it feel less imposing and impersonal."

Patrícia Fernandes Belletati from Brazil is being interviewed by Anders Söderberg. She says: "I have been studying nanotechnology at Chalmers. It's important for me to work for a company that's at the cutting edge when it comes to new technology."

Emil Rosenberg has been studying electrical engineering at Chalmers and he would like to work within the automotive industry. "I want a a job that offers me the chance to develop and an opportunity to work abroad."

and the competition is really fierce. In the past, we employed engineers with several years' experience, but we are now also recruiting directly from universities," says Susanne Hedberg, Global Programme Manager HR Services.

One example of this is Volvo Penta's Product Development Engineering Programme. Eight recent graduate engineers are offered employment with a special introductory programme. During the first nine months, they are able to work in different parts of the company.

Anders Söderberg is one of a number of managers who is at Chalmers to talk about Volvo Penta and the programme.

"Finding engineers has been a problem so this is a really good idea. I am very optimistic. There's so much interest and involvement on the part of the students," he says.

FOUR INITIATIVES FOR NEW TALENTS

Within the Volvo Group, there are a number of initiatives aimed at students, universities and recent graduate engineers. Here are a few examples:

1. ACADEMIC PARTNER PROGRAMME (APP)
This strategic, long-term programme covers ten selected universities in Sweden, France, the USA, China and Japan.

2. VOLVO GROUP INTERNATIONAL INTERNSHIP PROGRAMME
Every year, some 20 students from universities included in the APP spend two to six months working abroad for the Volvo Group.

3. VOLVO GROUP INTERNATIONAL GRADUATE PROGRAMME
A 12-month programme for recent graduates all over the world with a maximum of two years' work experience.

4. ENGINEERING GRADUATE PROGRAMME
A 12-month programme hosted by Group Trucks Technology (GTT). The programme offers graduate engineers a placement in Sweden, France, India and the USA.

Learning by doing

Mari Hiljemark and Bruno Gaudin have both often changed jobs – but always within the Volvo Group. They have tested their limits and tried many different roles.

TEXT
KARL JANSSON
& MARIA SKÖLD

PHOTO
CHRISTER EHRLING
& RICKARD KILSTRÖM

Mari Hiljemark,

VICE PRESIDENT, ON-BOARD TELEMATICS, GTT

NEXT YEAR, MARI Hiljemark will celebrate 20 years as a Volvo Group employee. During this time, she has performed many different roles within the company.

After finishing her degree in engineering physics at Chalmers University of Technology, Mari Hiljemark attended interviews for two Volvo Group jobs during the course of one week.

"Both jobs were at the same department, so both interviews were conducted by the same manager, but I wasn't aware of that when I applied. I wanted to work for Volvo Group because the product was clearly defined, so I understood what it was. It really appealed to me," says Mari Hiljemark.

After almost two decades with the company, she has worked at several departments, performing 12 different roles.

"Initially, I was an engineer and I worked on instruments – the speedometer, the display and other software in the trucks. I was then a team leader and managed various projects within the company. Leading and organising a team has always been fun. When people respect one

2011
Global
Technology
Manager Driver
Electronics

2015
VP On-board
Telematics

"I didn't have to leave the Volvo Group to make things happen in my career."

MARI HILJEMARK

another and enjoy what they do, it's possible to find a good flow – one plus one makes three."

On some occasions, she has changed jobs because of a reorganisation. On others, it was because she wanted to try something new.

"I didn't need to leave the Volvo Group to make things happen in my career. I haven't had a conscious strategy for changing jobs, but I have always looked for challenges and so I suppose that's a kind of strategy."

Mari Hiljemark's current title is Vice President On-board Telematics. Together with her colleagues, she is responsible for the hardware and software that enables trucks to communicate with the outside world.

"You could say that we turn the truck into a telephone."

The most challenging aspect of the job is the technology development, which means that people always have to be aware of new changes. When asked what is the most fun, Mari Hiljemark mentions two things: "The first is pride in and love of the products. The other is the feeling that comes from collaborating. Resolving something together generates energy."

MARI HILJEMARK

Job: Vice President, On-board Telematics at GTT
Lives: outside Gothenburg, Sweden
Education: Master of Science – engineering physics, Chalmers University of Technology, Gothenburg
Family: husband, three daughters and a dog
Leisure interests: working in the garden and spending time with the dog
The best thing about being an engineer: "Having the chance to work creatively and helping to create new technical solutions."

2000
Trainee at Renault Trucks, Lyon

2002
Fuel Injection Equipment Engineer, Lyon

2009
Project leader Exhaust After Treatment & Fuel Injection for Mack Trucks and Volvo Trucks in Hagerstown

2011
Engine & Machine Application Engineer, Volvo CE in Eskilstuna

2014
Project Manager Engine Performance, Volvo CE, Lyon

Bruno Gaudin,

ACTING MANAGER ENGINE CONTROLS, VOLVO CE, LYON

BRUNO GAUDIN WOULD like more of his colleagues to take the step of changing business areas. He had been working with three truck brands before he switched to construction equipment. As a result, he has also had the chance to live in three different countries.

"I like change and I enjoy learning new things. That's the best thing about being an engineer at the Volvo Group. There is such enormous potential for development," says Bruno Gaudin.

He is currently Acting Manager Engine Controls at Volvo Construction Equipment and divides his time between his home city of Lyon in France and Eskilstuna in Sweden, where he and his family previously lived. When they initially moved to Eskilstuna in 2011, encountering both Sweden and construction equipment was something of a cultural clash.

"Before that, I had only worked with trucks, so I had so much to discover. I was immediately fascinated by the fact that construction equipment could be put to so many uses. It's also fun to meet customers. It's often more relaxed when you meet them out in the mud!" He began his career as a trainee in Lyon in 2000, where he was primarily involved with Renault Trucks. He was then given the opportunity to move to Hagerstown for a couple of years, to work with Mack and Volvo Trucks. The whole family enjoyed the culture in the USA and Bruno Gaudin was impressed by the powerful team spirit at his workplace.

"Hagerstown isn't particularly large, so we could get closer to customers and it was easy to find informal ways of solving problems. I've learned a great deal from this," he says.

At the present time, he is something of a contact point for colleagues who are interested in working across national and organisational borders and do not really know who to ask.

"This can be difficult, but I think it would be good for both the company and its employees if more people took the opportunity to move around."

2016
Acting Manager Engine Controls, Lyon

"I like change and I enjoy learning new things."

BRUNO GAUDIN

BRUNO GAUDIN

Education: Master of Science, from IFP School, Rueil, France
Lives in: Chozeau in France
Family: married, three children
Leisure interests: outdoor activities and sports
The best thing about being an engineer: "We can do anything, changing locations or business areas, aiming for different career paths."

Mapping out career paths

For engineers at Group Trucks Technology (GTT), there is an enormous range of career paths. A job map makes it easier to take the right route.

With its 7,000 employees, GTT is one of the Volvo Group's largest units. GTT is responsible for research and development and the majority of its employees are engineers. There is an extensive range of career paths to choose from, but, in spite of this, the VGAS (Volvo Group Attitude Survey) results show that not all the employees agree that this is the case.

"Our employees and their skills are totally decisive. It's incredibly important for us to be seen as an attractive employer. To succeed with this, we need to make all the fantastic opportunities visible," says Agneta Bonna, Senior Vice President HR, GTT.

One step towards achieving this is the job map that has been developed for the 1,000 engineers in the Electrical & Electronics Engineering competence area. The map contains 30 jobs at different levels and within different categories. Jenny Hedström, Vice President HR Vehicle Engineering, is responsible for developing the concept.

"The job map isn't a career staircase. It shows the world of opportunities that exist in this particular area, Electrical & Electronics Engineering. Some people may not want to be managers, project leaders or specialists. The map helps employees and managers to understand the different paths that are available and the way different jobs are related to one another. It's also an excellent tool in connection with recruitment," she explains.


Agneta Bonna


Jenny Hedström

The job map will also help to create greater transparency and mobility within the organisation. All available positions will be advertised and everyone will be able to apply. "Greater mobility between the teams creates an enhanced collaborative climate, increased understanding and trust. If more people extend their skills and know-how, our delivery to the end customer will also improve," says Agneta Bonna.

The next step is a similar map for the 2,000 engineers working at Mechanical Engineering at GTT. "We want every employee to take responsibility for their own career and make the choices that suit each of them best. As there are so many career paths, it can be difficult to see all the opportunities. That is going to be easier now," says Agneta Bonna.

LINDA SWANBERG

JOB MAP

- Electrical & Electronics Engineering and Mechanical Engineering job maps show jobs in the career paths for engineers.
- The job map can be found in Employee Center on Violin.
- Employees can also pursue a career within Leadership Pipeline, Project Management Pipeline and Technology Specialists.

The automotive world is going through a period of dramatic change. Automation, electrification and digitalisation are attracting new players and forcing established companies to rethink their positions.

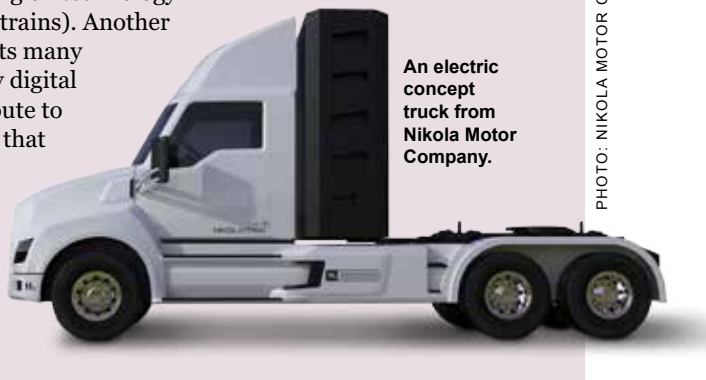
5 TRENDS

THAT ARE REVOLUTIONISING THE AUTOMOTIVE INDUSTRY

1 Newcomers with new ideas

The world of passenger cars has attracted a raft of new players who think in different ways, such as Tesla and Uber. These small start-ups are competing to come up with smart transport services for people who do not want to own cars.

This trend is now spreading to heavier vehicles, where Nikola is, for example, developing electric trucks, while Uber is involved with autonomous trucks. Peloton Technology, in which the Volvo Group is an investor, is focusing on technology for platooning (road trains). Another question that interests many companies is the way digital solutions can contribute to smarter transport so that trucks are no longer operated half full.



An electric concept truck from Nikola Motor Company.

PHOTO: NIKOLA MOTOR COMPANY

2 Large companies want to be like small ones

The traditional automotive industry is taking the challenge posed by new arrivals seriously. Last year, for example, Daimler announced that it was going to introduce a flatter, less hierarchical organisation. One fifth of its workforce is going to work in a decentralised swarm organisation, inspired by the world of start-ups.

3 New innovation strategies

Daimler is not the only large company to borrow innovation models from small entrepreneurs. When the prerequisites are unknown, a more agile working method is needed, where new ideas are constantly tested and everything can be reassessed. However traditional development methods are still important in projects of other kinds.

4 Customers are playing a new role

In the agile working method, it is important to obtain constant feedback from customers even before a technology or product is fully developed. Increasingly close and earlier collaboration with customers is a key trend.

5 Risk sharing

Large and small companies are collaborating on an increasing scale to develop new technology, new products and new services. No one company can be at the absolute cutting edge in every area.

MARIA SKÖLD

Trucks are working tools for haulage companies, helping them transport goods from A to B. "Uptime is by far the most important thing for us," says Johan Pålsson, Fleet Manager Schenker Åkeri.

"We would like raw data"

Every day, the Schenker Åkeri haulage company puts together a gigantic jigsaw puzzle to plan the routes for its 560 trucks and 300 trailers on the roads of Sweden. Software from the vehicles is key.

TEXT ANN-MARI ROBINSON **PHOTO** PATRIK OLSSON

"WE WOULD LIKE raw data from the Volvo Group to be made available to us to make it easier for us to adapt these data to our own fleet management system," says Johan Pålsson, fleet manager at Schenker Åkeri AB. He and 12 colleagues in different parts of Sweden make sure that the vehicles are roadworthy and optimised on the basis of efficiency and uptime.

Schenker purchases and leases trucks from Volvo, Scania and Mercedes and these vehicles operate from Sunday evening to Saturday morning. The longest route is 250,000 kilometres a year. According to the company's work environment policy, its drivers should be able to get home every evening, making the traffic set-up even more complex, with vehicles changing drivers at different hubs all over Sweden, from Malmö in the south to Luleå in the north.

"Every link in the chain is incredibly important to ensure that everything works, so Volvo Trucks' well-developed aftersales network is extremely valuable. Our collaboration and information exchange with the Volvo Group work really well. One thing that would improve the service level still further is a workshop vehicle that could be used while other vehicles are being repaired."

Thanks to technological developments, vehicles are improving the whole time, but they are also more complex. The 1,000 or so drivers need to keep themselves up to date when it comes to the different brands' HMI (Human Machine Interface) system in the driver's cab.

"I believe in a simplification that would make the vehicle better than the driver – the vehicle adapts the driveline and power settings to the planned route through dynamic interaction with the driver so that he or she can trust the truck to make the optimal choices. As things stand, there are far too many manual steps and selections."

THE SHORTAGE OF new drivers and long-term decisions when it comes to the infrastructure, environmental legislation and fuels are challenges Schenker Åkeri shares with other large haulage companies. Johan Pålsson's advice to vehicle manufacturers is to "dare to think along new lines without ever forgetting the past".

"We make a living from the goods and the trucks are our working tool. So uptime is by far the most important thing. Our trucks have to keep rolling." ⊙

SCHENKER ÅKERI SWEDEN

- One of Sweden's largest haulage companies and transporters in the DB Schenker network
- Part loads for goods and parcels under the slogan "public transport for goods"
- 560 trucks from Volvo Trucks, Scania and Mercedes, approximately 30% of each brand
- Operations in nine locations and around 1,000 truck drivers

HOW COOPERATIVE MERGING WORKS:

1. As the car approaches the highway, the cooperative merging system begins communicating with oncoming vehicles.

2. The truck and the car exchange data about position and speed, as well as other dynamic objects. The truck can then adjust its speed in order to let the car enter the lane.

3. The car periodically evaluates the best time and spot to merge into traffic, and automatically adjusts its speed accordingly.

4. The cooperative merging technology, based on collective perception, safely steers the car onto the highway.

With cooperative merging technology, vehicles communicate with one another to coordinate safe lane changes. The truck driver receives a warning on the dashboard and the speed of both vehicles is automatically adapted.

Foreseeing the road ahead

Through the EU's AdaptIVe project, Group Trucks Technology has been exploring how automation can be used to improve traffic safety. The project also shows the benefits of collaborating with external partners.

TEXT
NIC TOWNSEND

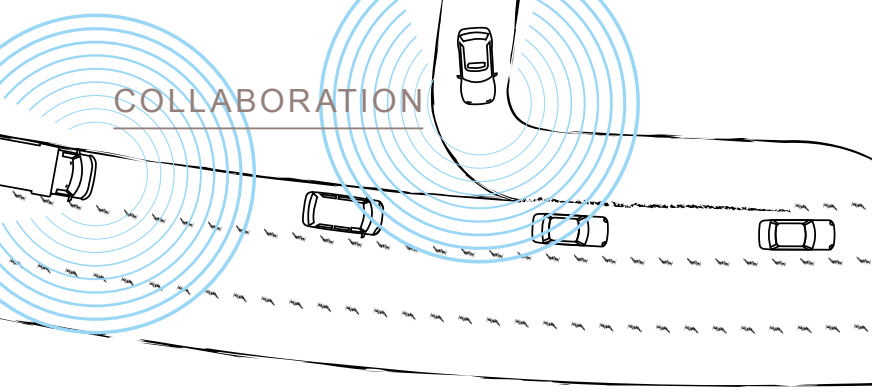
PHOTO
SÖREN HÅKANLIND

IMAGINE HOW MUCH easier and safer changing lanes and merging into traffic would be if vehicles could communicate with one another and manoeuvre themselves. When approaching a highway, all you would have to do was press a button and your vehicle would start evaluating the distances between oncoming vehicles, identify the best time and spot to merge, and then let oncoming vehicles know you were coming so they could automatically adjust their speed accordingly. You could take your hands off the steering wheel, let the car merge itself into traffic, safe in the knowledge that both your vehicle and any oncoming vehicles would time the lane change with perfect precision.

This is not science fiction – it is possible right now using proven technology developed by GTT as part of AdaptIVe (Automated Driving Applications and Technologies for Intelligent Vehicles) – an EU-funded research project aimed at developing automated solutions for improving road safety. The Volvo Group was one of 29 partners involved in the €25 million project, which has been coordinated by Volkswagen and ran for three and a half years before ending in June 2017.

Martin Sanfridson, the Research Engineer who led the GTT team within AdaptIVe, believes that developing advanced systems like this is only possible through joint research projects. "Vehicle-to-vehicle communication is not something we should do by ourselves. We need to communicate with vehicles from other brands to make it work, so we need to set common standards and work at an international level."

BEING INVOLVED IN AdaptIVe has given GTT's engineers greater freedom to experiment and expand their research, while also learning from others in the industry. "A lot of the sub-suppliers and other manufacturers are doing some very interesting stuff, so it's great to get some insight into what they are doing," adds Martin Sanfridson.



GTT's AdaptIVe team (left-to-right) with two demo trucks at Lindholmen in Gothenburg, Sweden: Robert Laxing, Johan Löfgren, Tommy Svensson, Martin Sanfridson, Robert Sjödell, Behnam Adlkhast and Erik Jonsson Holm.

For Urban Wass, Senior Vice President, Research & Innovation Policy, Volvo Group, the opportunity to access wider expertise and help establish industry standards, is the key reason why the Volvo Group is so active in external research projects. In fact, AdaptIVe is just the latest of over 200 European research projects that the Volvo Group has actively been involved in since 1984.

"There are so many technological areas that we need to master and the list is only growing," says Urban Wass. "We do not have the resources to cover them all so we need to collaborate. At headquarters, we are in constant discussions with the European Commission, ministries and national funding agencies."

THE REALITY IS that it will be a very long time (possibly even never) before cooperative merging technology becomes a standard feature in our vehicles. However, the knowledge and experience acquired through the project sets strong foundations for further research and development, particularly in the field of automation.

"The purpose of AdaptIVe and other research projects is to do research, and not everything will trickle down to a finished product, but there are some things from this project that we will take to other projects," says Martin Sanfridson. "We will continue to work with HMI and lateral control, and a great part of what we've developed will continue to be used in projects targeting automated driving."

Robert Sjödell (left) gives a demonstration of the cooperative merging technology to two colleagues, Aime Vesmes and Emma Wermström.

In fact, many of the Volvo Group's products and innovations have originated from external collaboration. "We introduced an advanced emergency braking system on the market before it became mandatory and that was only possible because of European research projects that we had been involved in earlier," adds Urban Wass. "Results from EU research have also been incorporated into our Euro 6 engines and electric drivelines." ⊙

Growing need for collaboration

AS THE PACE of technological change quickens, the need to collaborate with external partners will increase. GTT's new Research & Technology Office will help establish a more strategic and coordinated approach.

Today the Volvo Group is involved in over 120 publicly-funded research projects across the globe and works with a wide spectrum of partners, from large multilateral organisations to small enterprising start-ups. As technology changes, the mix is becoming even more diverse.

"Technological development is getting much quicker and more complex," says Helene Niklasson, head of the newly established Research & Technology Office. "There are now many more stakeholders and we are working with partners that we could never have imagined a few years ago. Which technology should we bet on? And how will we identify and qualify the right partners to work with?"

The Research Collaboration group within the Research & Technology Office has been set up by GTT to help answer these questions. It will coordinate research partnerships and be the main contact towards external partners, as well as ensuring that the Volvo Group's participation in research programmes is in line with the Volvo Group Technology Plan.

Helene Niklasson

Some of the key technological areas in the coming years – automation, electromobility and connectivity – will also involve setting new industry standards, making it even more important that the Volvo Group collaborates with others in the industry.

"Any technology we develop will need to be adapted to future standards and eco-systems, so it is obviously good to be part of building those eco-systems from the very start," says Joakim Svensson, who will lead the Research Collaboration group. "It is also good for the development of our engineers to let them be involved in these projects, so that they can stay up to date with technology trends."

Finding new ideas and inspiration

Everyone can learn to be more creative. Within the Volvo Group, there are courses, innovation labs and workshops to provide maximum training in this important art.

TEXT MARIA SKÖLD PHOTO NICOLAS DARTIAILH

Sofia Ohnell

Anitha Botta

SOFIA OHNELL HAS spent the last years as Innovation Planner, working to develop methods and processes for innovation and creativity at GTT, but she is eager to stress that this is not simply related to technology. Creativity is important everywhere and it is something everyone can practise and improve. The Volvo Group University, VGU, offers courses in the creative process and trained facilitators can help teams develop new approaches.

"We need to be innovative in absolutely everything we do – regardless of whether it involves the products and services we offer or how they are to be produced, sold or financed. First and foremost, it is a question of having an open, enabling culture in people's working groups, where everyone can test new ideas," she says.

An open attitude to other approaches is especially important in a period of rapid technological shifts. The Volvo Group currently needs to work in a number of different ways when it comes to innovation. It is a question of continuing to be good at developing existing products and investigating new technology, while testing the things that could become disruptive innovations or game changers.

"There's an enormous strength that can be generated by the way large companies like the Volvo Group combine forces to focus on innovation. At the same time, we also borrow ideas from agile start-ups. What's more, the needs differ tremendously in different places," adds Sofia Ohnell.

AS A RESULT, creative arenas have sprung up in different parts of the Group. One example is the Innovation Lab in Bangalore which is used primarily by teams that want to run creative workshops or develop their working methods in relation to innovation.

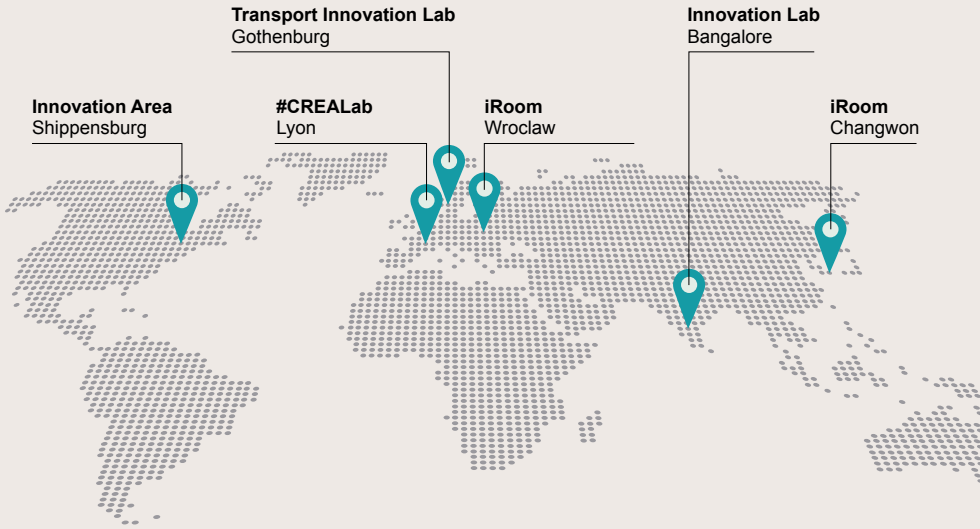
It has also become a natural place for collaboration between different parts of the Group, such as GTT, Group IT and Volvo CE, according to Anitha Botta, Technology & Strategy Planning at the Research Technology Office in Bangalore. External partners, such as customers and researchers, are also invited to participate in the development work.

"For example, we like to include drivers, to hear their views and opinions at an early stage. On a market like the one in India, customers are extremely cost conscious, so we need to work close to them and make sure we develop the kind of things they really want," says Anitha Botta.

Bertrand Félix, Stéphane Parisot, Nathalie Fontaine, Céline Buffet-Eymard and Ruggero Guerin at CREALab in Lyon, which has been a huge success. Read more on page 36.

Innovation and places for creativity

Anyone in the need of new ideas can try out the creative areas, or innovation labs, that have been established in different parts of the Volvo Group. Here, teams and co-workers should be able to work on problem solving, idea generation and development in an environment that stimulates creativity and inspiration. Some facilities also offer laboratories, as well as opportunities for prototyping and demonstrations.
The creative areas are open for anyone within the Group to use. To learn more, contact innovation@volvo.com. There is also more information at the Innovation Community on Violin.



Erasing the limits to creativity

At the CREALab in Lyon, there are no normal rules. This is where Bertrand Félix got the chance to experiment with new ways of using augmented reality.

TEXT MARIA SKÖLD PHOTO NICOLAS DARTIAILH

IN RECORD TIME, Bertrand Félix and his team have developed a software prototype for hololenses: glasses that use augmented reality technology. The idea is that these glasses will be used by operators at the Volvo Group's plants to perform quality control with intuitive head-up display instructions. The prototype is now going to be tested at the GTO Powertrain Production plant in Lyon after anchoring with global forums. At the same time, the team continues to investigate other possible applications for augmented reality.

This is a highly unconventional project, which started without a team and without a budget, when one individual co-worker came up with an idea. "I am actually manager of senior project leaders within Processes & IT at GTO, but, because I was previously involved with augmented reality, I recognised the potential it could offer the Volvo Group. I felt that, as the technology is now coming to maturity, this was the right time to explore it," says Bertrand Félix.

So, he contacted the CREALab, a creative space on the Volvo Group's site in Lyon. They believed in his idea and gave him access to their incubator. Bertrand Félix's boss gave him permission to devote 20 per cent of his working time to the project and some 20 people from different business areas eventually joined him. They all shared the same interest in augmented reality, creating a high level of energy and bringing knowledge from different parts of the Volvo Group.

"We started in January 2017 and we already have a finished prototype, so things have moved extremely quickly. What's more, it is far less expensive than other projects," says Bertrand Félix.

He sees the interaction with entrepreneurs and start-ups in the incubator as a huge advantage: "Inspired by them, we adopted an agile mindset in the team. This includes overcoming silos thinking, to collaborate as much as possible, as well as putting pragmatism and a fast pace into the project. We've been using internal co-funding and have made external partnerships."

Bertrand Félix does not think that his idea could have been realised without the CREALab, which was set up in 2015 by a number of pioneers. One of them was Céline Buffet-Eymard, Technical Training Manager.

The AR team in Lyon.

Bertrand Félix (left) and Frédéric Rabellino run a quality control check on a Volvo Trucks engine. This type of enhanced instructions can be a valuable tool for assembly-line operators.

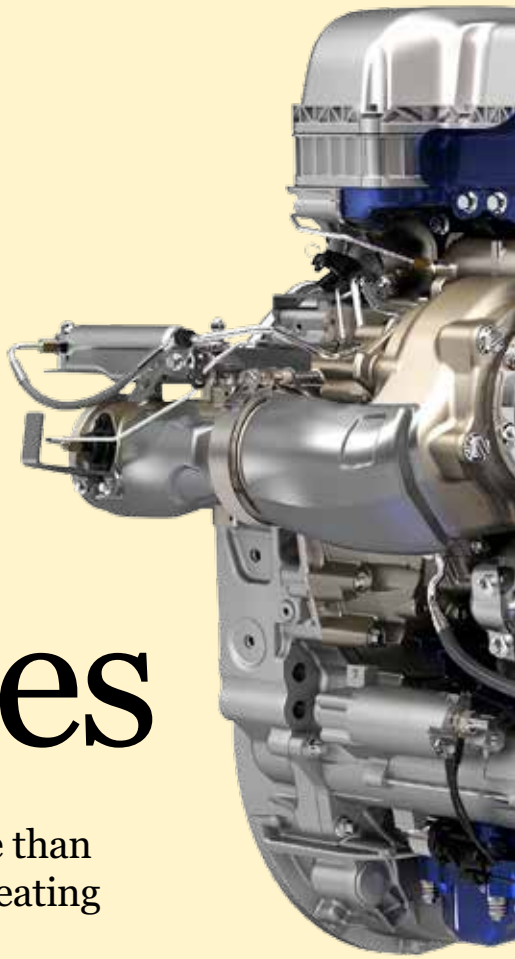
"At that time, there was no creative facility in Lyon, so we decided to make one. There were some empty premises and used furniture that we could use. As we had no budget, everything was done by volunteers," she says.

Staff cutbacks were being planned at the time and the CREALab soon began to function as an incubator for the co-workers who were thinking about leaving the Volvo Group. Everyone who was interested could apply and would then spend eight weeks part-time at the CREALab to see whether they were able to develop ideas into viable companies.

This kind of entrepreneurial spirit is also needed within the Group, according to Stéphane Parisot, another founder member. He is Innovation Manager at the Volvo Group University (VGU) and regards the CREALab as a place where the Group can develop innovative methods inspired by small start-ups.

"The VGU can help with training associated with realisation, for example. However, it's also a question of getting co-workers to think and act more like entrepreneurs," says Stéphane Parisot.

Rumours about the CREALab have spread outside the Volvo Group and many other companies are currently expressing an interest in making study visits. In Lyon, more creative spaces have been set up to meet the huge interest shown by co-workers. ◉



The next step for diesel engines

The Volvo Group diesel engines are the result of more than 100 years of development work. New technology is creating new opportunities to make them even better.

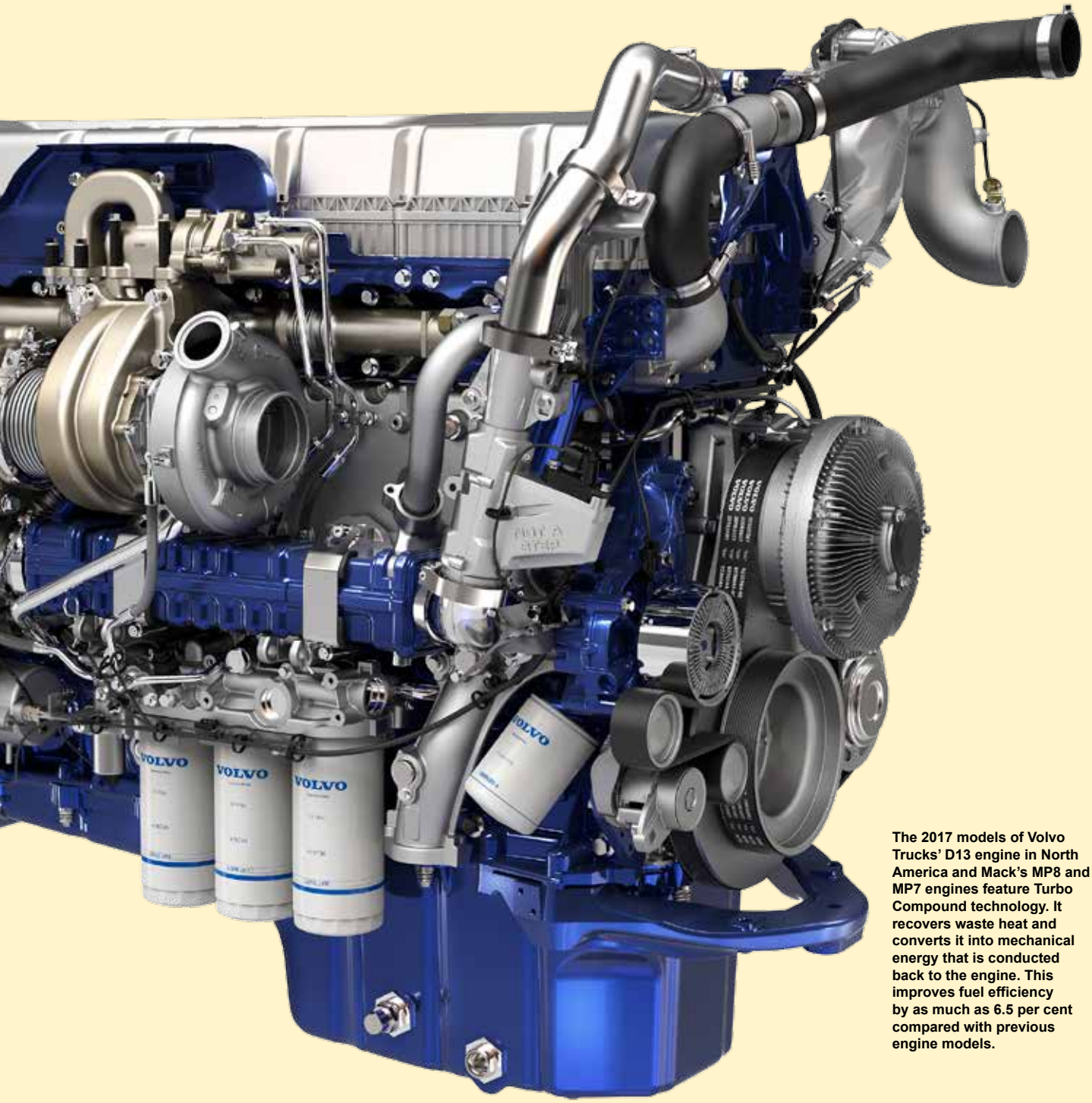
TEXT LINDA SWANBERG & LINA TÖRNQUIST
PHOTO PATRIK OLSSON & MARTIN MAGNTORN

WHEN RUDOLF DIESEL invented the first diesel engine in Germany in the late 19th century, it represented a revolution for the transport industry. Even today, it is still playing a central role for transports globally – in the Volvo Group alone, some 1,800 people are involved in engine development. Staffan Lundgren, Technology Advisor and Specialist at Powertrain Engineering in Group Trucks Technology, is one of them.

"In the foreseeable future, we do not envisage any technology that is going to be able to replace the combustion engine in long-distance transport. So it's incredibly important that we continue to improve and develop the engine both to comply with the increasingly rigorous legal requirements and to stay competitive," he explains.

Over the past 20 years, the fuel efficiency of the combustion engine has been improved by 20 per cent. At the same time, emissions have been sharply reduced. The main challenge going forward is to improve fuel efficiency still further, without impacting driving characteristics, while simultaneously reducing carbon emissions. To succeed, electrification is an important key.

"We often say that electrification is the next step for the diesel engine and what's going to support developments to continue moving ahead. As the electrification level of the engine continues to rise, the engine will be more precise and more effective. One example of this is the move from mechanical to electrical fuel injection. This was an important step when it came to fuel efficiency," Staffan Lundgren says.



The 2017 models of Volvo Trucks' D13 engine in North America and Mack's MP8 and MP7 engines feature Turbo Compound technology. It recovers waste heat and converts it into mechanical energy that is conducted back to the engine. This improves fuel efficiency by as much as 6.5 per cent compared with previous engine models.

Three milestones in engine development

1 Turbocharger

Volvo was the first company to fit a turbodiesel engine in a truck in 1954. This increased engine power from 150 bhp to 185 bhp, while reducing fuel consumption at the same time.

2 High-pressure injection system

The fuel injection system regulates engine output and influences efficiency and emissions. The replacement of the mechanical system with an electric one at the beginning of the 2000s resulted in large-scale improvements.

3 SCR catalytic converter

Selective catalytic reduction (SCR) is a technology that reduces nitrogen oxide in engine emissions. This emission control system was introduced in Volvo trucks in 2009 and has dramatically reduced both particulates and nitrogen oxide.

"The combustion engine is a complex system and there are many potential areas for improvement."

STAFFAN LUNDGREN
TECHNOLOGY ADVISOR AND SPECIALIST, GTT

Even if electric vehicles have attracted a great deal of attention in recent years, there is currently no battery technology that is sufficiently effective for most of the transport undertaken by long-distance trucks. On the other hand, Staffan Lundgren envisages real potential when it comes to using the electric motor as a complement to the combustion engine by implementing a number of development steps.

"An electric motor increases the potential to plan a journey and control engine operation to ensure the lowest possible fuel consumption for the customer," he adds.

IN PARALLEL WITH electric solutions, the Volvo Group is also working to adapt the combustion engine to alternative fuels, among other things. For example, Volvo Trucks recently launched a gas-powered truck with more efficient, cleaner gas operation and, in a number of places, tests are being conducted in which trucks are being powered by dimethyl ether (DME), which can be produced from a range of raw materials, including biomass.

"In order to use carbon-neutral fuels on a wider scale, society needs to make large investments. We have not as yet reached this point and it's important that we find new ways to improve fuel efficiency," says Staffan Lundgren.

The Volvo Group's most fuel-efficient engines are currently fitted in the new Mack and Volvo Trucks models that are being launched in the USA during 2017. Staffan Lundgren is convinced that it is possible to develop even more efficent engines. Software and control system strategies are an important key to future opportunities.

"The combustion engine is a complex system and there are many potential areas for improvement. New technologies will enable us to make it even better," says Staffan Lundgren.

Adding power with an extra turbine

THE SECRET BEHIND the new turbo compound engines which are being launched in North America this year is an extra turbine. Every aspect of the technology has been fine-tuned to deliver maximum fuel efficiency.

The new Volvo D13 with Turbo Compounding and Mack's MP7 and MP8 engines include an extra turbine after the turbocharger in the exhaust flow. This innovation allows the engines to make use of extra energy that has not been used up in the turbocharger and to give extra power to the engine.

THE NEW ENGINE range is highly efficient and offers a 6.5 per cent reduction in fuel consumption. It was developed as a cost-effective solution to meet stricter US emission standards.

The team behind the engine includes Per Andersson and Magnus Ising, both specialists in Aerodynamics at Powertrain Engineering, GTT in Malmö, Sweden. Between them, the two have over 50 years' experience designing and building turbine systems. Know-how that was brought into play when working on the new engine ranges.

AN ESSENTIAL ELEMENT in designing the new engine range with turbo compound technology was engineering a highly optimised turbo that maximises the efficiency of the entire system. A major challenge for the team was the extreme variation in pressure and speed of the exhaust flow. "The turbo compound rotor reaches a spin speed of 32 times the engine speed and the speed of the rotor varies between 20,000 and 60,000 rotations a minute," says Per Andersson.

In overcoming these engineering challenges, the team has delivered an engine solution that produces truly exceptional fuel efficiency.

Innovative colleagues, engine labs and advanced simulation tools constitute the heart of the development process at GTT where Staffan Lundgren works. New ideas and solutions involving a one-cylinder engine are being tested and verified here. "This engine has been converted more than 2,000 times to develop new technological solutions. It's also important to be able to fail in order to produce new results."

Per Andersson and Magnus Ising are specialists in Aerodynamics at Powertrain Engineering in Malmö, Sweden. Having a site for turbo development allows GTT to develop and test different engine prototypes and systems entirely in house.

Anders Eriksson, Product Manager at Powertrain Control, GTT, started working for the Volvo Group in 1998. He likes driving trucks himself to test different kinds of functionality. "I have the advantage of working on the entire chain, from concept to development and testing. This makes it easier to be innovative."

Mr 81 patents

The automated mechanical transmission (AMT) has simplified everyday life for truck drivers all over the world. They have Anders Eriksson to thank for many of the solutions.

IN MAY, ANDERS Eriksson, Product Manager at Powertrain Control, GTT, was presented with the Lifetime Achivement Award at the recently instituted Volvo Group Innovator Award. With his 81 patents, he is the employee who has obtained the most patents, the majority of which are linked to the AMT (Volvo I-Shift, Renault Trucks Optiride, Mack M-drive, and UD ESCOT-VI). "Being given this award is absolutely fantastic. Some ideas are perhaps never realised, but patents are a prerequisite when it comes to enabling the Volvo Group to be a world leader in this area. If we want to create customer value, we have to start by protecting products and services," he explains.

When the I-Shift was launched in 2001, it represented a huge technological advance for the Volvo Group. The technology is based on an unsynchronised main gearbox equipped with an electronic management unit which handles the clutch and gear-shifting. The system uses information about speed, weight, road gradient and torque to execute each gear shift with maximum precision.

Anders Eriksson and his colleagues have been working to develop and refine the software that controls the transmission. Their adjustments have, for example, helped to improve the tractive capacity from 44 to 300 tonnes. The solution is currently fitted in most of the Volvo Group's trucks.

ANDERS ERIKSSON IS now working on the new generation of I-See, a predictive cruise control system launched this year. I-See is based on technology enabled by connected vehicles, an area with tremendous development potential. It also has many similarities to the way Anders Eriksson works. "The challenge is to try to identify needs which customers aren't even aware that they have. What can we do that customers will appreciate? The trick is to work in a goal-oriented way and always be one step ahead."

The Quon is currently the only Japanese-manufactured heavy-duty truck with disc brakes.

Ground braking

The all-new Quon is UD Trucks' most technologically advanced truck model yet. Innovations and improvements – such as the disc brakes – are the result of Volvo Group common technology being adapted to meet specific market demands.

TEXT NIC TOWNSEND **PHOTO** JUN TAKAGI

THE DEVELOPMENT OF the new Quon was the largest project undertaken by UD Trucks in its 82-year history and it has involved Volvo Group colleagues from across the globe. One of the many innovations that helps distinguish the new truck is its disc brakes, which allow for smoother, faster braking, compared with conventional drum brakes. It has also been a key factor, among others, in reducing the overall weight of the chassis by 200 kg – a significant achievement, given that many people expect new truck models to increase in weight in coming years, as they are adapted to meet new emission regulations.

Disc brakes have been used in passenger cars for decades, but they have only recently been introduced in heavy-duty ▶

trucks and the Quon is the first Japanese-manufactured truck to feature them. This has been made possible by adopting technology from the Volvo Group and adapting it to suit local market needs.

"TECHNICALLY, THE COMPONENTS of the brake itself –the calipers, brake chamber, the pads, are part of our common Volvo Group technology," says Andreas Jokel, Project Manager Brake System. "For the Quon, we have developed a new pad material to meet Japanese market demands for long durability and optimised the ventilation of the brake disc. Yet the true challenge was the integration of the known components into a new arrangement and then testing it exhaustively to show that the parts can live up to Japanese expectations."

The adaptations were necessary since the unique operating conditions that can be found in Japan make it impractical simply to transfer across parts and components that have been developed for European markets. Heavy-duty trucks in Japan need to be able to handle the country's many mountainous roads, as well as the flat, congested urban streets found in many cities.

Throughout the project, which started in 2013, members of the Volvo Group Trucks Technology team from different parts of the world have worked together closely with their colleagues at UD Trucks in Ageo. To ensure the success of the integration, the UD Trucks team led the project cross site and cross functionally.

"One lesson we learnt is that a component alone, no matter how well engineered it is, is not a solution in itself," adds Andreas Jokel. "It is the integration that is the challenge and what determines the success of a solution. Integration into a complete vehicle and integration over the product lifecycle from development, production, sales and aftermarket."

ONCE THE DISC brake was developed, the next challenge was convincing the market of its reliability. The fact of the matter is that this is not the first time disc brakes have been used in heavy-duty trucks in Japan. During the 1990s, several manufacturers attempted to introduce the technology but without success.

"The perception of disc brakes was very bad, because of the brakes introduced in the Japanese market in the past," says Yoshikazu Suzuki, Soft Product Management, UD Trucks. "The materials and components were immature and they could not cope with heavy loads. Based on these experiences, many people are still afraid to use them."

The challenge therefore was to convince the market – both customers and UD Trucks' own sales teams – that the new disc brakes could deliver improved braking

The cross-functional team that helped adapt and develop the disc brakes for UD Trucks' new Quon (left to right): Kan Iida, Noriaki Hashimoto, Andreas Jokel, Aki Hoizumi and Yoshikazu Suzuki.

The all-new Quon

Under the pledge of 'innovation that puts people first', the all-new Quon includes a number of unique features for improved drivability, fuel efficiency, safety, productivity and uptime. This includes the EXCOT-VI automatic transmission; a cleaner, more powerful GH11 engines; and the Traffic Eye braking and Driver Alert system. It was launched in April 2017.

performance without compromising reliability or increasing maintenance costs.

"We have started some test-driving events for customers at a closed test track and approximately 700 customers have been invited so far," says Aki Hoizumi, Vehicle Product Offering, UD Trucks. "We've received a lot of good feedback about the disc brake. If we had not selected the disc brake, payload increases would have been limited. Overall, I think the disc brake offers the best balance between payload, and driving and braking performance."

Again, the support of the wider Volvo Group has been valuable. Since the technology is already proven in European markets, UD Trucks has been able to provide extensive technical and warranty information to support its reliability and performance, as well as customer testimonials.

"Once the braking performance is proven, perceptions change dramatically," adds Yoshikazu Suzuki. "By being the only Japanese brand to introduce disc brakes, we have shown that we are one step ahead and we have proven that both the Volvo Group and UD Trucks are far more advanced than the competition." ◉

Using automatic self-steering, the Volvo VM Autonomous stays aligned with the harvester while never deviating more than 25mm laterally from its set course.

Sweet success

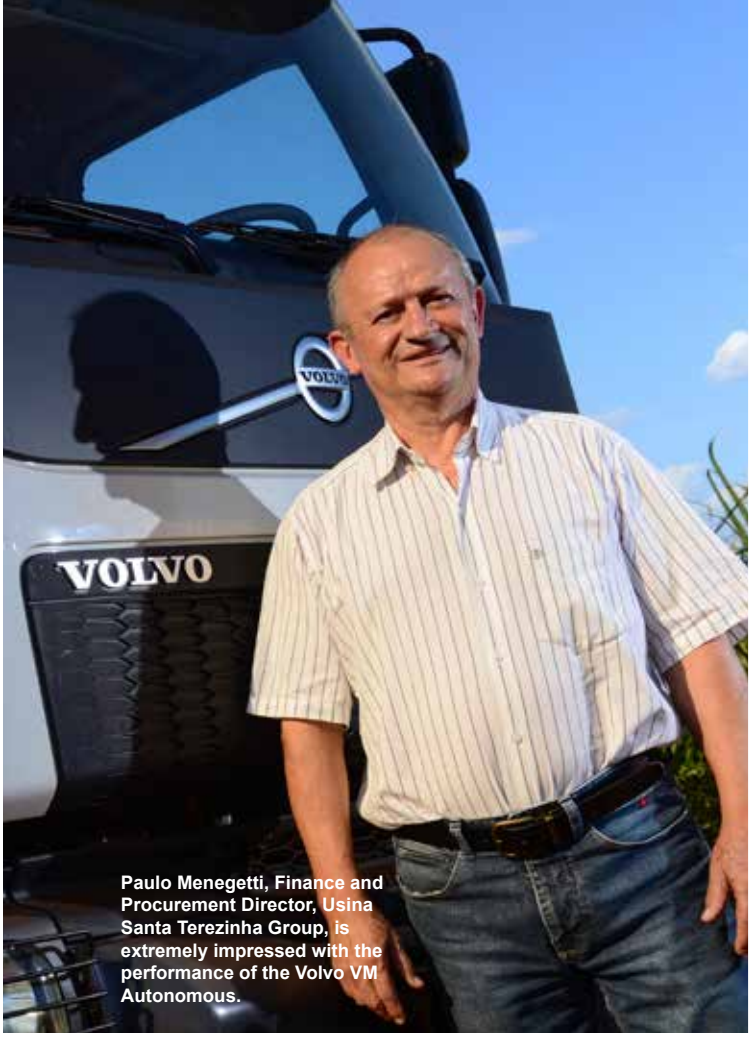
By combining and adapting technologies from across the Volvo Group, GTT in Brazil has developed an automated self-steering Volvo VM truck that can save sugar cane growers thousands of tonnes in lost production.

TEXT NIC TOWNSEND **PHOTO** HUMBERTO MICHALTCHUK

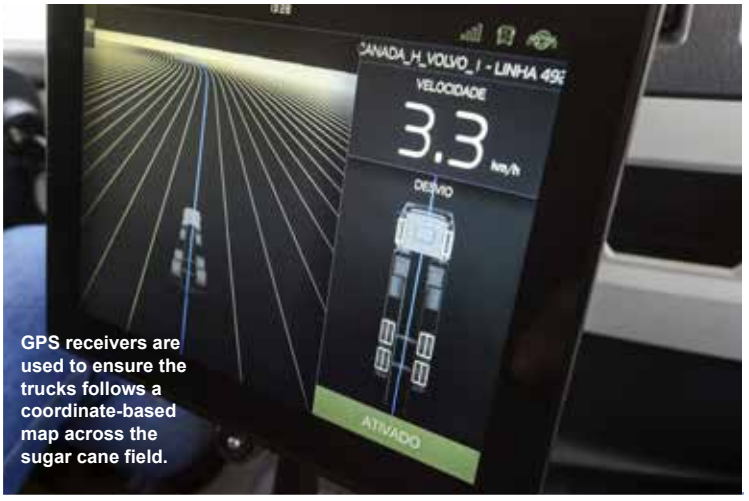
EVERY YEAR, THE Usina Santa Terezinha Group produces sugar and ethanol from its vast sugar cane fields in Maringá, southern Brazil, and it recently enjoyed a bountiful harvest thanks to a new prototype autonomous Volvo VM. The self-driving truck, which was developed specifically for the Brazilian sugar cane industry, can boost productivity by ensuring it stays within plantation lines when collecting freshly harvested sugar.

Ordinarily, sugar harvesting is a highly stressful operation for truck drivers. It requires them to maintain an excruciatingly slow yet consistent pace (around 4.5 km/h) that keeps them parallel to the harvester, while at the same time ensure minimal lateral displacement from the central line so they do not cross plantation lines and trample seedlings for next season's harvest. It is an impossible task and production losses are inevitable. After several years, the cumulative losses from the truck, trailer and harvester (around twelve per cent a year) reach a point where it is more economical simply to replant the whole plantation.

HOWEVER, THE AUTONOMOUS VM, which is being trialled at Santa Terezinha, uses an advanced GPS-RTK mapping system to follow a set path while also regulating the speed to stay in perfect harmony with the harvester. The result is exceptional control and high precision, which ensures the truck never deviates



Paulo Menegetti, Finance and Procurement Director, Usina Santa Terezinha Group, is extremely impressed with the performance of the Volvo VM Autonomous.



GPS receivers are used to ensure the trucks follows a coordinate-based map across the sugar cane field.

The new technology could increase sugar cane harvests by up to ten tonnes per hectare a year.

more than 25mm laterally from its set course.

"With the help of Volvo Trucks, we are able to increase productivity, not only for a single harvest but for the entire lifecycle of the sugarcane plant, which is five to six years," says Paulo Meneguetti, Santa Terezinha's Finance and Procurement Director.

It is estimated that the Autonomous VM will reduce lost production from twelve to eight per cent a year, by eliminating all losses caused by the truck. This will increase the time needed before the plantation has to be replanted, as well as relieving much of the strain and tension on drivers, which in turn will improve driver retention.

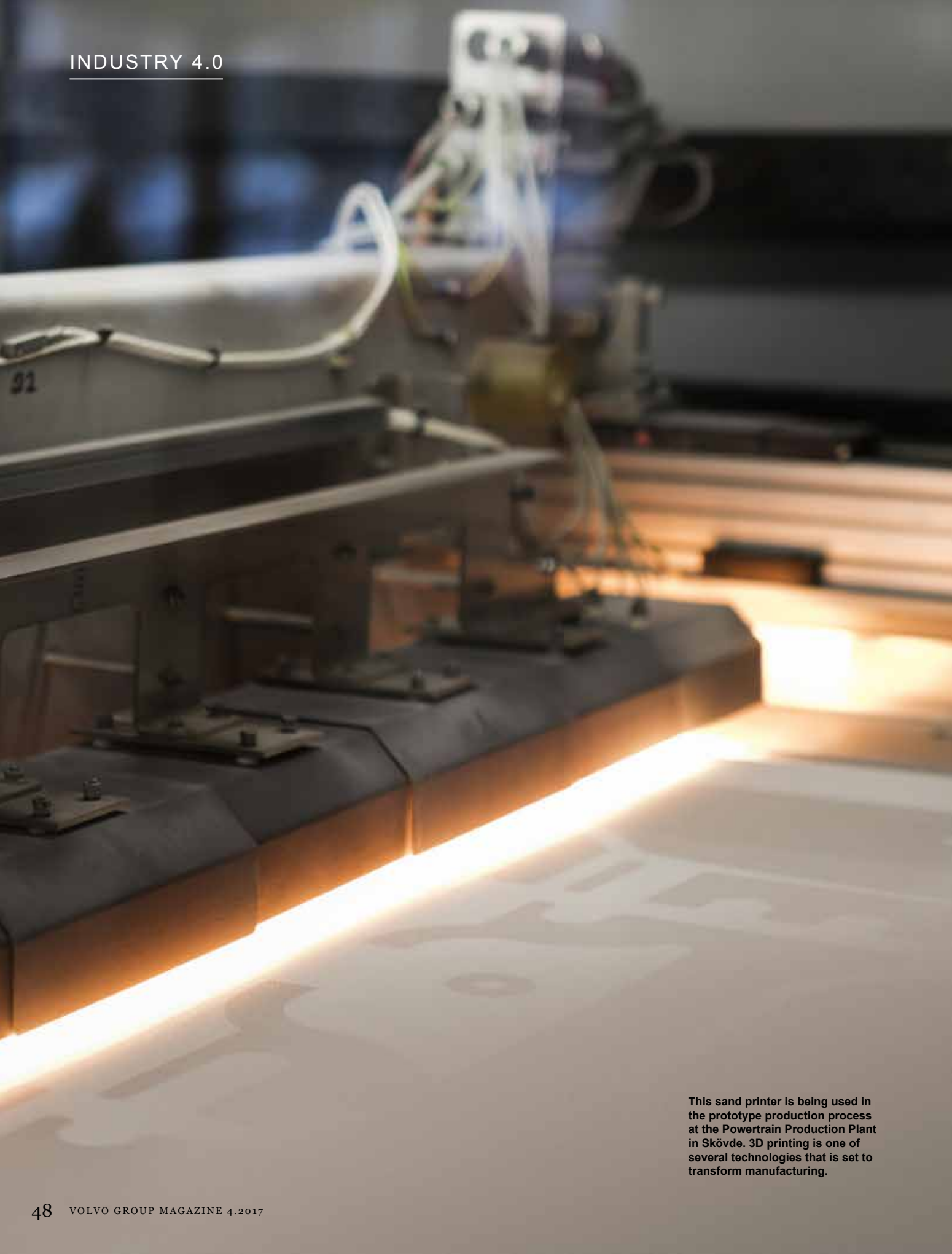
"Our focus is on two things: productivity for the customer and making life easier for the driver and this truck delivers both," says Roberson Oliveira, Project Manager at GTT, who has collaborated closely with Volvo Trucks on the development of the Volvo VM Autonomous.

Roberson Oliveira, Project Manager, GTT in Brazil

It has taken less than two years to develop the Autonomous VM and, after the success of the field tests at Santa Terezinha, it has the potential to be a commercial offer soon. This is a remarkable feat – especially given the project's relatively small team and low budget. But it has been made possible through strong collaboration across the Volvo Group, including being able to access and adapt technology from the other Volvo Group businesses.

FOR EXAMPLE, THE GNSS/RTK antenna and gyroscope network originated from Volvo Construction Equipment, the electric motor used on the steering gear comes from Volvo Dynamic Steering, the path-following base software has been adapted from that used by Volvo Penta and the electrical architecture of the Volvo VM has been updated using parts from Volvo Buses.

"This project is an example of how we can build synergies between different business areas," adds Roberson Oliveira. "We started at the end of 2015 and we have now already developed something that could be out on the market soon. This has only been possible because of our collaboration and agile way of working."



This sand printer is being used in the prototype production process at the Powertrain Production Plant in Skövde. 3D printing is one of several technologies that is set to transform manufacturing.

The future of manufacturing

Digitalisation technologies are transforming manufacturing. So what is in store? *Volvo Group Magazine* asks Thomas Lezama and Staffan Viden from GTO.

TEXT LINA TÖRNQUIST PHOTO PONTUS JOHANSSON

Put simply, the past two hundred years of industrial technology development can be summed up in three main stages: first came the steam engine, then electrification and later computers. Now, we are in the early phases of a new era: connectivity and digitalisation. This fourth stage is often referred to as Industry 4.0 and it is set to define the future of manufacturing.

"We're in a really exciting time and place," say Thomas Lezama and Staffan Viden at Group Trucks Operations (GTO). Together with their teams, they are tasked with looking at how new technologies such as 3D printing, big data and the cloud, can be adapted to the truck plants within the Group. They are also charged with coordinating strategy for the way plants can be redesigned to produce new types of products, such as electric and autonomous vehicles.

"Looking to the future, we see a variety of needs and goals: they can include cutting costs, increasing capacity, or meeting new emission rules. In some cases, the solution might be continuous improvement. In others, it's about introducing new technology. That's where we come in," says Staffan Viden.

Which technologies show the most potential to meet the Volvo Group's goals? To answer this question, the team at GTO has mapped out underlying technology infrastructure such as augmented reality and autonomous robots with current growth drivers related to manufacturing, ▶

"All this technology brings possibilities and it's a lot of fun. It's a great time to be an engineer."

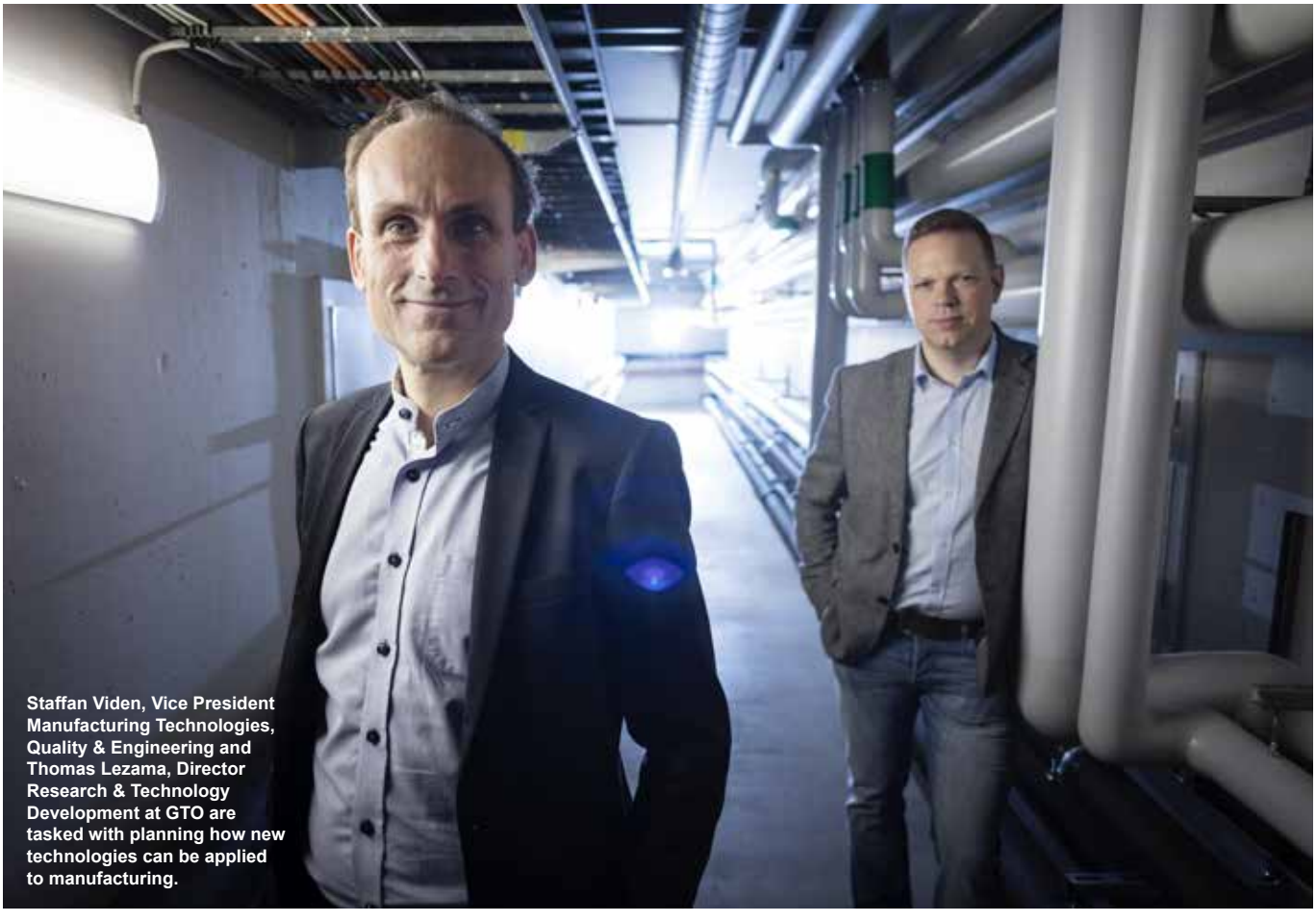
STAFFAN VIDEN, VP MANUFACTURING TECHNOLOGIES, GTO

such as smart supply chains and data-driven operational excellence. Already, there are 140 projects within GTO aimed at assessing the potential of these technologies.

"High-level technology in manufacturing is absolutely necessary," says Staffan Viden. "Since technology is developing rapidly, to keep pace, we need to have momentum beyond what is taking place naturally. Look at it this way; if you are standing still on an escalator, while others are walking, you are going to fall behind even though you are moving forward."

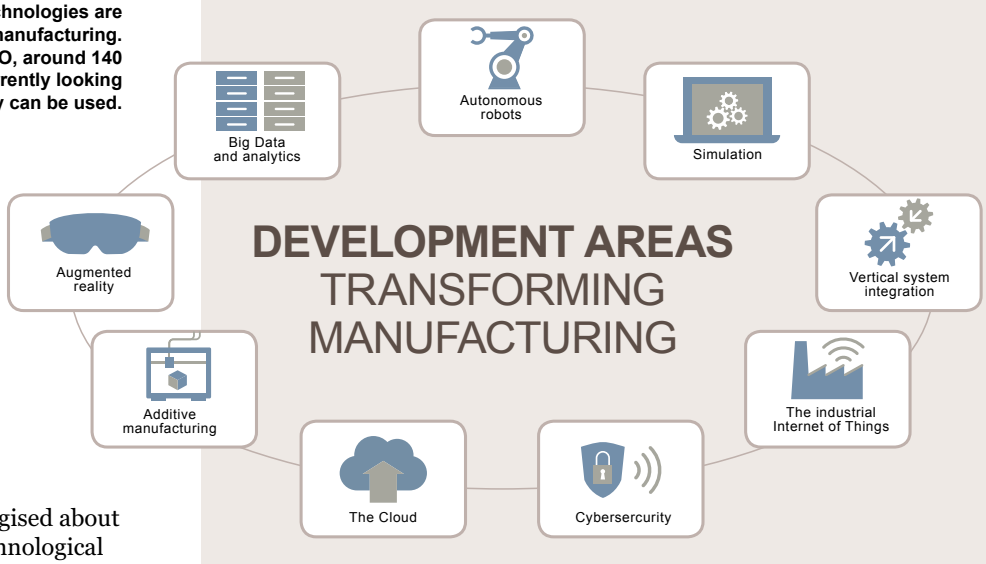
They point out that most new technology is not developed at GTO. Instead, they work with partners such as universities.

One example Thomas Lezama brings up is the work of developing smart manufacturing together with Linköping University in Sweden. "In plants today, robots are mainly in cages and work from precoded instructions. But we are working on projects that will bring them out of their cages and allow more human-robot collaboration. Robots can help with heavy lifting and manual work, for example," says Thomas Lezama.



Staffan Viden, Vice President Manufacturing Technologies, Quality & Engineering and Thomas Lezama, Director Research & Technology Development at GTO are tasked with planning how new technologies can be applied to manufacturing.

These technologies are changing manufacturing. Within GTO, around 140 projects are currently looking at how they can be used.



DEVELOPMENT AREAS TRANSFORMING MANUFACTURING

Both he and Staffan Viden are energised about the future, pointing at the pace of technological change today. "When I started working at Volvo Group, one of the most high-tech things that was going on was that we had started using CAD for designs," says Staffan Viden. But look at what's happening now! All this technology brings possibilities and it's a lot of fun. It's a great time to be an engineer."

Doesn't the long list of areas that you need to keep on top of seem daunting at all?
"That is not how we feel. Instead, we see it as a list of opportunities. It may seem daunting with so much novelty but if you look at the underlying technology, a lot of it isn't all that new. Look at the energy storage in today's electric vehicles. The underlying technology is batteries and they were developed in the 1830's. But now the materials are a lot better and that's opening a lot of possibilities," says Staffan Viden.

What about employees who are worried about the high pace of change?
"Everyone at the Volvo Group has a great deal of experience and knowledge, so we need to make sure that people have information and that they know where they can contribute. The way forward is to talk about the future. With these new technologies, we are looking at real trends. Some cities, for example, are moving away from diesel – that's a fact. So, we have to be ready with solutions," says Staffan Viden.

Name some things we may see going forward?
"There are so many cool things happening. As an industry, we are not far away from developing exoskeletons that can help people when they work, for example, by making them stronger or by raising them up into a more ergonomic position. That's something that was only possible in science fiction books before. But it's not far off now, perhaps as near as five years away," says Thomas Lezama.

1. ADDITIVE MANUFACTURING
Additive manufacturing, such as 3D printing, provides the possibility to produce more complex components and to improve the manufacturing process. It can be used to produce critical spare parts for the service market and opens up new business opportunities.

2. AUTOMATION AND FLEXIBILITY
Increased automation, humanoid robots that help with difficult assembly tasks and smart software robots that use artificial intelligence to help engineers, are all set to become more prevalent.

3. ENVIRONMENT AND ENERGY EFFICIENCY
Smart energy, water and material management will be key future priorities. When new process technology solutions are implemented, these should be sustainable. Included in this area is a focus on safety, health and workplace management.

4. BIG DATA AND THE INTERNET OF EVERYTHING
The Internet of Everything could make it possible to communicate with resources, in order to monitor, fine tune and control process steps. Big Data is set to make it possible to analyse and improve processes in real time as well as to predict maintenance requirements.

5. VIRTUAL MANUFACTURING
Virtual manufacturing allows for the prediction of potential safety, ergonomic, quality problems or inefficiencies. Using virtual tools to develop and verify processes improves quality and saves time and costs.

6. WEIGHT AND MATERIAL
New light-weight material and components will need new and advanced forming and joining processes and modified assembly strategies. Developing manufacturing processes that lead to weight reduction also presents opportunities to minimise material use and reduce waste.

3D printing is ideal for small batches of products, such as prototypes, because the printing process reduces the number of process steps. For serial production, traditional methods are still quicker and less expensive.

SKÖVDE

PRINTING CORES WITH SAND

3D printing is proving its potential. In Skövde, a sand printer is a recent addition to the plant. It has cut both lead times and costs of making protoypes.

TEXT LINA TÖRNQUIST **PHOTO** PONTUS JOHANSSON

In a small room a short walk from the smelting furnaces at GTO's Powertrain Production plant in Skövde, operators are dusting off sand from newly printed 3D sand cores. At first glance, they look a bit like archeologists picking through the remains of a space ship.

Unlike most 3D printers that produce plastic or steel objects, this sand printer produces objects using thin 0.3 mm layers of sand and glue. The end product of the process is a 'core' which is used for casting component prototypes.

By making use of both metal casting and 3D sand printing, the new process involves the use of both one of the most traditional manufacturing methods and one of the most high-tech.

These finished cores are about to be sanded off by the operators. The cores are then used to cast metal component prototypes. Each layer of sand in the core is 0.3 mm thick and is interspersed with a thin layer of glue.

“Our team is kind of run off its feet because we are getting so many requests.”

CARLJOHAN JOHANSSON, PROCESS ENGINEER

That has proved to be a winning combination.

The sand printer is now being used in a wide range of projects within the Volvo Group. Six months since being installed, the costs saved through shortened lead times are already evident.

ANOTHER MAJOR BENEFIT is the added confidentiality that comes from keeping the protype process entirely in house. Using a 3D printer also makes it relatively easy to make design adjustments to see what the effect of a design is in real life.

“When we are designing a part or an engine component, we can do a lot of work with digital simulation, but it’s not until we actually produce a part that we see the true result. That’s when we can know if the resulting protoype behaves exactly as it should,” says Carljohan Johansson, Process Engineer at the Skövde Powertrain Production.

Taken together, these benefits have generated increased demand for the work the team does: “It’s really fun, but our team is kind of run off its feet because we are getting so many requests.”

The project team also includes two operators: Lars Widhensparr and Johan Arvidsson. Both have worked at the plant for 19 years.

“It’s funny because we both started on the same day in 1998. Since then, we’ve been working in separate parts of the plant but now ▶

Operators Johan Arvidsson (left) and Lars Widhensparr are working on removing the sand from the finished cores. The process of producing 3D sand cores is faster than working with traditional methods because the process involves fewer stages.

we're back together again. So, you could say this project reunited us!" says operator Lars Widhensparr with a laugh.

HIS COLLEAGUE JOHAN Arvidsson has also enjoyed working in this new constellation and with the new technology. "This is really fun. It's high-end technology and it feels like the future. To do this work, it's important to be careful and detail oriented. There are challenges and we need to keep improving the process. We are working on limiting the amount of waste sand in the process. So, there's still a lot to be done, but the possibilities actually feel pretty limitless." ◉

AN ENVIRONMENTALLY APPROVED PROCESS

This sand printer produces objects using thin layers of sand and glue. Ahead of installing the 3D sand printer, the team worked with the supplier to cut down the toxicity of the chemicals used in the glue mix. "From a project perspective, we have worked a great deal with environmental issues. We made it clear from the start that we needed to have a process that is as environmentally sound as possible and that doesn't include chemicals on the Volvo Group's grey or black list. Getting there is something we are very proud of," says Erika Genberg, Project Manager, Casting Projects, Powertrain Production.

PHOTO: WERNER JUVIK

13.09 pm

Volvo Construction Days 2017, Hovinmoen, Norway

"**THIS HAS BEEN** a fantastic day! It was both exciting and rewarding to test new construction machines and trucks. I think the EC750E was coolest." Jeanette Edvardsen is involved, among other things, with excavation, transport and asphalt milling at Jan Edvardsen AS. She was one of around 700 customers who took part in the 14-day event, Volvo Anleggsdager (Construction Days), outside Oslo earlier this year. This event is jointly organised by Volvo Trucks, Volvo CE, Volvo Penta and Volvo Buses and presents the Group's wide range of construction-related products.

With the world in the midst of a huge technological shift, Olle Högblom, SVP Group IT and Group CIO, explains how the new Strategic IT Priorities will prepare the Volvo Group for the upcoming challenges and opportunities.

TEXT
NIC TOWNSEND

PHOTO
SÖREN HÅKANLIND

THE NEED FOR SPEED

Why are these new Strategic IT Priorities needed?

"There are essentially two key drivers: changes in the Volvo Group and rapid technological change in society. During the restructuring of the Volvo Group, Process & IT was focused on efficiency, commonality and streamlining processes. Now the Group has a new vision and a new direction, so our strategic priorities need to change too.

"At the same time, several IT and digitalisation technologies are rapidly reaching maturity and are set to change the way we live, work and conduct business. The Strategic IT Priorities outline issues that we feel are fundamental for the next three to five years."

In terms of IT, what will be the biggest challenge in the coming years?

"I believe it will be speed. IT or digitalisation will be increasingly important and present even greater opportunities both for us and our customers' businesses. For us working with IT, it will be a challenge to meet expectations of speed while not jeopardising quality or efficiency."

The new Volvo Group vision is much more customer oriented. How does the Process & IT community contribute to this?

"We will become more engaged in working directly with customer solutions and in supporting our business partners in their

"It's our ambition to be a solution provider and solutions are often a combination of products and services."

support of our customers. The opportunities presented by IT or digitalisation will impact many of our customers' industries as much as, or even more than, our own. In many cases, our customers will need our support to succeed in their own digitalisation journeys."

How will the Strategic IT Priorities be implemented in practice?

"It will influence the priorities in the different parts of the Volvo Group business. We need to explore the opportunities presented by new technologies and we will need to redirect some of our investments from more traditional areas to these new areas. Further, we will build up a number of capabilities, skills and foundational services in Group IT."

What parts of the Volvo Group will be most impacted?

"The general principle will be to prioritise areas where we have the biggest business benefit. For sure, we can expect a number of initiatives relating to improved customer solutions and improving the capabilities of people that are closest to the customer. But there will also be opportunities in manufacturing, in supply chain management, in R&D and in support functions."

Will the Strategic IT Priorities have any impact on people who do not work directly with IT functions?

"Hopefully everyone within the Group will see that we will become quicker in delivering new IT solutions. They will also hopefully find that our IT systems and tools become easier to work with, since we will be prioritising usability improvements as part of the 'design around me' initiative (see strategic IT priority no. 3)."

What differences will customers notice?

"They will see that the Volvo Group is even better at understanding and meeting their needs. It's our ambition to be a solution provider and solutions are often a combination of products and services. Digitalisation will allow us increasingly to customise solutions based on their industry segment or even individual needs."

Olle Högblom has been working with IT within the Volvo Group since 1989. Today, he has two roles: SVP Group IT, where he has operational responsibility for Group IT; and Group CIO, where he oversees all Process & IT functions.

IT WITHIN THE VOLVO GROUP

- The **Process & IT Community** is made up of the Process & IT (or Process & Solutions) organisations embedded within the different divisions and functions of the Volvo Group, Group IT and Connected Solutions. These organisations work closely together and jointly manage IT for the Volvo Group.
- **The TD/BA Process & IT functions** manage the demand for IT solutions and services and ensure that new solutions are deployed effectively.
- **Group IT** is the competence centre for IT within the Volvo Group and is responsible for IT deliveries and for the management of IT suppliers.
- **Connected Solutions** leads the development of services and solutions for Volvo Group customers enabled by connected products.

The Volvo Group Strategic IT Priorities are shared mid- and long-term priorities for the Process & IT community. Each priority addresses an area of fundamental importance to the Volvo Group and the IT community.

The Volvo Group Strategic IT Priorities

1 **Digitalise the Volvo Group.** Exploiting new IT-enabled opportunities to transform Volvo Group offerings, how it approaches the market, as well as dramatically improving its internal processes.

2 **Leveraging the value of the Volvo Group's digital assets.** Making use of new analytic tools and techniques and the data gathered at customer interaction points, in products and in internal processes, to improve sales and customer relationship management, to enable product improvements and to drive operational efficiency.

3 **Provide an attractive digital workplace.** Ensure that the 'digital workplace' supports making the Volvo Group an admired employer and a preferred partner. Increase the focus on the user-centric design of IT tools and systems, based on the principle of 'designed around me'.

4 **Establish architecture and IT platforms enabling speed and reliability.** Evolve the IT landscape to allow combining the reliability and efficiency of the 'operational backbone' with working in explorative mode with rapidly produced proof-of-concept solutions followed by quick scale-up.

5 **Secure best-in-class operational excellence in IT.** Significantly reduce lead times for the delivery of new solutions, while working with continuous improvement to further improve quality and efficiency.

6 **Develop strategic competencies and innovation capabilities.** Develop skills in new technologies, combined with nurturing a deep understanding of the Volvo Group's processes and IT solution landscape. Improve innovation culture and capabilities.

For more information on the Volvo Group Strategic IT Priorities visit Violin.

Participants in the battery sensors course test their recently acquired skills. Right now, Christoffer Bö is making measurements, while Tor Helge Solberg is checking inside the bus.

New opportunities

Rapid technology advances and increasingly demanding customers are putting new pressure on the bus industry. But in the small Swedish town Säffle, it has also created new business opportunities.

TEXT MARIA SKÖLD **PHOTO** CHRISTER EHRLING

"SO, WHO WOULD like to begin?" Mattias Andersson, the teacher, has gathered together all nine participants enrolled in the course on troubleshooting Euro 6 components. They are standing round a brand-new Volvo bus from the 8900 model series and have the chance to test what they have just learned.

Constantly interspersing theory and practice is a cornerstone of the philosophy here at the Competence Centre in Säffle, which is part of the Volvo Group and runs most of the advanced training for Swedish and Norwegian bus technicians.

"The courses are really effective. This is, in fact, the ninth time I have been here and it has always been great," says Mads Garlid, a participant from Stryn in Norway.

Mads Garlid is a bus key technician and so he is regularly summoned to Säffle for further training. Most of the 850 people who were

RUNE HJELLE
Trucknor Sogn og Fjordane in Stryn in Norway

"I have been working at Trucknor since 1989, on both buses and trucks. Buses are special, because they have more parts and fittings. The technology shift, with more and more electrical operation, is exciting."

MADS GARLID
Trucknor Sogn og Fjordane in Stryn in Norway

"As I'm a key technician, I often come to Säffle for courses. Training is both enjoyable and exciting. We have also taken part in VISTA for the aftersales market and have made it to the final on three occasions."

MAGNUS KRING
Bilbolaget Lastvagnar Persson & Co, Sundsvall, Sweden

"I'm responsible for parts, but this is a fairly new position for me and that's why I'm attending the course on parts. It's interesting and it provides a really good overview."

COMPETENCE CENTRE

Activities: Trains bus technicians and other service staff in the Nordic Region. At the facility in Säffle, there are three trainers. Training also takes place in Denmark and Finland. In 2016, some 90 courses were run in Säffle.

VOLVO BUS BODY REPAIR CENTRE & VOLVO PARTS SUPPORT

Activities: Handles conversions and parts management. Both new and older buses are upgraded and customer adapted. Buses damaged in road accidents are also repaired here.

trained here last year were technicians, but service advisers, parts managers and driving instructors also take part. Right now, there are 14 courses to choose between.

"We need to update our course programme the whole time, as developments are taking place so rapidly. Today's technicians need to understand both conventional technology and hybrids and electric buses," says Magnus Björkström, head of the Competence Centre.

He can see a steadily expanding need for training, from both dealers and customers with their own workshops. Some, but not all, of the training courses at the centre are also available to customers' technicians.

THE COMPETENCE CENTRE was set up in 2008, but in 2013, when bus production in Säffle was phased out, the future looked uncertain. Would all the Volvo Group's operations disappear from Säffle?

That did not happen. After a period of uncertainty, it became clear that Säffle would retain both the Competence Centre and the Volvo Bus Body Repair Centre, which has also been given an increasingly important role when it comes to meeting new requirements in the competitive bus industry.

The Volvo Bus Body Repair Centre is made up of two parts. The first, Volvo Parts Support, provides dealers in Sweden and Norway with parts and support. The other is involved in adapting and upgrading buses to ensure that they match customer requirements exactly. This can include fitting a bus with a wheelchair lift or with components that are not part of the standard range.

"We need to update our course programme the whole time, as developments are taking place so rapidly."

MAGNUS BJÖRKSTRÖM,
HEAD OF THE COMPETENCE CENTRE

"These operations are becoming increasingly important and, within the Volvo Group, we are the only unit in Sweden that offers them," explains Torbjörn Ryen, site manager at the Volvo Bus Body Repair Centre.

The rapid technological developments also mean that more and more upgrades are being made to existing buses. Among other things, customers want new cameras, IT cabinets and connections of various kinds. The last of these is something current passengers simply expect.

"The demands that are imposed on service and comfort are being stepped up the whole tine and the future therefore looks bright for us," says Torbjörn Ryen. ◉

DELIVERING VOLVO QUALITY

NRV ASSEMBLY PLANT BEGINS PRODUCTION OF NEW TRUCK MODELS

Volvo Trucks North America has launched its first new products in more than 20 years for long-haul and regional-haul applications.

TEXT JANICE KIZZIAH **PHOTO** VOLVO TRUCKS

IT WAS LATE evening on the 10th of July 2017 – launch day for the new Volvo Trucks VNL series in North America – and Göran Nyberg could not stop smiling. Hours after the big reveal at the brand's new Customer Experience Center in Dublin, Virginia, members of the press, employees and special guests were still examining the newly built VNL tractors on display.

Göran Nyberg, President Volvo Trucks North America, had looked forward to this day since moving to the US in 2012 to lead the Volvo Trucks team. "It feels good to celebrate the end of the project phase and go to market," he says. "We're ready to harvest the great work that's been done to make our products super modern, more aerodynamic and extremely efficient."

Göran Nyberg

About 60 per cent of Volvo Trucks' business in the region is in the long-haul sector, and the new VNL series is the brand's flagship offering. With its sleek design, the VNL caters to large fleets or owner-operators who spend days or weeks on the road.

THREE MONTHS AHEAD of the VNL launch, Volvo offered a preview of what was to come with the introduction of the VNR series for regional-haul applications.

The new Volvo Trucks VNL series represents the brand's flagship offering in North America.

VNL AND VNR FEATURES

- Engines meet EPA greenhouse gas 2017 standards and are up to 3.5% more fuel efficient than previous models
- Telematics hardware for Volvo Remote Diagnostics
- Improved visibility and aerodynamics thanks to lower hood design
- Reduced vehicle weight for more payload
- Collision avoidance via Volvo Active Driver Assist
- Automotive-quality headlamps for greater visibility
- Industry-leading ergonomic seating
- Position Perfect steering wheel
- Connectivity via WiFi, Bluetooth
- Navigation, apps, exterior camera and infotainment system with Apple CarPlay
- **VNL:** Upgraded sleeper cab
- **VNR:** 50-degree wheel cut for greater manoeuvrability

"We're extremely competitive with this new lineup, and I'm willing to bet on our success."

GÖRAN NYBERG, PRESIDENT VOLVO TRUCKS NORTH AMERICA

Considered a premium work truck, the VNR features exceptional manoeuvrability for drivers who need to navigate city traffic or tight spots when making deliveries.

Both the VNL and VNR have narrower hoods for improved aerodynamics and visibility, along with redesigned grilles and new headlamps that improve visibility at night. The result is an overall look that's distinctly Volvo. "Our product design team did a fantastic job making sure these trucks show off the Volvo brand exactly the way we wanted," Göran Nyberg says. "You'll recognise them as Volvo trucks from a long distance."

For increased efficiency, the trucks include Volvo's I-Shift automated manual transmission and XE (eXceptional efficiency) package. But it's the cab interior that drivers can't stop talking about – from the most ergonomic seating in the industry and Position Perfect steering that helps reduce driver fatigue, to advanced connectivity and infotainment features.

"**WITH OUR NEW** VNL and VNR series, we're capturing the attention of a new generation of drivers," Göran Nyberg says. "We're extremely competitive with this new lineup, and I'm willing to bet on our success."

With the new VNR, Volvo Trucks expects to grow its share of the regional-haul market.

VOICES

A renewed sense of pride

The launch of new truck models in North America has brought a renewed sense of pride at the New River Valley plant in Dublin, Virginia, where they're built. Four employees share their experiences.

William Price
Off-line Repairman

As an Off-line Repairman, William Price's primary job at the NRV plant is making repairs and modifications to Volvo trucks before they're delivered to customers. He also has a commercial driver's license, and earlier this year he drove a new VNR 640 tractor decorated with special graphics to honor US veterans at Memorial Day celebrations. "I really like the layout of the dash, and the visibility is perfect," he says. "It also has a good turning radius, letting you get in places without backing up and pulling forward several times."

As a member of the plant's ambassador program, William Price is often called on to greet customers and answer their questions about the trucks and the assembly process. It's one of his favorite parts of the job. "I've worked in every phase of production in my 30 years here – the paint shop, axle line, cab line, you name it," he says. "I feel proud when I see a Volvo on the highway because I know we built that truck."

Renee Williams
Parts Assembler

"When you hear the name Volvo in this community, it's a big thing," says Renee Williams who works the evening shift on the NRV cab line. "We put out some beautiful trucks here, and the best part is that I get to see them every day."

She joined the Volvo Trucks team more than 5 years ago, and her current job is assembling parts for overhead storage boxes in the cabs. She quickly adapted to the new parts needed for the VNL and VNR series. "It was important for our team to get up-to-speed as quickly as we could," she says. "We all strive to do a quality job because we want our customers coming back."

That level of commitment has earned Renee Williams the opportunity to greet and interact with customers and other visitors in her role as a Volvo Trucks ambassador. "We have a lot of opportunities to get involved in activities outside of our regular job. I like that."

Dean Trueheart
Quality Technician

In advance of the new VNL and VNR production, the NRV plant completed a significant renovation of its paint operation, including the addition of new robotic sprayers that provide a near-perfect finish. Dean Trueheart couldn't be prouder of the new facility. The upgraded equipment is also making his job as a quality inspector much easier. "We had to adjust the direction of the spray because of the different hood shape, but we're seeing very few defects," he says "These new products look amazing – a real eye-catcher."

Dean Trueheart has worked at NRV for 23 years, following in the footsteps of his father who retired from the plant in 1998. "I like the fact that customers stop by the paint operation on their tours. A lot went into setting up this new process, and now our shop is spotless. It's a great opportunity to showcase what we do."

Todd Boothe
Parts Assembler

Todd Boothe likes to build race car engines in his spare time, a job that requires careful attention to detail. He brings that same discipline – along with a commitment to continuous improvement – to his work at the NRV plant.

As a Parts Assembler on the cab line, he makes sure the correct door panel parts are ready for the production line. "The whole interior of the trucks changed dramatically with the new VNL and VNR models, and we have more wiring harnesses and more lights than before," he says. "When we started the new production, our team worked with the engineers and the designers to find the best process. The goal was to make it as streamlined as possible so we could eliminate errors."

Todd Boothe has worked at the NRV plant more than 25 years, and he believes the culture of teamwork and camaraderie makes a difference in product quality. "When you focus on staying upbeat and positive, it makes for a good place to work. Things tend to run smoothly, with no chaos."

TEXT **JANICE KIZZIAH**
PHOTO **MARCUS THOMPSON**

NRV PLANT

Location: Dublin, Virginia
Employees: 2,350
Founded: in 1981
Builds: VNL, VNR, VNX, VHD and VAH models
Recent upgrades: North American paint operations, 50-plus robots in body-in-white weld shop. Uses carbon-neutral electricity since 2014.

5 QUESTIONS TO ANTONIO NICOLETTI

SALES MANAGEMENT, VOLVO TRUCKS, SWEDEN

The Volvo Ocean Race is not just a sailing race, it is a global customer event out of the ordinary and a chance to build relationships and share knowledge. Ultimately, that helps to sell vehicles and services.

What's your role at the event?

"I am part of a working group that puts together the customer programme during the race. The Volvo Ocean Race is a full conference programme. In all, customers spend around six hours a day learning and networking. We are tasked with putting together an itinerary that's holistic and helps our customers' grow their business and raise profitability."

Why does the Volvo Group co-host the Volvo Ocean Race?

"Relationships are the very essence of our business. Through the Volvo Ocean Race, we have the chance to interact with our customers, over several days. We can listen to their needs and share our expertise. Visits to the race village allow customers to experience the Volvo brand values and its range: from buses and trucks, to construction equipment, marine engines, industrial engines and cars. Being able to show that breadth is a big advantage!"

What types of customers attend?

"There is no typical attendee: they span from single-vehicle owners, to owners of huge fleets. The customers who attend are most often invited through dealers, so we depend on them to make the call. One thing I know that customers appreciate is being able to interact and learn from their industry peers.

"Meeting others can also lead to sales. In the previous race, we sold trucks to one customer in large part because of a conference session in which several other customers gave positive feedback."

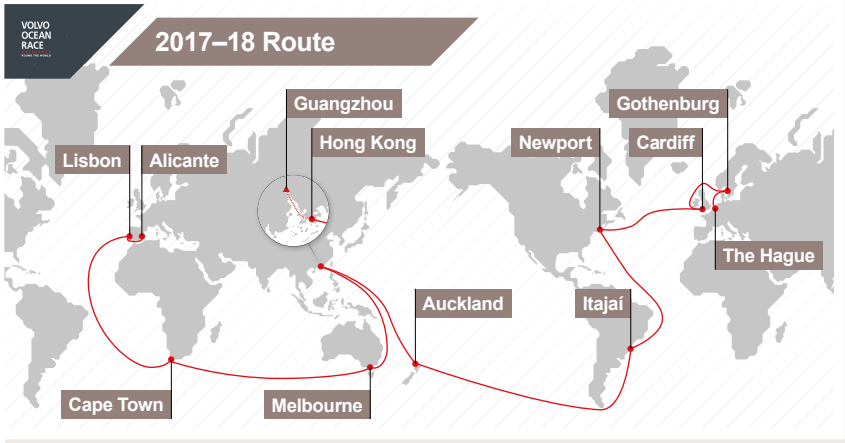
What is arranged for customers?

"Customers pay to attend the Volvo Ocean Race, just like they would to attend a conference. So, we present them with a full programme: lectures from experts, workshops, site visits, visits to the race village. We really sweat the details of the customer experience, because we want to give them that "little bit extra" which makes the experience both seamless and unforgettable. Our customers trust us to give them an experience that is truly out of the ordinary."

What are you looking forward to in this edition of the race?

"I'm really looking forward to the sailing. I love that aspect of the event and I hope it's a good race. There's also been a lot of customer interest in Hong Kong, which is a new port. The added racing opportunities in the home port of Gothenburg are also going to make that a destination to watch."

LINA TÖRNQUIST



The Volvo Ocean Race is known as the world's toughest sailing race. It takes place over nine months and circumnavigates the globe.

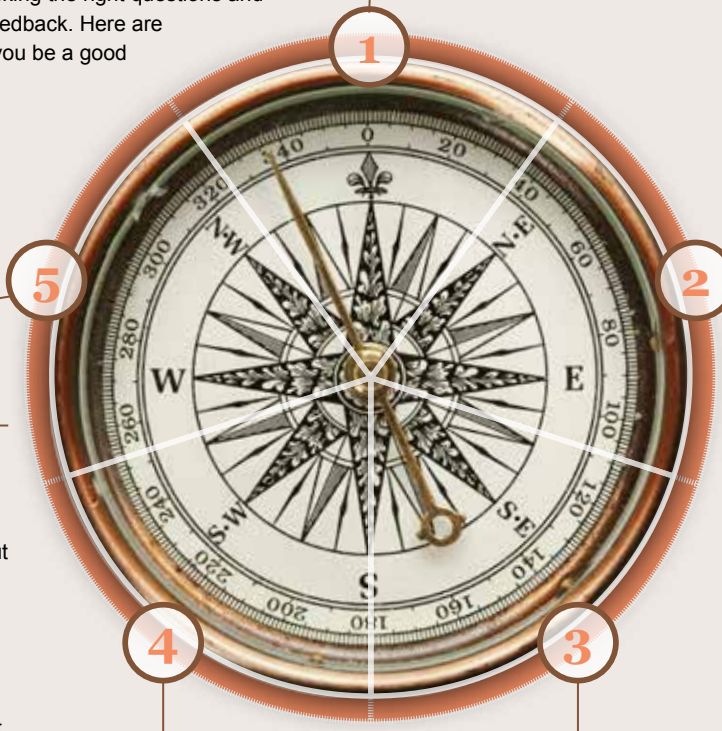
PHOTO: SÖREN HAKANLIND

“The Volvo Ocean Race improves both customer relationships and the image of the Volvo brand,” says Antonio Nicoletti. During the previous edition of the race, the Volvo Group hosted 20,000 corporate guests and sold 900 Special Volvo Ocean Race edition trucks.

Coaching the right way

WOULD YOU LIKE to help your colleagues or employees to learn new things and develop at work? If so, it is good to understand the basic elements of coaching. It is largely a question of listening, asking the right questions and giving well-thought-out feedback. Here are some useful tips to help you be a good coach at work.

TEXT: **KARL JANSSON**



1 Show interest

Put away your mobile phone and close your laptop. What is the person on the opposite side of the table actually saying? Showing interest is the most important factor. Allow your colleague to finish speaking and show that you are listening and actually paying attention to what they are saying. Little gestures like a confirmatory "mm", a nod or a carefully chosen follow-up question, can go a long way.

2 Open the door

One of the objectives of coaching is to help your colleagues think along new lines and develop in their role. One way of achieving this is to allow your colleagues to come up with the answer. Ask open questions, such as, "What are your thoughts?" or "What would happen if…?".

3 Not everything at once

"What are you hoping to achieve and how are you going to do it?" To help your colleagues and employees achieve their objectives, you must help them to express their objectives in concrete terms and find sub-objectives.

4 Feedback

Coming back to questions and giving your opinion on how things are going is decisive. Remember to give feedback on one thing at a time, so that what you say is established in the mind of the recipient. Be concrete and clear when you give your views and opinions on what is good and what could be improved.

5 Talk about behaviour, not individuals

Take care not to talk about personal characteristics when you give feedback. Talk instead about behaviour. Behaviour can be changed or repeated, personalities are constant.

Want to learn more about coaching? Volvo Group University offers several courses on the topic.

Coaching for Performance Training to develop managers coaching skills

Individual coaching for leaders A professional coaching program for leaders

Sources: www.forbes.com, www.ledarna.se

PHOTO: COLOURBOX

PHOTO: VOLVO TRUCKS

‘See and Be Seen’ is Volvo Trucks’ road-safety programme for cyclists. The programme features activities that demonstrate how to improve safety in the interaction between cyclists and truck drivers.

New report on traffic safety

EARLIER THIS YEAR, Volvo Trucks’ Accident Research Team released a new safety report, which showed that, in the past decade, the number of serious road accidents involving heavy-duty trucks has almost halved in Europe.

However, truck accidents involving vulnerable road users have not been reduced to the same extent. 35 per cent of people who suffered injuries or fatalities in traffic accidents involving heavy-duty trucks were vulnerable road users such as pedestrians, cyclists and motorcyclists.

“Cutting road accidents is an immensely important global issue. That’s why we want to share our research results in a clear and easy to understand way,” says Peter Wells, head of the Accident Research Team.

Volvo Trucks’ work towards better safety is ongoing. Through awareness campaigns such as ‘Stop Look Wave’ and ‘See and Be Seen’ and through innovations such as rear view cameras that detect vulnerable road users – safety is improving.

The report also highlights concerns surrounding safety belt usage among truck drivers. “Far too many truck drivers don´t use their safety belt. We know that half the unbelted truck drivers who have died in road accidents would have survived if they had been wearing their safety belt,” says Carl Johan Almqvist, Traffic & Product Safety Director at Volvo Trucks.

The Volvo Trucks Safety Report 2017 is the second externally published report from the Accident Research Team. The report can be found at **volvotrucks.com**.

Traffic Safety Dialogues

DURING 2017, several Traffic Safety Dialogue meetings have been held across Europe. The Volvo Group has invited different organisations to participate in the summits to discuss the future of traffic safety. “The purpose of the meetings has been to share knowledge, experience and new ideas concerning traffic safety,” says Peter Kronberg, Director Safety, Volvo Group.

The goal is that the findings of the conferences will be presented at a Volvo Group Safety Day in Gothenburg at the end of 2017.

Love to learn

English is an important business tool that ensures that Volvo Group employees are able to communicate effectively with colleagues and customers globally. Virtual English courses from the Volvo Group University are now open for applications.

A SET OF NEW COURSES PROVIDED by Volvo Group University give employees the chance to raise their English level. The newly introduced English Live courses all provide unlimited access to 2,500 hours of online content and exercises, as well as guided group discussions. Additionally, courses include scheduled private reviews with a teacher. Premium Plus course participants also have access to a set number of one-to-one teacher-led classes.

Some 350 Volvo Group employees have already taken part in the English Live programme as part of its pre-launch test phase.

One of them is Takashi Ogose, Material Controller at UD Trucks Production Planning Department, who uses English to communicate with colleagues and suppliers overseas:

"I'VE BEEN TAKING part in the programme for six months and it's made a big difference, especially for my listening comprehension. Before, when I attended a meeting in English, my understanding would be around 30 per cent. Now, I understand about 60-70 per cent.

"For the first three months of the course, I made an effort to study one to two hours every day and made a lot of progress. The past few

PHOTO: JUN TAKAGI

Takashi Ogose, Material Controller at UD Trucks in Ageo, Japan, is one of 350 employees who have enrolled in Volvo Group University's online English course. He believes it has helped dramatically to improve his listening comprehension.

months have been busy for me as I am working on a big project, so I've been able to spend less time studying, but I plan to make a renewed effort over the coming weeks.

"Taking part in the programme was a great opportunity because it forced me to study every day and English became part of my daily routine. I've especially found the parts of the course which use voice-recognition to be a big help. These excercises have aided both my listening and response time.

"My advice to others who would like to do this: keep working with it every day and make it part of your daily routine," says Takashi Ogose.

LINA TÖRNQUIST

What is included and how to apply

English Live courses provide unlimited access to 2,500 hours of interactive English content and exercises online. Since the courses are online, they allow participants to study anywhere, at any time and on any device (through a company or private computer, tablet or smartphone). Courses start four times a year and are open to employees at all English levels.

Different types of courses are available:

- Premium is a 12-month course which includes access to group conversation classes starting every 30 minutes and short, scheduled one-to-one reviews with a teacher.
- Premium Plus course is a 6- or 12-month course which includes all the elements of the Premium course and 12 or 24 additional one-to-one classes with a teacher.

To enroll or find out more about the English Live courses – visit Navigator.

MICHAEL BALTHASAR

We need to work like a small company

WHAT IS NEEDED for a company to be innovative? This is a question I am often asked and it is extremely important.

Actually, we know a great deal about what characterises truly innovative companies: they consider innovation in everything they do and they have realised that creativity is something everyone can learn. And, not least importantly, they have a long-term strategy for turning ideas into reality.

At the Volvo Group, we need to master four types of innovation. First of all, we always seek to improve the products and services we have. Secondly, we quickly need to see how we can benefit from radical technology shifts, such as electromobility and digitalisation. Thirdly, we need the ability to recognise opportunities presented by disruptive change, such as when customers want to move from owning a product to subscribing to a service. Fourthly and finally, we must tackle the combination of radical technology shifts and disruptive change, which could lead to a totally new playing field.

LARGE COMPANIES ARE leading developments when it comes to the first two forms of innovation, continuing to develop existing technology and exploring radical technology shifts. But small start-ups can often be more agile when it comes to identifying new trends and finding unexpected ways of benefiting from technological advances.

To succeed with all four types of innovation, the Volvo Group needs to retain its successful, structured model for product and technological development. However, when it comes to disruptive change, we can learn from the agile start-ups' way of testing new ideas. We need to be able to work like a small company inside a large one, something we are doing in GTT's innovation arenas and within Connected Solutions.

We need quite simply to be as innovative in our approach to innovation as we are in everything else we do.

MICHAEL BALTHASAR, DIRECTOR TECHNOLOGY, STRATEGY AND PLANNING

Test your knowledge of Volvo Group innovations!

The Volvo Group's history is full of exciting innovations that have all contributed to making the company what it is today. How much do you know about Volvo Group innovations?

1

Volvo was a pioneer when it came to the turbocharged truck engine in 1954. Which truck model had the first turbocharger?

A. Titan
B. Viking
C. F82

2

In the same year, Volvo CE established itself as a global leader with the release of one of the world's first wheel loaders with an attachment bracket. What was it called?

A. L220D
B. Gravel Charlie
C. H-10

3

The video The Epic Split *with Jean-Claude Van Damme has more than 85 million views on YouTube. Which technology made the stunt possible?*

A. Volvo Dynamic Steering
B. I-Shift
C. Dual Clutch

4

Nils Bohlin's three-point safety belt has become an international life saver. In which year was it first introduced as standard in a Volvo car?

A. 1972
B. 1959
C. 1963

5

Renault Trucks' vehicle management system Infomax is a tool for measuring and analysing fuel consuption. In which year was it awarded the Siemens Prize for innovation?

A. 2002
B. 2006
C. 2004

6

In 1959, Volvo Penta's innovation the Aquamatic was a revolution in the boating industry. Who invented this new propulsion system?

A. Harald Wiklund
B. Ingemar Johansson
C. Jim Wynne

Win a Volvo Power Bank!

Email your answers to **groupmagazine@volvo.com** no later than 15 November 2017. Write "Quiz" in the subject line and remember to include your name and address. Five lucky winners will receive a Volvo Word Mark Power Bank 2600mAh. This power bank can charge any mobile device that you can charge via an USB output and is useful for everyday life. Good luck!

The right answers to the quiz in *Volvo Group Magazine* #2 2017 were: 1C, 2C, 3A, 4B, 5A, 6B. The winners were Sébastien Saguin, France, Christian Holmström, Sweden, and Annie Gao, China. Congratulations!

VOLVO