

t-time

A MAGAZINE FROM TRELLEBORG GROUP

2-2019

Solutions that seal, damp and protect critical applications.

PLUS
WORLD'S
TOP DRINK

GOING
ELECTRIC

INSIDE
A RUBBER
PRODUCTION
FACILITY

Preserving paradise

An ingenious solution keeps
Norway's salmon swimming



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MATERIAL GIRL

Daniela Mazza is on a mission to improve print quality.



Cover photo:
Getty Images

The next issue of T-Time will be released October 23, 2019.

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T-Time is published three times a year. The opinions expressed in this publication are those of the author or people interviewed and do not necessarily reflect the views of Trelleborg. If you have any questions about Trelleborg or wish to send us your comments about T-Time, please email: karin.larsson@trelleborg.com

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Trelleborg is a world leader in engineered polymer solutions that seal, damp and protect critical applications in demanding environments. Its innovative solutions accelerate performance for customers in a sustainable way. The Trelleborg Group has annual sales of about SEK 34 billion (EUR 3.32 billion, USD 3.92 billion) and operations in about 50 countries.

The Group comprises five business areas: Trelleborg Coated Systems, Trelleborg Industrial Solutions, Trelleborg Offshore & Construction, Trelleborg Sealing Solutions and Trelleborg Wheel Systems.

The Trelleborg share has been listed on the Stock Exchange since 1964 and is listed on Nasdaq Stockholm, Large Cap.



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EDITORIAL

PROTECT WHAT MATTERS

Over the past year, we have formulated what we have used as a guiding principle ever since the company was established more than 100 years ago. Namely, that we protect what matters. This has been true for Trelleborg ever since the time of raincoats, since bike and passenger car tires were our main products. And it is truer than ever today, when our products and solutions are everywhere and protect people, the environment and infrastructure. They remove noise and vibrations, save energy and reduce emissions, and extend the service life of bridges, tunnels, pipe systems and buildings.

What matters for people differs, of course. In this issue we write about protecting people in a port in the Baltic sea, seals in beverage production that get beer safely and cleanly into the bottle, and about the production of natural rubber that can contribute to a local community.



Peter Nilsson,
President and CEO

Many people enjoy the occasional glass of beer, and sealing solutions are vital in the effective and safe delivery of your favourite tippie to the pump, can or bottle.

TEXT DONNA GUINIVAN PHOTOS GETTY IMAGES

A GOOD CLEAN TASTE

Beer is the third most popular drink in the world after water and tea. Millions of liters are produced every year. From the mash tub via the brew kettle and the chiller to the storage tank, there are seals all the way along the route. “Whether simple O-Rings, complex molded parts or gaskets, our seals ensure that beer finds its way safely and cleanly into bottles, cans and kegs,” says Martin Krüger, Area Sales Manager for food, beverage & water at Trelleborg Sealing Solutions.

Filling equipment must be precisely engineered and very well sealed. But when you consider that breweries can fill up to 100,000 containers per hour on a single packaging line (equivalent to 2,000 per minute), this is no small feat.

Fundamental to ensuring safe delivery of the product to the consumer is hygienic design. “In most cases, seals will be specifically engineered for food and beverage processing applications,” says Krüger. Designs have been developed to avoid dead space around, within, or beneath a seal. In dead spaces,

bacteria or micro-organisms can be deposited and these literally develop a “life of their own”. This can lead to contamination with germs and mold, potentially triggering a so-called spontaneous infection in a beverage, making it undrinkable and leading to a loss of production.

Finite Element Analysis (FEA) is utilized to simulate where liquids collect and how this can be prevented. If dead space can be avoided in a filling machine, for instance, not only will incidences of spontaneous infection of beverages be lowered, but cleaning cycles can be reduced. This in turn relieves the seals themselves, making them more durable and extending a seal’s life cycle.

An increasing trend is the consumption of craft beers and this is also bringing FEA in seal design to the fore. Around 17,700, or 94 percent, of all breweries can be defined as craft beer producers. Often these are microbreweries, where particularly compact brewing and filling systems are required. There, sealing solutions must be adapted to tightly defined installation spaces and FEA is used to simulate the behavior of seals under these restricted installation and application conditions.

FEA also allows the function of seals to be improved even before the introduction of a prototype. “It is possible to check at an early stage whether molded parts and seals achieve targeted performance, saving time-consuming trials and test phases. In addition, thanks to FEA, the sealing components can be individually integrated into brewing and filling systems, matching them to liquid throughput, required geometry or cost expectations,” says Krüger.

Another trend is a growth in demand for mixed beer beverages. This means increasing use of inline



Step-by-step to brewing the perfect beer

How is pure water, malted barley, hops and yeast transformed into beer?

- In the brew house, different types of malt are crushed together to break up grain kernels to extract fermentable sugars and produce a milled product called grist.
- The grist is transferred to a mash tun where it is mixed with heated water in a process called mash conversion, using natural enzymes in the malt to break the malt’s starch down into sugars.
- The mash is then pumped into the lauter tun where a sweet liquid known as wort is separated from the grain husks.
- The wort is collected in a vessel called a kettle that is brought to a controlled boil, at which point hops are added.
- After boiling, the wort is transferred to a whirlpool for separation; malt and hop particles are removed to leave a liquid.
- The liquid goes into a vessel and yeast is added during the filling.
- The yeast converts the wort into beer by producing alcohol, flavors and carbon dioxide, which are used later in the process.
- After fermentation, the ‘green’ beer needs to mature to develop flavors and a smooth finish.
- When reaching its full potential, the beer is filtered, carbonated and transferred to a bright beer tank in which it is celled for three to four weeks. When completed, the beer is ready to be bottled, canned or kegged.

Source: Anheuser-Busch InBev

Below: Martin Krüger, Area Sales Manager for food, beverage & water at Trelleborg Sealing Solutions.





mixing systems, where liquid components are mixed directly in the pipeline and filled as a homogeneous end product. “Sealing solutions for such processing lines must be resistant to different bacteria and yeast cultures native to the beer, as well as acids from sodas and fruit juices. In these circumstances, ensuring seal compatibility becomes extremely challenging,” says Krüger.

One way of achieving this is to produce seals in a perfluoroelastomer (FFKM), such as Trelleborg’s Isolast®. With a terpolymer of monomers in which all hydrogen atoms are replaced by fluorine, the lack of hydrogen in the molecular chain increases the material’s chemical resistance. The cross-linked molecular chains combine the elasticity and

sealing power of an elastomer with the chemical resistance and thermal stability of polytetrafluoroethylene (PTFE).

The universal compatibility of FFKM is also important, due to the trend for shorter runs in breweries. Craft beers and mixed beer beverages tend to be manufactured in smaller quantities; and, because one and the same bottling plant fills different kinds of beer and mixed beer drinks, there is a need for more flexibility in processing systems.

Therefore, seals need to be resistant to different beer and mixed beer ingredients, whatever they may be. In addition, there is a need with each beverage production run change for the system to be subjected to

Did you know?

Beer is the most popular alcoholic beverage worldwide, and the third-most popular drink overall after water and tea. People brewed beer for several thousand years before the Common Era (aka: Anno Domini)

- Global beer production is almost 2 billion hectoliters (2017)
- China is the largest beer producer in the world
- There are over 19,000 breweries worldwide

Source: Statista, International beverage news

deep cleaning and sterilization. But frequent cleaning with harsh media can quickly destroy standard seals. Effective and long-lasting chemical resistance is also vital in the elimination of flavor or aroma carry-over from one drink to another.

An old Czech proverb says: “A fine beer may be judged with only one sip, but it’s better to be thoroughly sure.” So next time you are savoring the aroma and relishing the flavor of a beer, remember how much care, attention, research and technology goes into ensuring that your favourite brew is safe to drink and has the perfect taste. ■

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Material girl

From the gondolas of Venice to the fields of Lodi Vecchio, materials expert Daniela Mazza has traveled across Italy to finally arrive at Trelleborg, where she is part of an Innovation & New Developments team that perfects the quality of print.

TEXT DONNA GUINIVAN PHOTOS MAURIZIO CAMAGNA

Wrestling with the periodic table on a daily basis wouldn't perhaps be everyone's first career choice, but for Daniela Mazza, chemistry is her first love. Her youthful appearance belies her almost 15 years' experience behind the microscope. Before joining Trelleborg Coated Systems, she was at Pirelli, then in the automotive industry and finally with a rubber manufacturer where she saw applications for almost every sector, from sealing to electronics and electrical appliances.

Mazza's move to focus on printing solutions three years ago was a departure from her earlier roles. "Other than Pirelli, the companies I was employed by were just based in

Italy," she says. "I was really attracted to Trelleborg because it was international and therefore presented an opportunity for me to grow in my career.

"I've always been involved in the chemical analysis of rubber but I was amazed at the level of detailed examination and the quality requirements for printing blankets. There is no comparison to the other applications I have been involved with. Here we're working to around 100 microns or less."

The printing blanket, a layered fabric and rubber mat, is a critical element in the printing process that transfers or offsets (as in offset printing) an image from a printing plate to a surface. Traditionally this would have been paper or cardboard, but

increasingly the process involves other substrates such as metal cans (both two- and three-piece) or plastics, each of which presents its own particular challenges.

"Perfection in print reproduction is paramount," continues Mazza. "Print is not dead; it's alive and kicking. But requirements are changing. Yes, the volume is lower in certain segments, yet it is increasing in others. The demand for flawlessness has intensified; like with a fine diamond, when even the very slightest inclusion can ruin it."

In the complex parts of a printing blanket, the rubber has different functions; in the top, the inner layer and on the bottom. It may provide chemical resistance or compatibility





Mazza in the QC Lab in Lodi Vecchio, monitoring various tests carried out on raw materials.

RUBBER PROCESS ANALYZER RPA 2000

ALPHA TECHNOLOGIES

MOONEY MVB

TRELLEBORG

Lodi Vecchio

8150318
Mazza
10/05/18



with different inks and mechanical function.

Mazza loves her job, and what drives her is the joy of grappling with a chemical conundrum. She also enjoys her outward-facing role, working with the third-party suppliers of raw rubber materials for the printing solutions. Her job here is to ensure that the materials supplied meet standards, and in particular, that they fulfill the needs of current and future applications.

Having provided support to Japanese printers recently, Mazza

says, “Worldwide, Japan is the country that demands the highest print quality. We often receive feedback from our dealers who represent and distribute our solutions. They meet with printers every day and report results, benefits and achievements. Sometimes our Japanese dealers will highlight a printing defect and when they do, it is often so small, it can only be seen with a magnifying glass.”

This triggers an investigation by Mazza and the R&D team. The blemish could be caused by any

Above: At Lodi Vecchio labs, the team undertakes a wide range of tests. Here they are running analysis on a printing blanket.

component or function of the blanket, including the chemicals. “We examine every aspect of the blanket digitally and chemically to find the root cause. This challenges us, and what we learn from these printers who are demanding the ultimate print quality is transferred across all of our solutions to enhance and improve the quality of our offerings for all printers.

“Sometimes the investigation can result in the development of a new material, a product test or validation process. This is a key part of



The solventless roller-head equipment during one of the manufacturing phases.



The roller-head must be cleaned regularly.



our customer-focused approach; listening to printers' requirements to boost their business."

As part of the material development team, Mazza also contributes to group-wide rubber initiatives. "I've been involved with the integration and homologation of processes between our operation here and our acquired printing blanket operation in Slovenia, as well as in projects in Sweden."

She also highlights the trend toward environmentally friendly

"A key part of our customer-focused approach; listening to printers' requirements to boost their business."

Daniela Mazza, Trelleborg



Above: Discussions take place during the quality control and visual inspection of the final product.

solutions, which is vital in China where the government is legislating to exclude certain chemicals from the printing process.

“Traditionally, printing has involved quite nasty chemicals, but over the years many of these have been excluded. We’ve been at the forefront of this sustainable trend in our own processes. We were one of the first printing blanket companies to have a solvent-free roller head line. Not only did this improve our production speed and product

quality, but it is also a much more environmentally friendly solution.

“To respond to the requirements, especially in China, we are ensuring that all our products comply with current and forthcoming standards. This may mean that we have to change a compound’s recipe to conform and it is a challenge to maintain performance with a different formula. It’s very important work.” ■

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Research and development for printing solutions

The Innovation & New Developments team at Lodi Vecchio supports printing blanket product development and customers globally. Currently it is eight strong, and being multi-disciplined, all team members contribute their own area of expertise to projects. As the chemical expert, Mazza works with suppliers, production and other members of the Innovation & New Developments team. She says, “The people in the Lodi Vecchio team here are the best that I have ever worked with.”

NEWS



The recently opened Hong Kong-Zhuhai-Macau tunnel, which utilizes Trelleborg's Gina gaskets and Omega seals between the tunnel's sectional elements.

Cooperation in China

China's tunneling projects are increasingly demanding, and Trelleborg plays an important role as a partner with Fourth Harbor Engineering, one of China's largest infrastructure construction services institutions. A new strategic partnership will see both parties collaboratively carry out extensive research and development into polymer sealing systems.

Ruud Bokhout, Sales and Marketing Director for Infrastructure Projects within Trelleborg Offshore & Construction, says: "Given the increasingly complex and demanding tunnel projects across China and beyond, partnerships throughout the supply chain and across industries are now critical."

New motocross tires

Mitas, a brand within Trelleborg Wheel Systems, has launched a completely new motocross competition line, Terra Force-MX.

"Mitas Terra Force-MX line is intended for both professional and amateur riders seeking high performance. It replaces the previous motocross competition range and was developed in cooperation with many professional motocross riders on different tracks and various types of terrain. The new line is offered with three different tread patterns to meet the requirements of all riders and terrain types," explains Ksenija Bitenc, director of the Mitas Motorcycle Tires division.



Code of Conduct update

A comprehensive review of Trelleborg's Code of Conduct has been carried out. It contains new regulations in areas such as trade restrictions, information processing and diversity.

Trelleborg's whistleblower policy and system gives each employee the right and opportunity, by telephone or online, to report suspicions of legal or regulatory violations in their own language, without repercussions.



Loyalty pays off

The Agriplus loyalty program for the agricultural tire industry is expected to double its number of participants in 2019.

The program enables professional farmers and dealer salesmen to collect points during the configuration of a new machine, when they specify Trelleborg tires. At the same time, tractor dealers can also benefit from a number of digital tools.



Huang Sha, founder of Wellcall, pictured with Leong Hon Chong, Executive Director of Wellcall, alongside Bill Hagenberg and KJ Tan of Trelleborg.

Joint venture established in Malaysia

Trelleborg Industrial Solutions has signed an agreement with Wellcall Holdings Bhd to form a joint venture in Malaysia to manufacture and sell industrial hoses made from composite materials. The joint venture will establish a production site in Malaysia. The first hose deliveries are scheduled to begin in 2020.

Hoses from composite materials are typically used by road and rail tanker trucks, and to handle aviation fuel and aggressive chemicals. Trelleborg currently manufactures composite hoses in Europe.



LET THE SUN SHINE IN

Much of our energy consumption directly or indirectly depends on the sun. With solar energy's share of the energy mix becoming bigger every year, the renewable energy portion of the total energy mix continues to grow.

TEXT PETRA LODÉN ILLUSTRATION NILS-PETTER EKWALL



Renewable energy has an important role to play in the development of technologies and efforts to address rapid climate change. Almost one-fifth of our energy already comes from renewables and the shift to sustainable solutions continues to grow.

Much of our renewable energy comes from the sun. Alongside other renewables; windpower, hydroelectricity, bioenergy, wave power and geothermal energy are

contributing to a sustainable world.

While some renewables, such as windpower, have been used for thousands of years, others are emerging technologies. Trelleborg is following the evolution of new technologies closely, as well as the development of more traditional ones, with its buoyancy, sealing, anti-vibration and protective solutions, helping to optimize efficiency. This illustration highlights just a few examples. ■

Hydropower

1. Orkot bearings are used in many hydropower applications, including lock gates, wicket gates and spillway gates. Made of composites rather than metal, they require no lubricants (making them fish-friendly), have high load capabilities and low water absorption properties.

Solar power

2. Sealing profiles, designed to suit a building's architecture, keep glass solar panels in position and prevent heat loss or rain from coming in. They also stop the absorption of dust and other particles that could affect the service life of the application.

Wind power

3. Spherilastik bearings work by allowing a wind turbine's rotor blades to tilt on their hub, counteracting the see-saw motion caused by gusts of wind. They also keep vibration to a minimum.

4. Cushyfloat mounts reduce vibration amplitude, lower structure-borne noise and improve equipment life.

NjordGuard stiffener modules protect offshore windfarm power cables. They require only minimal assembly and importantly allow diverless installation and removal. Protecting cables from abrasion and impact, they also reduce the weight of subsea cabling.

5. Distributed Buoyancy Modules (DBMs) are used to protect the subsea electrical power cables that interconnect between turbines. The clamping solution provides uplift and maintains location of the cable.

Seals are used within the wind turbine to minimize friction, extend maintenance intervals and ensure zero leakage, while being resistant to temperature extremes, both low and high.

Wave power

6. Trelleborg's polymer membrane technology is used in wave energy submerged pressure differential devices to ensure the protection of internal components from external water pressure, and act as a bearing to prevent the hull of a vessel and compensation tank from colliding.

RENEWABLE

20 by 20 By 2020, Trelleborg is intending to reduce emissions by 20 percent in relation to sales, compared with the base year 2015.



Top 5

China is investing most in renewables followed by the United States, Japan, Brazil and Germany.



9%
Renewable power generating capacity saw its largest annual increase ever in 2017, raising total capacity by almost 9% over 2016. An estimated additional 178 gigawatts (GW) of power was generated globally. Modern renewables grew by an average +5.4% over the past decade.



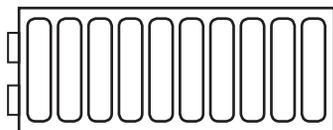
18.2%

In 2016, renewable energy accounted for an estimated 18.2% of global total final energy consumption.



2,195 GW

By the end of 2017, global renewable power capacity totaled around 2,195 gigawatt (GW), with hydropower accounting for about 16.4%: enough to supply an estimated 26.5% of global electricity.



48%

Heating and cooling account for 48% of final energy use, transport for 32% and electricity for 20%.

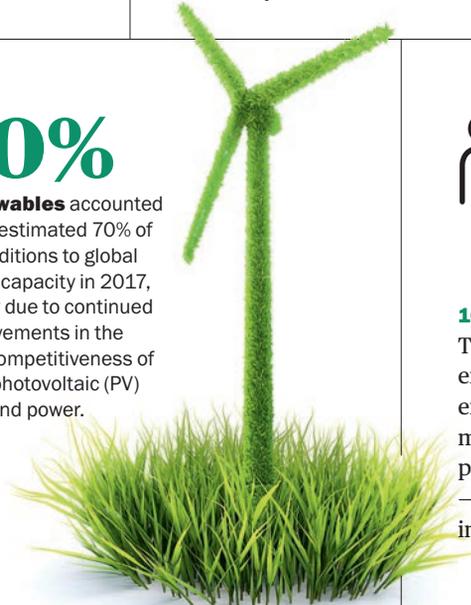


2.5 million solar panels

The Kamuthi solar facility in Tamil Nadu, India, was the world's largest solar power facility in 2018 with a total generation capacity of 648 megawatts (MW). Covering 10 square kilometers and consisting of 2.5 million solar panels, the site is estimated to generate enough power for 750,000 people.

70%

Renewables accounted for an estimated 70% of net additions to global power capacity in 2017, largely due to continued improvements in the cost-competitiveness of solar photovoltaic (PV) and wind power.



10.3 million

The renewable energy sector employed approximately 10.3 million people in 2017 – directly and indirectly.

Source: REN21, Renewables 2018 global status report, Paris, REN21 Secretariat. Read more at: ren21.net/



No more dancing forklifts

When a concrete manufacturer in the Netherlands needed to upgrade the tires on its heavy-duty forklifts, it looked to Trelleborg for a solution. Here's how the Elite XP is bringing added value to MBI De Steenmeesters' operations. ▶

TEXT JAN TAZELAAR PHOTOS CHRISTOPHE DAEMEN

BETTER BUSINESS FORKLIFT

Along the banks of the picturesque, meandering River IJssel in the Netherlands lies the old Hanseatic town of Kampen, which is home to one of MBI De Steenmeesters' concrete facilities. A wholly family-owned business, MBI was founded in 1945. In the past 75 years, MBI's staff has grown from five to 350 employees (or stone masters, as the company calls them), making it the largest manufacturer of non-reinforced concrete in the Netherlands.

The heavy equipment in use at the factory reflects the bulk of the products. Forklifts buzz around tirelessly between countless stacks of concrete

tiles and building materials, often hauling many tonnes of precious cargo in one go. MBI has 35 such forklifts, with the older diesel models now gradually being replaced by electrical ones.

Vincent Westerdijk is responsible for the service and maintenance of the fleet. "We make our forklifts run for their money," he says. "Since we have two- and three-shift rosters, many of them are in use 16 to 24 hours a day." Needless to say, only the best parts are good enough for these "workhorses", and so the tires of the entire fleet are now gradually being replaced with Trelleborg Elite XPs.

The warm relations between MBI and Trelleborg Wheel Systems date

back to 2011. "We had just purchased four new forklifts, but the operators were not too happy with them," says Westerdijk. The machines tended to "dance" when fitted with a brick clamp. And the tires were prone to excessive wear. So we decided to fit two identical trucks with two different sets of tires: our traditional brand for one; and Trelleborg Elite XPs for the other. We tested them extensively for two years - with and without loads, with and without brick clamps - and in 2013 we reached a clear verdict: the Trelleborg tires had won the day."

It was a victory for everyone involved. First of all, the operators no longer had to suffer the

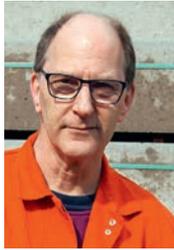
Each forklift is fitted with a heavy brick clamp, which puts considerable extra strain on the machines.



annoyance of the dancing forklifts, and since the Elite XP effectively absorbs vibration, their back ache complaints dwindled. The benefits paid off in the workshop, too. “Less vibration mean a longer life for the machinery, notably the mast bearings,” says Westerdijk. “And the tires themselves have a relatively long life span, too. For the diesel trucks, we reckon on 4,000 operating hours for the front tires and 2,000 for the rear, which are the steering tires.”

One time-and-money-saving feature of the Elite XP is the Pitstop Line wear indicator: an orange band that is revealed on the tire when it has some 100 operating hours left. While in the past, tires would often be replaced sooner than necessary, the Pitstop Line enables a reliable visual check: “Very convenient for both our operators and our workshop planners.” ■

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Above: Vincent Westerdijk: “Less vibration means a longer life for the machinery, notably the mast bearings.”



ProTex: the safe anti-static option

Protecting forklift operators against the risks related to static electricity can be a challenge. Material handling equipment must be used safely in applications where flammable gas, vapor, or dust are present. Trelleborg now offers a fully non-marking resilient tire made from an anti-static compound called ProTex.

Gianluca Abbati, Director R&D Material Handling and Construction Tires at Trelleborg Wheel Systems, says: “The intensity of material handling applications operating in potentially explosive environments is a key challenge. Being in control of this maintains the safety of both the machine and its operator, as well as ensuring that material handling operations run smoothly.”

Made from a unique polymer, the ProTex compound is 100 percent anti-static. Static electricity is continuously released at any point of contact between the tire and the ground while at the same time eliminating the risk of marking. The new solution is fully compliant with the stringent EN1755 regulation. ■



Read more about ProTex at: bit.ly/2VzsDp6

The tire of choice for forklifts

The Trelleborg Elite XP is a premium forklift tire for heavy-duty transportation. Thanks to its square footprint, it has a large contact area, which limits uneven wear and thus results in a longer tire life.

Controlled Deformation Matrix (CDM) technology enables the tire to quickly resume its original shape after deformation. This improves the handling characteristics of the forklift and makes for a more comfortable ride.

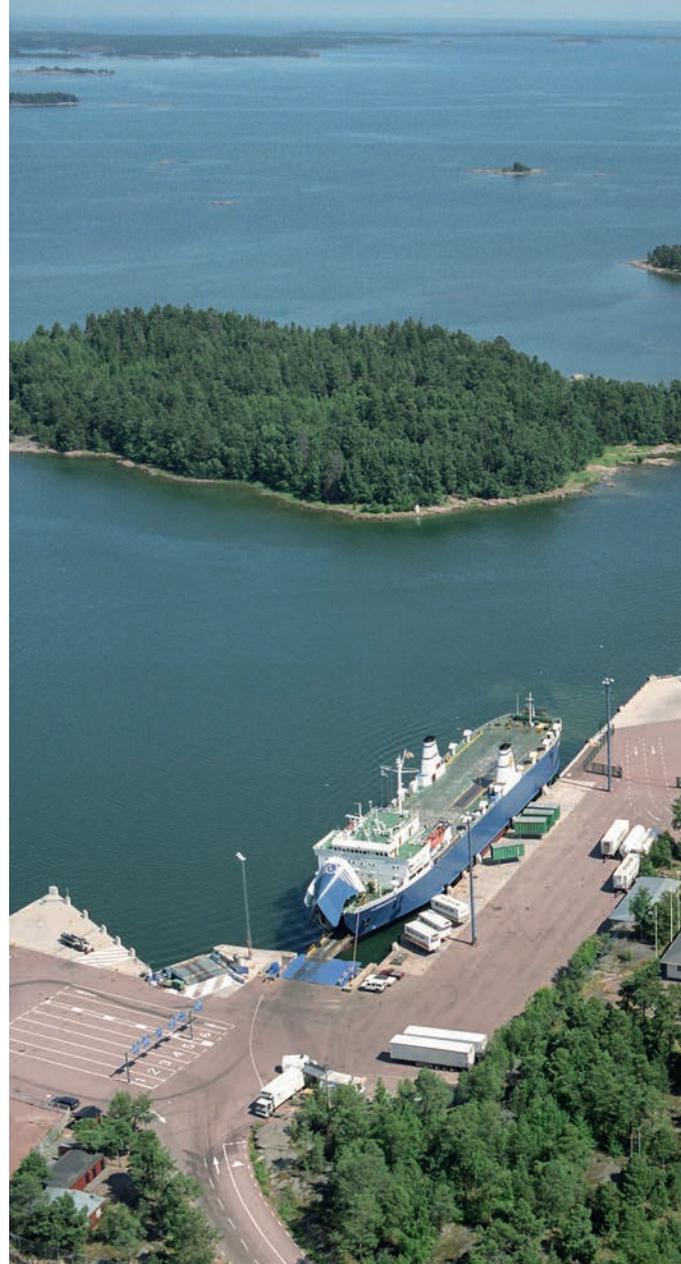
The Elite XP is available in a wide variety of sizes and compounds suited to different purposes. The Pit Stop Line wear indicator ensures that users get maximum whole-life value from their tires by replacing them at the right time. This keeps forklift downtime to a minimum and ensures that the tires are always safe to use.

Moor bang for the buck

Långnäs port, located in the archipelago Åland in the Baltic Sea, is a busy place with intensive ferry traffic traveling between Sweden and Finland.

Here a new rope-free automated mooring system is set to enable a faster and energy efficient berthing process and improved levels of safety.

TEXT CHRIS SANDERS PHOTO LÅNGNÄS HAMN



The AutoMoor rope-free automated mooring system ensures quick, safe and reliable mooring operations at the international cruise ferry and domestic roll-on/roll-off ferry berths at the port of Långnäs. In addition, the AutoMoor system saves energy due to its passive damping mode of operation.

Ronny Eriksson, CEO at the Port of Långnäs, says: “The port’s international cruise ferry berth alone accommodates nearly 3,000 vessel moorings per year. The majority of these are some of the most advanced cruise ferries in the world, weighing from 34,000 to 66,000 gross tonnes

and varying in length from 165 to 230 meters. Given the significantly high volume for a single berth, it was vital for us to upgrade both berths in the port to ensure that they continue to sustain such a high vessel throughput.”

Using vacuum technology to rapidly attach to a vessel and secure it at berth, AutoMoor reduces the ship’s movement and continuously monitors all mooring loads acting on the vessel. Live data is sent to the operator to optimize day-to-day port and terminal operations. This also minimizes personnel involvement, reducing the risk of human

Above: The port of Långnäs accommodates nearly 3,000 international cruise ferry moorings per year.

error and improving safety.

Developed specifically for use at the Port of Långnäs, Trelleborg’s AutoMoor T40 Twin Arm has two mooring arms that can operate in a synchronized manner or independently of each other to allow for the flexible mooring of vessels with varying hull profiles. This enables the port to accommodate a wider range of vessel types. The AutoMoor T40 Twin Arm also has a compact footprint, allowing for its installation in a limited space, including between gantry rails and the edge of the wharf.

“Through the use of AutoMoor at Långnäs, ship operators such as Viking Line, Tallink Silja and



SmartPort

Trelleborg's AutoMooring solution is part of the operation's SmartPort portfolio. SmartPort powers the critical interface between ship and port, on land and at sea. It connects port operations, allowing operators to analyze performance and use data to improve decision-making. The system integrates assets such as fenders, mooring equipment, ship performance monitoring, and navigation systems, and is underpinned by cloud and Internet of Things (IoT) technologies.

Powered By
SmartPort



Finnlines will be able to manage crew rest periods more efficiently while reducing onboard personnel and operating costs," says Eriksson. "Trelleborg certainly didn't disappoint with their AutoMooring system, which I've no doubt will prove its worth in optimizing mooring operations at the berth moving forward."

Richard Hepworth, Business Unit President within Trelleborg Offshore & Construction, says: "One of the main benefits with AutoMooring is its low power consumption due to its passive damping mode of operation, where once pretension is achieved, AutoMooring's motors turn

off and the majority of mooring capacity is managed by the passive damping system."

It has been calculated that a single AutoMooring unit can cost as little as a couple of euros per day to operate and moor vessels due to its passive mooring technology. This means operating costs are significantly less than current market offerings. AutoMooring will minimize downtime by reducing the effects that passing ships have on moored vessels. When using mooring lines, operators may need to interrupt operations, costing time and money in delayed product transfer. Using an automated mooring system to dampen ves-

sel movement and extend the range of conditions in which efficient transfer can take place can have huge implications for efficiency.

AutoMooring is also designed to help ports and terminals become more environmentally efficient, because vessels can be secured in less than a minute and released in 30 seconds. This reduces vessel idle time and reduces the amount of time tug boats are required to travel alongside the vessel until the mooring operation is complete, cutting overall emissions. ■

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PROTECT WHAT MATTERS NORWAY

Why did the salmon cross the road?

When Atlantic salmon head upriver to spawn, they fill Norway's magnificent rushing waterways with some of the finest fishing stocks in the world. Here's how Trelleborg is helping to preserve this anglers' paradise in the face of transport development in the area.

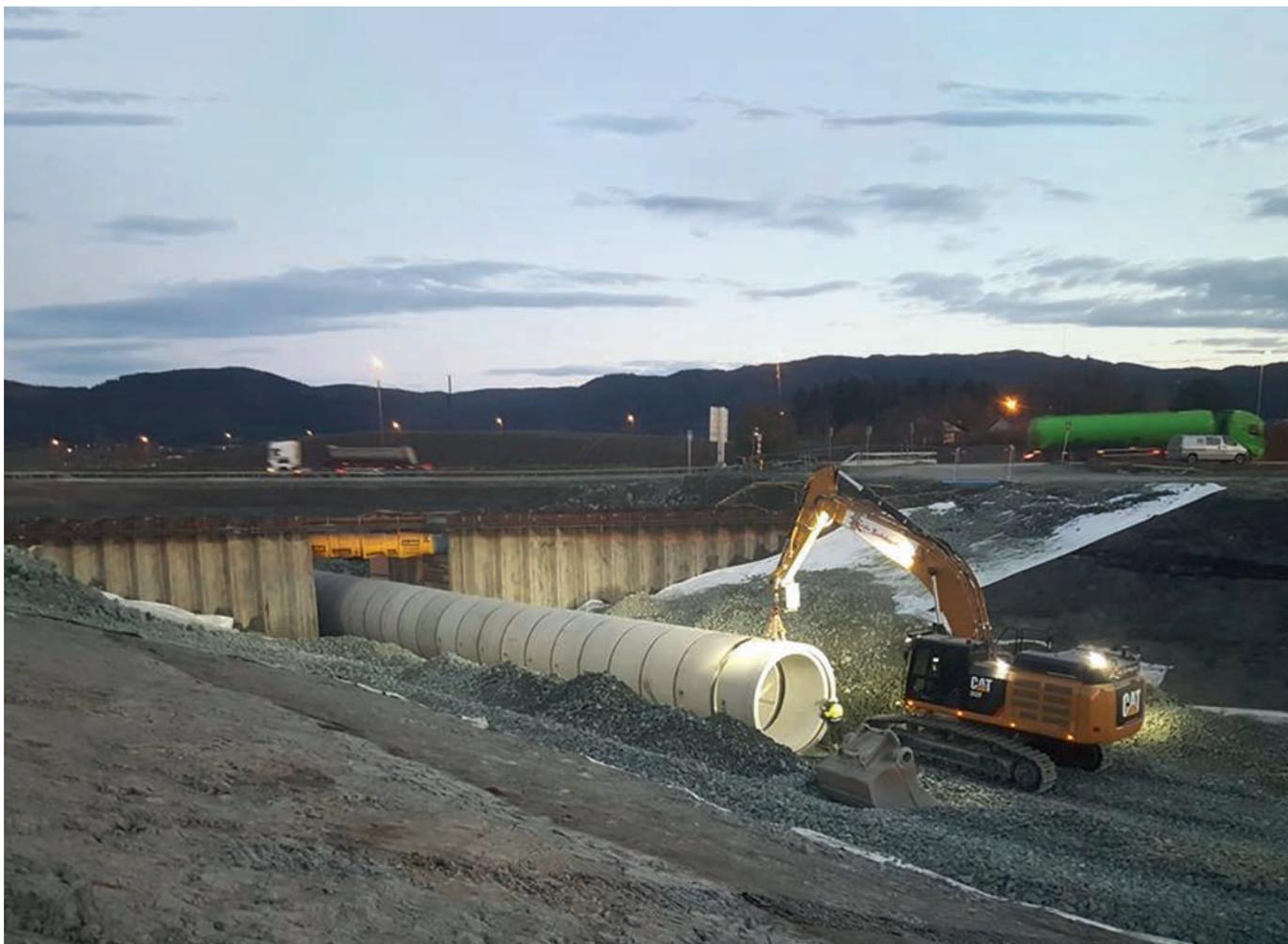
TEXT PETRA LODÉN **PHOTO** GETTY IMAGES, MORTEN LANDRO/LOE, CH - VISITNORWAY.COM





Norway is renowned for its beautiful landscapes and salmon fishing.





Thousands of foreign visitors come to fish for salmon in Norway every year, creating significant employment opportunities for the local population throughout the vast coastal landscapes. And since tourism is such an important industry here, the authorities take any potential risk to the business very seriously. One such risk lies in modern society's demand for fast, efficient transportation systems, which has led to the development of new roads that threaten to cut off the traditional salmon fishing areas, and jeopardize not only the angling opportunities but also the fragile life of the fish.

When the Norwegian Public Roads

Above: Loe Rørprodukter made 350 pipes, each three meters diameter and 1.75 meters long. Trelleborg supplied the seals that were integrated into the pipes.

Administration planned a new motorway near Trondheim, they encountered multiple challenges; such as the many rivers carrying salmon, and the fluctuating water levels due to the open connection to the sea. Blocking the rivers was not an option; that would have put an end to any fishing trips to the area. Besides that, any proposed solution to redirecting the rivers would need to accommodate very large volumes of water.

Pipe manufacturer Loe Rørprodukter was up for the challenge. And so, with the help of Trelleborg Industrial Solutions, they designed a large pipe and sealing system that would divert five streams: a network

Loe Rørprodukter

- Loe Rørprodukter AS is Norway's largest manufacturer of concrete products for the water and sewage industry.
- Founded in 1933 by Kristoffer Loe
- Head office Hokksund, southern Norway
- Turnover: about NOK 190 million (2016)
- Privately owned by Lars Kristoffer Loe, grandchild of the original founder



Did you know?

The salmon fishing season is short, lasting from the beginning of June through to September. Atlantic salmon migrate between freshwater and saltwater. They spend their first years in freshwater before migrating to the sea where they remain for one to three winters before returning to spawn. Salmon fishing takes place during the spawning period.

Find out more at visitnorway.com

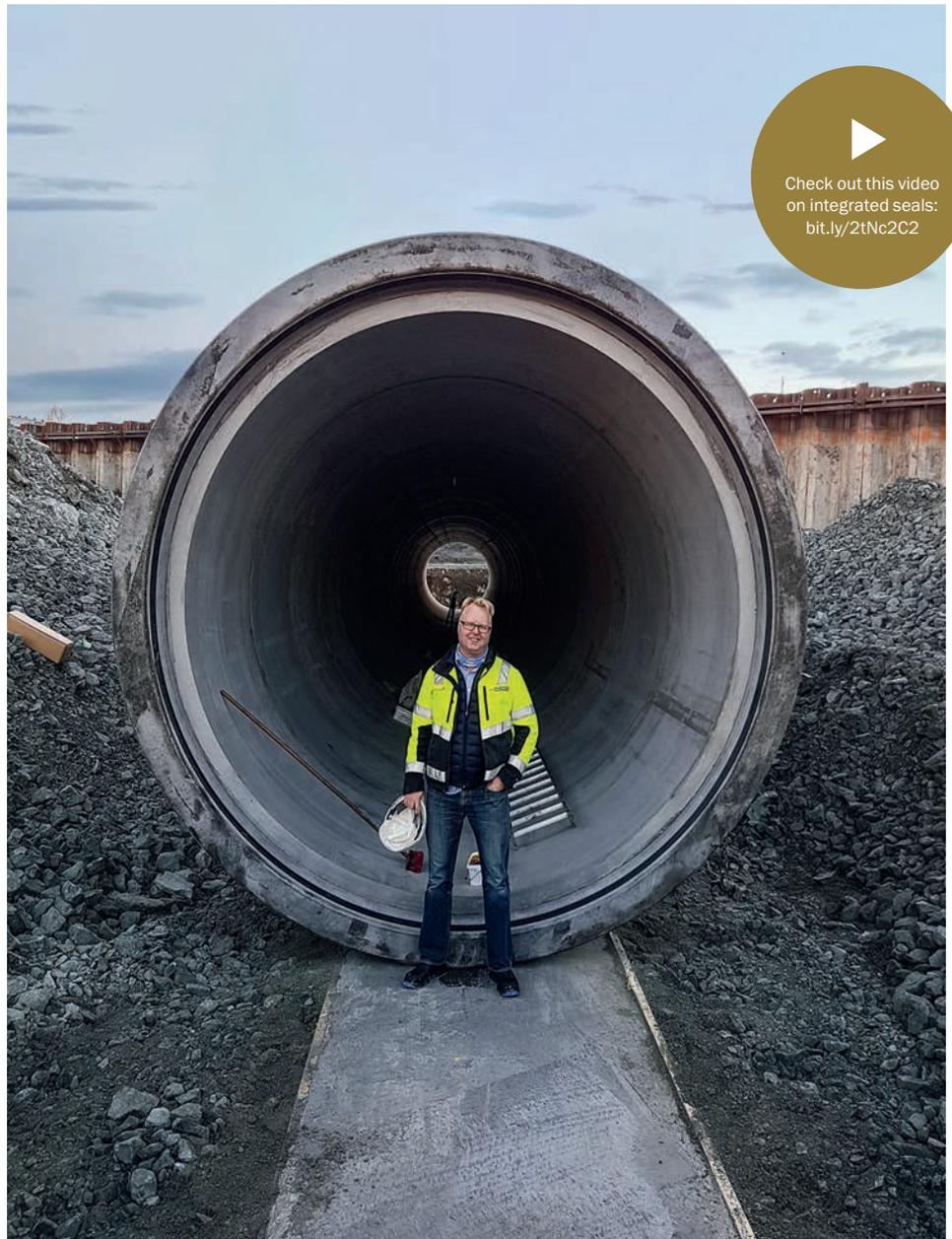
measuring a total of 595 meters. Loe Rørprodukter then bought molds for the wet casting of three-meter-diameter concrete pipes, and asked Trelleborg to produce a specific kind of seal for them. In total, 350 pipes – each 1.75 meters long – were produced, and Trelleborg supplied the seals, which were integrated into the pipes during their manufacture. Lars Loe, Managing Director of Loe Rørprodukter, says: “We had worked with Trelleborg on previous projects and knew they could produce high-quality, tailor-made seals that are suitable for even the most complex environments.” ■

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A tailored solution

Trelleborg’s tailor-made sealing system is originally designed for the Nordic market. It is integrated into the socket of a pipe during the manufacturing process. The multiple benefits of the solution include the fact that there is no risk of pipe layers misplacing a seal, selecting the wrong kind of seal or positioning one incorrectly. A protective strip is kept in the pipe socket during transport and handling to prevent any sand, clay or ice from getting in and to keep the seal in an optimal condition.

Below: These are the biggest concrete tubes ever made in Norway.



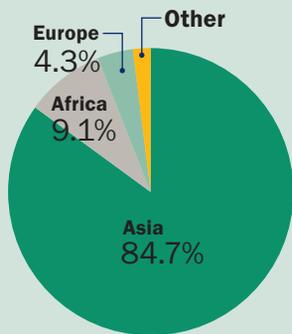
HIGH HOPES

Do you know how natural rubber is produced? To discover the intricacies of this ancient art, join Trelleborg's Pio Gizzi and Rosman Jahja on a tour of one of the largest production facility in Africa and find out how its owner contributes to the local community.

TEXT ROSMAN JAHJA PHOTOS ROSMAN JAHJA, GETTY IMAGES



SAPH Quality Manager Etienne Bertrand (left) with Henriette Gomis-Billon, who is responsible for sustainability and communication for the SIFCA Group, the main owner of SAPH.



Global exports for natural rubber by country in 2017 amounted to USD 16.6 billion. Asian countries accounted for about USD 14.1 billion or 84.7% of international natural rubber sales, while African exporters supplied 9.1% of the global total followed by Europe at 4.3%.



Pio Gizzi, Vice President Purchasing, Trelleborg Wheel Systems.



Synthetic rubber dominates the market - and yet almost half the rubber used by the manufacturing industry is natural. While Thailand and Indonesia are the two biggest producers of natural rubber, the third country on the list in terms of net exports is the Ivory Coast.

One of the producers there is SAPH, an important supplier of natural rubber to Trelleborg and its natural rubber producer in Bongo, in the south-east of the Ivory Coast, is the largest in Africa. It can produce 56,000 tonnes of natural rubber per year.

Rubber can be harvested every

month of the year except January and February. Siphoned off from the *Hevea Brasiliensis* tree, the raw materials are collected in a cup, where they coagulate to form what is known in the industry as a “cup lump”. The color of the cup lump changes depending on how much time it spends drying out in the sun, becoming more yellowish-brown with increased exposure and oxidation.

SAPH Quality Manager Etienne Bertrand says: “The first step we take with a batch is quality control - to check that the raw material

Rubber is harvested mainly in the form of latex; a sticky, milky colloid drawn off by making incisions in the bark and collecting the fluid in vessels in a process called “tapping”.
Source: Wikipedia

contains enough usable rubber. After that comes the washing, mixing, cutting and drying process.” Among the most striking features of the facility are the prominent graffiti-like reminders on the walls to wear safety equipment including helmets, boots, visors and, if necessary, ear protection. The reminders are clearly being taken seriously; the accident rate has decreased in the past few years, with only 13 recorded in 2017, which is comparable to any similar industrial production facility in Europe.

The initial washing phase involves the use of a great deal of water in

“The first step we take is quality control, to check there is enough usable rubber.”

Etienne Bertrand, Quality Manager, SAPH

large tubs. The facility has recently invested in a comprehensive water-cleaning site, where the aim is to recycle the water.

The recycling process has not yet been perfected, but it has reached a level where the purified water can be used for the first step of the industrial process for things like watering plants.

Having been dried, a finished bale of yellow-brown natural rubber weighs 35 kg. Wrapped in plastic sacks, 36 bales are then stacked on a pallet.

Around 2,000 tonnes of natural rubber of varying degrees of quality are stored on pallets in the large warehouse at the end of the production chain. Every pallet is inspected at the internal laboratory where obligatory tests are carried out to ensure quality and detect any impurities. The test results are saved so that batches can be tracked and cross-checked.

On the plantation, the high-tempo tapping work is in full swing. A tapper has less than 20 seconds per

Hopeful music

Rubber gives the local communities around the Bongo plantations in the Ivory Coast high hopes. High hopes is the name of a song that features a rubber tree plant, first performed by Frank Sinatra in 1959 in the film *A Hole in the Head*.

tree to make the right cut and empty the cup to collect the rubber. Everyone has gone on a 21-day course to learn how to make the optimal cut.

Supporting its workforce is vital to SAPH. Employees enjoy many benefits such as the opportunity to live in the nearby villages that the company has built which are directly connected to the factory. They also have free access to water and electricity in their living quarters, daycare facilities and places at locally run primary schools for their smaller children, and – not least – basic insurance and health care.

The significant fixed costs involved in taking proper care of the workforce fall under the heading Corporate Social Responsibility (CSR). It is perhaps mainly this aspect of comprehensive social responsibility that differentiates a manufacturing facility of this size in this part of Africa from any in Western Europe or North America.

Henriette Gomis-Billon, who is responsible for sustainability and communication for the SIFCA Group, the main owner of SAPH, says: “There really is no alternative. We have to take on a great deal of responsibility, otherwise it would be impossible to run an operation as large as ours, with almost 1,300 employees.”

Another positive result of SAPH’s CSR efforts is that the villages neighboring the ones owned by the company also benefit. They can also use the health center and receive advice and help from doctors and nurses, for example



Rosman Jahja, Vice President of Corporate Responsibility at Trelleborg, visited the SAPH facility in the Ivory Coast together with Pio Gizzi at the end of 2018.



A rubber-processing workshop where rubber is manufactured.

Hevea Brasiliensis

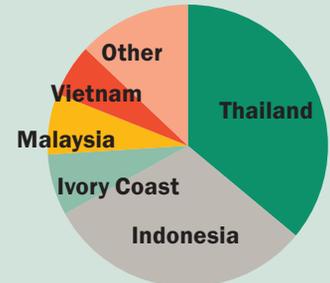
Both natural and synthetic rubber are used in the manufacture of products ranging from car tires to footballs. Most natural rubber is produced from the *Hevea Brasiliensis*, a softwood tree native to Brazil.

Natural rubber has a high tensile strength and is resistant to fatigue from wear such as chipping, cutting or tearing. It has tack, which means it can adhere to itself as well as other materials.



SAPH is an important supplier of natural rubber to Trelleborg. Etienne Bertrand is the company's Quality Manager.

The five countries that exported the most natural rubber in 2017



- 1. Thailand:**
USD 6 billion (36.2%)
- 2. Indonesia:**
USD 5.1 billion (30.7%)
- 3. Ivory Coast:**
USD 1.1 billion (6.7%)
- 4. Malaysia:**
USD 1.1 billion (6.6%)
- 5. Vietnam:**
USD 1 billion (6.1%)

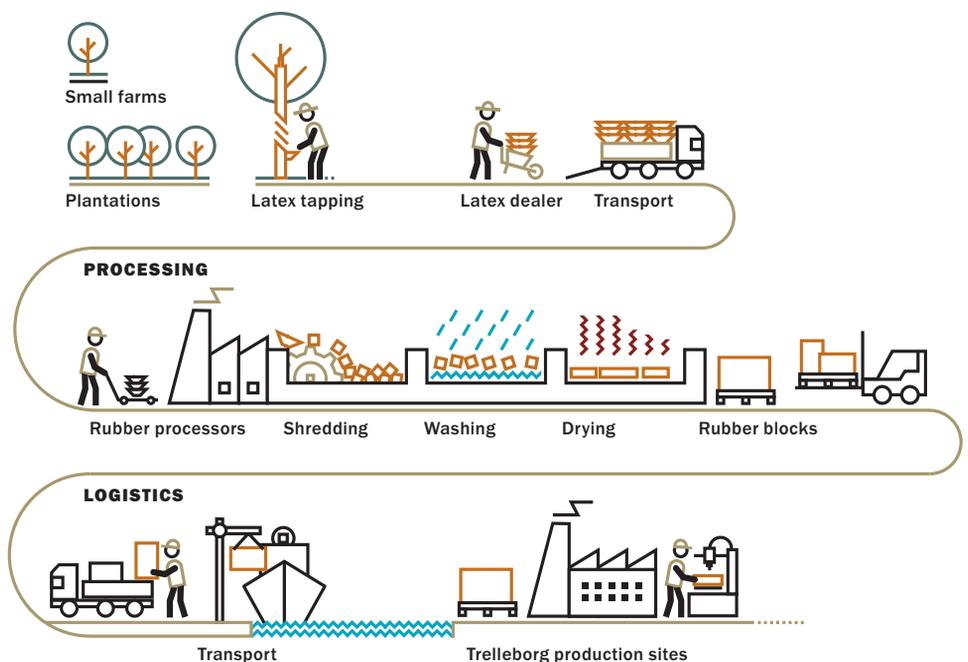
during childbirth. In general, the quality of equipment here is higher than at the equivalent state-owned health facilities.

Many other services that the state would usually provide are taken care of by the large rubber producer in this region - and access is not limited to those living in the company's villages.

In the areas just outside these villages, SAPH provides support to high schools in the form of materials and the construction of new buildings. The company also builds school canteens with support from local women's groups for food supply and preparation, using the motto "a hungry belly has no ears".

An entire ecosystem has sprung up around the facility in Bongo. And the operation has given independent rubber farmers a chance to earn an income that is better than if they were growing cacao, which you can only harvest twice a year. ■

Production of natural rubber



NEWS



▶
Check out this time lapse video of the construction: bit.ly/2BW8m5K

Not your average tunnel video

Marieholmstunnel in Gothenburg, Sweden, will improve traffic in the city. Trelleborg's Gina and Omega seals will make sure the tunnel stays dry and safe for many years.



Happy dog

Bobbie, a rescue dog cared for by the British charity organization Cinnamon Trust, received help with pain in his shoulders from Trelleborg's Confor foam. "Confor is designed to absorb and dissipate shock and impact," says Charlotte Dale, Sales Administrator within Trelleborg Offshore & Construction in Retford, England. "Bobbie's owner is delighted with the results, and Bobbie is a lot happier."

Find out more about the charity organization Cinnamon Trust. cinnamon.org.uk/

50%

More than half of the world's rubber consumption is used for tires in cars and trucks.

Passed the test

Two hoses for the food and beverage industry, Alikler G2 and Citerdial, have passed the latest Chinese standard for materials that come into contact with food.

Find the updated declaration of compliance at bit.ly/2D2yduY



Alikler G2 is used to handle liquid foodstuffs for unloading bays, filling and processing plants and liquid foodstuff tankers.

Global growth

After a period out of the two-wheeled market, Trelleborg reentered it in 2016 with the acquisition of CGS Holding and its Mitas brand. Recently the Group announced an investment in a production facility in India to manufacture tires for two-wheeled motor vehicles where tire deliveries are expected to start at the end of 2020. Trelleborg's existing manufacture of tires for two-wheeled motor vehicles is today concentrated in Europe.

"The investment enables us to continue to take our motorcycle tire operations to a new level," says Paolo Pompei, President of the Trelleborg Wheel Systems business area. "Trelleborg already holds a strong position in this niche segment, but the investment will increase our production capacity, strengthen our offering and enable us to act more globally."





OVERCOMING RANGE ANXIETY

Many motorists want to drive a vehicle that is environmentally-friendly but they also want to succeed in reaching their destination. Overcoming “range anxiety” is the key to the mass adoption of electric cars.

TEXT DONNA GUINIVAN

PHOTOS GETTY IMAGES, SCANIA, SONOMOTORS



Though the first electric car was invented in 1828, mass adoption of the vehicles depends on the development of viable technology that allows travel from one charge that is equivalent to a tank of gasoline.

“Overcoming ‘range anxiety’ is critical to significant growth in electric vehicles. With gasoline or diesel vehicles, people know they will get where they want to get to. The infrastructure is there and filling up the tank is never an issue. When people drive an electric vehicle they worry about whether they will have enough charge to arrive at their chosen destination, and a lack of charging points and the time taken to charge a battery make them nervous,” says Jan Zumbach, Head of Business Development for eMobility at Trelleborg Sealing Solutions.

A major technology in electric vehicles is the e-axle, a combined electric motor and gearbox that fits within the traditional engine space. The motor and gearbox are directly coupled but while the gearbox requires efficient lubrication, it is essential that the motor remains dry so a highly reliable seal is required between these two components.

The difficulty is that electric

motors run most efficiently at high speeds. The seal requirements are very different from those for a transmission input on a combustion-engine vehicle. Gasoline engines normally run at 2,000 to 4,000 revolutions per minute (RPM) but the electrically driven transmission typically runs at 16,000 RPM - and in the future this figure is likely to increase significantly. One of the few limiting factors in this system is the lifetime of the shaft seals.

At the moment, since electric cars are only small and tend to run for short distances in urban areas, it is adequate for the electric drive units to operate at relatively low speeds. If electric cars are going to challenge vehicles powered by combustion engines, they need to travel four or five hundred kilometers on one charge – the equivalent to a gasoline vehicle – rather than the average 280 kilometers achieved now.

“The difficulty is that the rotational surface speed limit for traditional seals in the e-axle of today’s electric cars is around 30 meters per second,” continues Zumbach. “The theoretical optimum rotational speed of the e-axle would be greater than 60 meters per second to maximize efficiency, a speed that is currently impossible to achieve.”



A milk float is a vehicle specifically designed for the delivery of fresh milk.



Electric – is it really a new idea?

Introduced in the 1940s in response to a shortage of cart horses and a need for increased efficiency, the electric milk float became a welcome and familiar sight on the streets of the UK. In August 1967, the UK Electric Vehicle Association put out a press release stating that Britain had more battery-electric vehicles on its roads than the rest of the world put together, and almost all of those were milk floats.

The Sion from Sonomotors can charge its battery using solar power.



To help solve this issue, Trelleborg practiced agile product development to speed the development of an effective sealing solution for the demanding conditions of the e-axle that would run at 40 meters per second.

“The resulting solutions are HiSpin™ PDR RT and HiSpin™ HS40,” says Zumbach. “Testing was extremely positive, with both solutions running at or exceeding 40 meters per second. There was zero leakage despite the very demanding conditions and HiSpin™ PDR RT recorded a 75% reduction in friction versus a standard PDR seal and proved to be capable of operating at 60 meters per second.” ■

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More than just cars

Most of the talk about electric vehicles focuses on the car, but eMobility is more than this one form of transport. At the moment, less than 5% of cars are electric but already in 2018, 20% of bicycles and 15% of motorcycles were electrically driven. Buses are the other big early-adoption success story, with 15% of electric vehicles operating in urban areas.

Although electric cars are expected to make up 40% of the total global vehicle population by 2025, 60% of bikes, 50% of motorcycles and 30% of the world's buses will also be electrically driven.

70%

70% of an electric vehicle's parts may be different from those of a gasoline-powered vehicle.

250

An electric drive system has around 250 parts rather than the 4,000 required in a traditionally fueled car.

3.1 million

There were 3.1 million electric vehicles on the roads globally in 2017.

220 million

There are expected to be at least 125 million and potentially up to 220 million electric cars on the road in 2030.



Seal, damp and protect

Trelleborg is a world leader in engineered polymer solutions that seal, damp and protect critical applications in demanding environments. Our innovative engineered solutions accelerate performance for customers in a sustainable way.

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